VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.



LAB REPORT

on

OBJECT ORIENTED JAVA PROGRAMMING

Submitted by

SHASHANK RAVINDRA(1BM23CS312)

in partial fulfillment for the award of the degree of BACHELOR OF ENGINEERING

in COMPUTER SCIENCE AND ENGINEERING



B.M.S. COLLEGE OF ENGINEERING
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(Affiliated To Visvesvaraya Technological University, Belgaum)

Department of Computer Science and Engineering



CERTIFICATE

This is to certify that the Lab work entitled "OBJECT ORIENTED JAVA PROGRAMMING" carried out by SHASHANK RAVINDRA KARANAM(1BM23CS312), who is bonafide student of B. M. S. College of Engineering. It is in partial fulfillment for the award of Bachelor of Engineering in Computer Science and Engineering of the Visvesvaraya Technological University, Belgaum during the year 2024-25. The Lab report has been approved as it satisfies the academic requirements in respect of Object-Oriented Java Programming Lab - (23CS3PCOOJ) work prescribed for the said degree.

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

```
Lab Program 1:
Develop a Java program that prints all real
Solutions to the quadratic equation ax2+bx+c=0.
Read in a, b, c and use the quadratic formula.
If the discriminate b'- hac is negative, display
a message stating that there are no real
Solutions.
impost java util scores;
class quadratic ?
   float d:
   Scanner Sc = new Scanner (System in)
   void check()

    System. out. prints ("Enter valves of a,b&c

      Int a = sc.nex+Int();
      in+ b = sc nex+ m+ ();
      intc = sc. next (nt();
     if (a==0)1
     System out println ("Invalid equation");
     elsek
         d= b*b - 4a*c;
         System out println(d);
         System but printin ("The solutions asso
         if (d >0) <
           system out print ("Roots unique");
           double 81 = (-b+ math sqr+(d))/12+a
           double $2 = (-b- math. sqx+(d))/(2*a)
```

PAGE NO DATE system out println (11+" "+ Y2) if (d=oK System out println L"Roots and equal) double 8 = -b/(2*2); System. out println(x); if (d < 01 { System out print In I "No real solutions Public class Main & public static void main (String [7 0298) quad ratic q1 = new quad ratic(). 91. check(); Output : Entex the values of a,b, and c : Discominant: 0.0 The solutions are: Roots and equal

```
Soft copy of the program
import java.util.Scanner;
class Quad_Eq_cal{
public static void main(String [] args){
int y=0;
Scanner sc=new Scanner(System.in);
System.out.println("General form of a quadratic equation is ax^2+bx+c=0");
do{
System.out.print("\nEnter value of a=");
int a=sc.nextInt();
System.out.print("Enter value of b=");
int b=sc.nextInt();
System.out.print("Enter value of c=");
int c=sc.nextInt();
float d=(float)(Math.pow(b,2)-4*a*c);
if(d<0)
System.out.println("There are no real solutions");
else if(d==0){
System.out.println("It has one repeated root(2 equal roots):");
float r = -b/(2.0f*a);
System.out.println("x="+r);
}
else{
System.out.println("It has two distinct roots:");
double r1=((-b+Math.sqrt(d))/(2*a));
System.out.println("x1="+r1);
double r2=((-b-Math.sqrt(d))/(2*a));
System.out.println("x2="+r2);
System.out.println("\nDo you want to calculate again?(yes=0 and no=1): ");
y=sc.nextInt();
\}while(y==0);
OUTPUT:
    General form of a quadratic equation is ax^2+bx+c=0
    Enter value of a=2
    Enter value of b=4
    Enter value of c=7
    There are no real solutions
```

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

```
PAGE RO
Lab Program 2:
Develop a lab program to create a class
Student with members usn, name, an array
exedits and an array marks. Include
methods to accept and display details and
a method to calculate SGPA of a student
impost java util scances:
public class capa (
 public static void main ( string [ ] args ) {
   Scannex scannex = new scannex (System in)
  System out point I" Enter the number of
   subjects:"):
  int numsubjects = scanney next Int ():
  double [] grade Points = new double (num subjets
  in+[] credits = new in+ [num subjects]:
  int total credits = 0.
  double total = 0;
  for (int i = 0; is numsubjects; i++){
      System out print ("Enter grade points"+(i+)+"
      grade Points[i] = Scanner next Double().
     System. out. println ("Credits"+(+1)+":")
     credits [i] = Scanner nex+ Int U;
      +o+a| + = grade Points[i] * credits[i];
      total (redits + = (redits [))
```

163 55		PAGE NO DATE
-		
-	double sapa = total/total	L Crodi
	System out printing your	GPA : "
	no from the analysis of a	The state of the s
1000	co 3 is some well standard there	Just 11
	shell she shear party its care	
The state of	Output:	Links
- skuple	Enter the number of Subjects: 8	
	Enter grade points for subject 1:9	
	" credits " " ; 4	
-	" grade " " " 2:10	
	" Coedits in it is it	
100000000000000000000000000000000000000	11 grade 11 11 11 3:9	
	" credits " " " " " "	
	11 grade 11 11 11 4:8	
-	1 113	
	11 grade 11 11 5:9	
Established III	11 grade 11 11 6:10	
	11 credits 11 11 11 11 11:2	
	" frade " " 7: 10	
	u credits " " " " 1	
	4 gode , 4 11 8: 10	
1	u explis " " " " "	9 1
210/11/2019	Steep out of the first warmen	
Y	our SGPA is 9.22727272727	2
170000		
	M. Jun	
	July 1	
The same of the sa		
	TO THE RESERVE OF THE PARTY OF	
	1.00	

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 {
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;
double SGPA = 0.0;
for (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[] arg) {
Scanner sc = new Scanner(System.in);
System.out.print("Enter number of semesters: ");
int numSems = sc.nextInt();
Student[] students = new Student[numSems];
double cumulative SGPA = 0.0;
System.out.print("Enter USN: ");
String usn = sc.next();
System.out.print("Enter Name: ");
String 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 semSGPA = students[i].calSGPA();
cumulativeSGPA += semSGPA;
}
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());
}
double CGPA = cumulativeSGPA / numSems:
System.out.println("CGPA: " + CGPA);
C:\3rd_sem\JAVA\Programs\lab>java StudentDetai
Enter number of semesters: 1
Enter USN: 1BM23CS312
Enter Name: Shashank
Enter details for semester 1
Enter marks for subject 1: 81
Enter credit for subject 1: 4
Enter marks for subject 2: 92
Enter credit for subject 2: 4
Enter marks for subject 3: 89
Enter credit for subject 3: 4
Enter marks for subject 4: 91
Enter credit for subject 4: 3
Enter marks for subject 5: 67
Enter credit for subject 5: 3
Enter marks for subject 6: 78
Enter credit for subject 6: 2
Enter marks for subject 7: 98
Enter credit for subject 7: 1
Enter marks for subject 8: 97
Enter credit for subject 8: 1
USN: 1BM23CS312
Name: Shashank
SGPA for sem 1: 9.045454545454545
CGPA: 9.045454545454545
```

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

4	
+	Lab program 3:
	Cxeate a class Book which contains four
-	members: name, author, price, num_pages, Include a constructor to set the values for the
1	members. Include methods to set and get
	the details of the objects include a tostring () method that could display the complete
*	details of the book Develop a Java program to execute n book objects.
	sample "La astenia " same " la rechio
-	impost java util sconnes;
	class Book {
-	private string name;
	private clouble price;
	projecte int numPages;
	and the Party Chairman age of the south and a suite state
	public Book (String name, String author, double police, int numpages) (
	this name = name;
-	this author = author;
-	this price = prince;
	+his. num Pages = num Pages :
	3
	Public void set Details (string name, String author
	double price, int num Pages) of
-	this name = name;
	this author = author;

```
this price = price;
          this numPages = numPages;
  Public String get Details () {
        return to String U;
 public string to to String() X
      zetum " Book Name: "+ name+ ", Author: "+
       author + ", Price: " + proice + ", Pages:"+
       num Pages:
public class Book Demo (
   public static void main (String (70995)
      Scanner Seanner - New Scanner (System.in
     System out paint ("Enter po of books: "
     int n = scanner -next Int ();
     Scannex next line()
     Book () Books = new Book (n);
     For (int i=0; i<n; i++) <
         System out, point in I" Ent. " + (i+i) + ":
         System . out . print ("Name: ") .
         String name : Scanner nex+line().
         System out - print ("Author:");
        String author = Scannex . next uppl):
        System out . Doint (" Police: ")
```

갂	DATE:
4	
4	double price = Scanner next Double():
4	System Date Daint ("Number of a")
4	THE THIRD TURES - SCORDER MAY INTE
4	scanner next line ();
	The state of the s
	books(i) = new Book (name, author, price,
	num Pages);
	System out printing books (i) getdetails()).
	y and the second of the second
	Scannet close();
	Y 21 Manual Control of A Manual Control
	y man with the same
	Output:
Т	
	Enter number of Baks 2
	Enter dutals jet book 1:
	Name : ABC
	Author: DEF
	Price : 230
	Number of Pages: 450
	Book Name : ABC , Author : DEF, Price : 130 , Pages : 452
	Date Traine Bot, Halles Der, Paice Bo, lags. 180
	Enter defails la book 2:
	Name: XYZ
	Author: MNO
	Price: 410
V	Number of Pages: 700
1	Roy Kales VV2 Author America Comments
110	Book Name: XYZ, Authol: NNO, Price: 40, Roges: 20

```
java.util.Scanner;
class Book {
  String name, author;
  double price;
  int noPage;
  Book() { }
  Book(String name, String author, double price, int noPage) {
     this.name = name;
     this.author = author;
     this.price = price;
     this.noPage = noPage;
  }
  void setDetails() {
     Scanner sc = new Scanner(System.in);
     System.out.println("Enter name of book: ");
     name = sc.nextLine();
     System.out.println("Enter author name: ");
     author = sc.nextLine();
     System.out.println("Enter price of book: ");
     price = sc.nextDouble();
     System.out.println("Enter number of pages: ");
     noPage = sc.nextInt();
  void getDetails() {
     System.out.println("Name of book: " + name);
     System.out.println("Author: " + author);
```

```
System.out.println("Price: " + price);
     System.out.println("Number of pages: " + noPage);
  public String toString() {
     return "Book name: " + name + "\n" + "Author: " + author + "\n" + "Price: " +
price + "\n" + "Number of pages: " + noPage + "\n";
class MyBook {
  public static void main(String[] args) {
     Scanner sc = new Scanner(System.in);
     System.out.println("Enter number of books: ");
     int n = \text{sc.nextInt()};
     sc.nextLine();
     Book[] books = new Book[n];
     for (int i = 0; i < n; i++) {
       books[i] = new Book();
       System.out.println("Enter details for book " +(i + 1));
       books[i].setDetails();
       books[i].getDetails();
     System.out.println("All book details: ");
     for (Book book : books) {
       System.out.println(book);
```

```
Enter number of books:
3
Enter details for book 1
Enter name of book:
Reema Thareja
Enter author name:
Reema
Enter price of book:
435
Enter number of pages:
600
Name of book: Reema Thareja
Author: Reema
Price: 435.0
Number of pages: 600
Enter details for book 2
Enter name of book:
Elmashree Navathe
Enter author name:
Elmashree
Enter price of book:
678
Enter number of pages:
1000
```

ALL DOOK GETAILS:

Book name: Reema Thareja

Author: Reema Price: 435.0

Number of pages: 600

Book name: Elmashree Navathe

Author: Elmashree

Price: 678.0

Number of pages: 1000

Book name: Forest of time

Author: Ruskin Bond

Price: 124.0

Number of pages: 78

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

	LAB program 4:
2	Develop a Java program to credit an
	atotaatt class named shape first
	contains see integers and an empty
	messed named punishmail, fronte
	the dated formed restory's intary's
	tibile buth that than one of those
	Charge calends the cast Shape fact
	Stirk of the Classess contours only the
	roched paint Direct bload to bed to
	come a significant straight.
	import jara util sources
	Observate closs Strope (
	ine dan 1, dan 2;
	abstract void partfirmall,
	class Receingle attents Shape to
	public Recession of the Autor of A
	ma dim to I
	And direct ou
	1
1	void paint fixes (1)
ł	int assaudioni * dim z
Ī	System Cur gratto I for least
ł	grand a " - alea);
ŀ)

public Triangle (Int b, Int b) 2 this dim 1 = b; this dim 2 = b; void print Axea() 4 float area = 0.5 * dim 1 * dim 2; System. out println ("Triangle area = "+ area *): class circle extends shape { private fire public circle (int x) 4 this dim 1 = 7; y void print Axea() { math pix dim 1 * dim 1	public Triangle (int b, int b) ? this. dim 1 = b; this. dim 2 = b; y void point Axea() 4. float axea = 0.5 * dim 1 * dim 2; System. out pxintln ("Triangle axea = "+ axea*). class cixcle extends shape { private fire public cixcle (int x) x this. dim 1 = v; y void point Axea() { float axea = Math. pix dim 1 * dim 1 System. out. point ln 1 " Lixcle axea: 1 oxea); b	+	class Triangle extends shaped
this dim 1 = b; this dim 2 = b; void print Axea () float axea = 0.5 * dim 1 * dim 2; System out println ("Triangle axea = "+ axea *). class cixcle extends shape { private fire public cixcle (int x) x this dim 1 = 0; Void print Axea () { float axea = Math pix dim 1 * dim System out print In 1 " Lixcle axea 1 oxea); b	this dim 1 = b; this dim 2 = b; void print Axea () \(\) float axea = 0.5 * \(\) System out println ("Triangle area = "+ area *). class circle extends shape \(\) private fire public circle (int x) \(\) this dim 1 = \(\); Void print Area () \(\) float area = Math pix dim 1 * \(\) System out print In 1 " \(\) \(\) system out print In 1 " \(\) \(\) \[\] \	+	oublic Triangle (intb, int h) 1
this. dim 2 = b; void print Axea()/ float axea = 0.5 * dim 1 * dim 2; System. out :pxintln("Triangle axea = "+ axea *). le class cixcle extends shape { private fine public cixcle (int x) x this. dim 1 = 0; Void print Axea() { float axea = Math. pi.x dim 1 * dim System. out. print In 1 " Lixcle axea + oxea); b	this dim 2 = b; void print Axea() 4 float axea = 0.5 * dim 1 * dim 2; System out println ("Triangle axea = "+ area *): class cixcle extends shape { private fire public cixcle (int x) x this dim 1 = 0; y void print Axea() { float axea = Math pi * dim 1 * dim 1 System out println 1 " lixcle axea: 1 axea); b	+	this dim 1 = b;
void print Axea () . float axea = 0.5 * dim 1 * dim 2; System. out pxintln ("Triangle axea = "+ axea *). class cixcle extends shape { private fire public cixcle (int x) x this dim 1 = 0; void print Axea () L float axea = Math. pix dim 1 * dim System. out. print ln 1 " lixcle axea + oxea); b	void print Axea () \(\) float axea = 0.5 * \(\) \(+	this dim $2 = b$;
System out println ("Triangle orea = "+ area"). Le class circle extends shaped private fire public circle (int x)x this dim 1 = 0; Void print Area() L float orea = Math pix dim 1 + aim System out println 1 " Lircle area 1 orea);	System.out.pxintln("Triangle osea="+ area"): le class cixcle extends shape of private fire public cixcle (int x)X this.dim 1 = 7; y Void print Area() \(\) float onea = Math.pi.x.dim 1 * Aim 1 System.out.println1" Lixcle onea: 1 onea); b	+	le d'anni
System. Out : pxintln ("Txiangle osea = "+ area"). class cixcle extends shaped private fire public cixcle (int x)X this dim 1 = 0; y void print Area() { float onea = Math: pix dim 1 + aim System. Out. print In 1 " Lixcle area + onea); b	System.out.pxintln("Triangle osea = "+ area"): le class cixcle extends shape of private fire public cixcle (int x)X this dim 1 = 7; Void print Area() { float onea = Math.pi.x dim 1 + flim 1 System.out.println1 " Lixcle onea: 1 onea);	1	void print Axea ()
System.out.pxintln("Triangle area = + area =). le class circle extends shape a private fire public circle (int x)x this.dim 1 = 0; void print Area C) \(\) Float one a = Math.pi x dim 1 x Aim. System.out.println1 "Lircle area 1 one a); b	System. Out-println ("Triangle area" + area"). le class circle extends shape a private fire public circle (int x)x this dim 1 = 0; Void print Area() { float onea = Math. pi x dim 1 x fim 1 System. Out. println 1 " lircle area: 1 onea); b	1	0 -1 0000 - D.S. Malon 1 " CIM)
class circle extends shapes private fire public circle (int x)x this dim 1 = 0; y Void print Area() { Float cova = Math. pi.x dim 1 + aim. System. Out. print In 1 " Lircle area + orea);	class cixcle extends shape { private fire public cixcle (int x)x this dim 1 = 0; y Void print Area() { float corea = Math pi * dim 1 * dim 1 System out print In 1 " Lixcle area: 1 corea);	1	Sustem out println ("Triangle area = +
class cixcle extends shape { private fire public cixcle (int x)x this dim 1 = 0; y Void print Area() { Float cova = Math. pi.x dim 1 * aim. System. Out. print In 1 " Lixcle area + one a); b	class cixcle extends shaped private fire public cixcle (int x)x this dim 1 = 0; y void print Area() { float orea = Math. pix dim 1 + aim 1 System. Out. print In 1 " lixcle area: 1 oreal; b	1	asea 4).
class cixcle extends shapes private fire public cixcle (int x)x this dim 1 = 0; y Void print Area() { Float one = Math. pi * dim 1 * dim System. Out. print In 1 " lixcle area 1 one a); b	class cixcle extends shaped private fir public cixcle (int x)x this dim 1 = 0; y void print Area() { float onea = Math. pi * dim 1 * dim 1 System. Out. print In ("Lixcle area: 1 oneq); b	4	le 31 Acolor algoritation
class circle extends shape a private fire public circle (int x)x this dim 1 = 0; y void print Area() { float cova = Math. pi * dim 1 * dim System. Out. print In ("Lircle area + one a); b	class cixcle extends shapes private fire public cixcle (int x)x this dim 1 = 0; y void print Areac) float onea = Math. pix dim 1 * aim 1 System. Out. print In 1 " Lixcle area: 1 onea);	-	
class cixcle extends shaped private fire public cixcle (int x)x this dim 1 = 0; y Void print Area() { Float one a = Math. pi * dim 1 * dim System. Out. print In 1 " lixcle area 1 one a); b	class cixcle extends shaped private fir public cixcle (int x)x this dim 1 = 0; y void print Areac) \(\) Float onea = Math pi * dim 1 * dim 1 System out print In ("Lixcle area: 1 onea);	+	
private fire public circle (int x)x this dim 1 = 0; y void print Area() \(\) Float one a = Math. pi * dim 1 * dim System. Out. print In 1 " lircle area 1 one a); b	private fir public circle (int x)x this dim 1 = 0; y void print Area() { Float onea = Math. pi * dim 1 * dim 1 System. Out. print In 1 " Lircle area: 1 onea); b	+	alone sixole extends shaped
public circle (int 8)x this dim 1 = 0; y void point Area() { float one a = Math. pi * dim 1 * dim System. Out. print In 1 " Lircle area 1 one a); b	public circle (int x)x this dim 1 = 7; y void print Area() { float revea = Math. pi * dim 1 * dim 1 System. Out. print In 1 " Lircle revea: 1 orea); b		Class crace
this dim 1 = 0; y void print Area() { float onea = Math. pi * dim 1 * dim System. Out. print In 1 " Lircle area 1 onea); b	this dim 1 = 0; y void print Areac) \(\) Float cove = Math pi x dim 1 * aim 1 System out print In 1 " Lircle area: \(\) \(\) \(\) \(\) \(\) \(\) \(\) \(\)	-	parvace (int x)X
Void print Area() \\ Float cova = Math. pi * dim 1 * Aim. System. Out. print In 1 " Lircle area 1 onea); b	Void print Area() { Float orea = Math. pix dim1 * aim1 System. Out. print In 1 " Lircle area: + orea); b	-	this dim 1 = 0.
System out print In 1 " Lircle area + onea);	System. Out. print In 1 " Lircle asea: 1 oreal;	-	The first and a specific to the second
System. Out. print In 1 " lircle area 1 onea);	System. Out. print In 1 " Lircle agea: 1 onea);	-	2000
System. Out. Part in the Care	System. Out. point in the circums of some of the circums of the ci	E	
b + onea);	b + one a);		Sustem. Out. point In 1 " Lircle agea:
j.	ß.		1 0909 1:
		- 20	
		===	P

```
output :
     Entex length of rectangle = 10.
import java.util.Scanner;
abstract class Shape {
  int dimension1;
  int dimension2;
  abstract void printArea();
class Rectangle extends Shape {
```

public Rectangle(int length, int width) {

this.dimension1 = length;

this.dimension2 = width;

```
void printArea() {
     int area = dimension1 * dimension2;
     System.out.println("Rectangle Area: " + area);
class Triangle extends Shape {
  public Triangle(int base, int height) {
     this.dimension1 = base;
    this.dimension2 = height;
  void printArea() {
     double area = 0.5 * dimension1 * dimension2;
     System.out.println("Triangle Area: " + area);
class Circle extends Shape {
  private final double pi = 3.14159;
  public Circle(int radius) {
     this.dimension1 = radius;
     this.dimension2 = 0;
```

```
void printArea() {
     double area = pi * dimension1 * dimension1;
     System.out.println("Circle Area: " + area);
public class Main {
  public static void main(String[] args) {
     Scanner scanner = new Scanner(System.in);
     System.out.print("Enter length of rectangle: ");
     int length = scanner.nextInt();
     System.out.print("Enter width of rectangle: ");
     int width = scanner.nextInt();
     Rectangle rectangle = new Rectangle(length,
width);
     rectangle.printArea();
     System.out.print("Enter base of triangle: ");
     int base = scanner.nextInt();
     System.out.print("Enter height of triangle: ");
     int height = scanner.nextInt();
     Triangle triangle = new Triangle(base, height);
     triangle.printArea();
     System.out.print("Enter radius of circle: ");
     int radius = scanner.nextInt();
     Circle circle = new Circle(radius);
     circle.printArea();
     scanner.close();
```

Rectangle Shape The area is : 10 Triangle Shape The area is : 5.0 Circle Shape The area is: 78.53981633974483

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

1111	and the latest the state of the
impr	ort java util-scanner;
clas	s Account 4
97	private String customer name;
lai.	private int accino;
	protected double balance;
	public Account (String customer name)
116	int acr no, double balance) {
	this customer name = customer name;
	this anno-no = acc-no;
d di	this - balance = balance)
	} - Louisel
	public double get Balance (17
	retien balama:
	Adjust shorter down Assurages and a
	- wieler western striffents Africans
	public vold deposit (clouble amount &
. Surface	if (amount >0) for them
thos	balance to amount;
	System out Drinkin L" Deposited:"
tol de	+ amo un+ li
	Y Cheroperate of
1	else &
	system out println ("Deposit amount must be positive.");
	must be positive!);
0	and the desired to their spirits
-	Warman - sen entire senten
	- Indeposit see

	public vold withdraw (double amount)
	if (amount < = get Balance ()) {
	balance -= amount;
	System.out println ("withdrew:"+
	amount + "balane is: "+ balane).
	Smort else in mintantenna dilleren
- 0716	System out pointly ("In sufficient furds!
	public void clisplay Balance ()4
	System out println ("Current Balana:"
	9
	2 Fillspanish of the
	entelper reduc
_	class Savings Account extends Account (
	private double interest Roste;
	America stable transfer blad stiding
	public Savings Account (String customerName, int
lbel.	interest Rate /
	Super (Clustoma Name, account Number,
1	initial Balance);
	this interest nate = interest nate;
Print	on the Martin and an early 12
	12 Constitution of London
	Public void compute And Deposit Toterest IX
	public void compute and Deposit Interest I'm clouble interest = getBalanal) * interest pot /100}
	de posit linterest).
	4
	Y

=

	•
	class Custent Account extends Account
	private double minimum Balane;
	private double service charge;
	The second secon
4	public current Account (String customer Namo,
4	Int account Number, double initial Ralena
1	clouble minimum Balance, clouble service chaine K
4	Super(customer Name, account Ware, initial Ra
_	this minimum Balane = minimum Baknu;
	this-service though = service warse.
	2 - 112
	y makes 190
	avilled - 2 - para bank
	public class Bank (
	public Static void main (String(7 augs)x
-	Scanner Sc = New Scanner (System.in).
ii.	Sop (" (Ustomer name: 11);
	String name = Sc-nextline();
	SOP (" enter initial balana:"):
	Clouble had once = SC. Mex+ Double.
	SOP ("enter interest rate:");
	clouble interest_rate = sc. Oex+Double);
	SOP 1" Enter Choire: In 1. current accin
	2. Savings arc 1);
	int ch = Sc. next Int();
SI.	SOP (" Cust name: "+ have +" \n Accro-
	number: " + a ccps + " \n");
_	
	Catholic Charles Tours Editors A

switch (ch)K
case(1):
sop("account is current type");
CurrentAccount ca = new
current account (name, accord, balance
minimum babno, service charge);
do < sop (" "):
int c = sc. nex+In+();
ca. check Minimum Balance ();
if (c== 1) 2
SOP("enter:");
clouble a mt = Sc. next boubb().
ca. Cleposit (arnt). 5
esc if(c = =2)2
SOP("enter amount:").
double ant = sc. nex + Don blac)
City A Co. 2016
erse if (C==3) &
ca. display Balana(); 9
elsentin and 1402
System . exit (0);
y while (true)
Cose (2):
System. out. Prin+In ("Savings type"); Savings Account Sa = new Savings
Account (name, accno, balance, interests
do & System out print In ("enter
Choice: In 1. deposit In 2. withdraw

	3. display balane ");
	int CI = SC. next Int();
	if (c1 = =1) {
	System. out. prointln ("enter amount to
	be deposited: ");
	double amt = Sc. nex+Double();
	Sa. deposit (amt); }
	else if (a==a) 1
1	System out println ("enter amount to
	withdraw:");
+	clouble am+ = sc. next Doublec).
1	Sa. withdraw (amt); y
+	
+	else if (ci==3){
+	sa · compute And Deposit Interest (); sa · display Balance ();)
+	
-	else (mass demonstrate at the contract
-	Sys tem · exit(0);
1	· · · · · · · · · · · · · · · · · · ·
	I white (+xue) . my - hall you at
	y ameles ameles
4	
y	of the translation of superior super-
1	and a stanta a comparation
	i e vilsa sagari

	entex customes name : Sujan
	entex accno: 12344667
	enter initial balance: 34567
	enter minimum balance: 1000
	entex interest rate: 2
	enter service charge: 1
	Enter choice:
	1. Current acc strong water
L	2. Savings acc
	1. 1/4-2171 /6 4/4
L	Customer pame: Sujan
L	Account no: 13241667
ŀ	account is current type
ŀ	entex choice:
ŀ	1. deposit
-	2. Withdraw
ŀ	3. display balance
H	2
	enter amount to withdraw: 4567
	withdrew: 4567.0 balance: 30000
e	inter choice : 1
e	nter amount:
0	e posited: 1.0
9	nted choice: 3
C	assent balance: 30061.0

import java.util.Scanner;

```
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+"\n");
    switch(ch){
       case(1):
```

```
System.out.println("account is current
type");
         CurrentAccount ca = new
CurrentAccount(name,acc_no,balance,minimum_bala
nce,service_charge);
         do{ System.out.println("enter choice:\n
1.deposit\n 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){
```

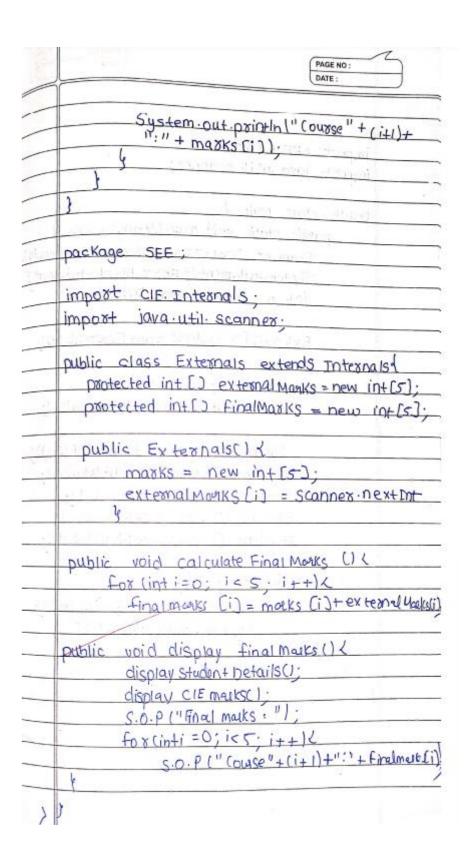
```
System.out.println("enter amount to be
deposited:");
            double amt=sc.nextDouble();
              sa.deposit(amt);}
          else if(c1==2){
            System.out.println("enter amount to
withdraw:");
            double amt=sc.nextDouble();
            sa.withdraw(amt);}
          else if(c1==3){
           sa.computeAndDepositInterest();
            sa.displayBalance();}
          else{
            System.exit(0);
           }while(true);
                  123456789 and Name sushanth is :0.0
Insufficient Balance
Amount of 1000.0 has been debited
Amount of 1000.0 has been debited
Intereset deposited
Amount of 1000.0 succesfully withdrwn
The Balance Of The 123456789 and Name sushanth is :1080.0
The Balance Of The 987654321 and Name likhith is :5000.0
Amounte of 500 withdrawed Succesfully
Penalty Added
Amount of 1000.0 has been debited
Amount of 1000.0 has been debited
Amounte of 1000 withdrawed Succesfully
The Balance Of The 987654321 and Name likhith is :5450.0
```

LABORATORY PROGRAM – 6

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

	Lab Program-6
	Create a package CIE which has two classes.
	has members like USN, Name, son The
-	Three mus an organ that stores
-	internal marks Stored for 5 courses of the current Semester of the student create
	another package SEF which has the class
	External which is a derived class of student.
	Into class has an aggray that staxes the
_	SEE Marks Stored in 5 courses of the
	current semester of the student. Import
_	two packages in a life that declares
	5 cources
4	huld short a start of the side
S.	package CIE;
	impost java. util. scanner; live ildivi
100	BUILDING THE EXPONENT MANIES
	public class Student (
+-	protected String usn:
	protected string name;
	Diotected int sem;
	public void input Student Details () {
_	Scanner scanner = new Scanner (System
1	System out print ("Entex USN: ");
-	usn = scanner nev+line().
	System.out.print ("Enter Name:").

	122	DATE:
	name = s	canned next line ();
_	System	out print ("Enter Semester:")
2000 D	Sem = Sc	annes. Next Int();
	personal systems	Shirt S. D. M. H. Card.
SH	and the pro-	Attached Marketin and A
	public voic	displaystudent Details ()
sill .	System.	aut pointln ("USN: "+USn);
	System	.out. printly (Mame: "+ name).
		out printly ("Semester:" + sea
mi.	J	DO A CHARLEST WAR LOND TO
April 1	}	arme and successful of
150	A Party Service	
	package CIE;	at the first state of
	color of the section	inter requesters so the M
	import java.ut	il·scannex;
	nublic class To	itemals extends students
	protected int	[] marks = new in+ [5];
	public void i	nput CIF marks () {
	Scanner	scanner = new scanner Lsystem
		ut.pxintln ("Enter internal: ").
		i=0; i<5; i++){
_	Sys	tem. out print ("Manks" + (i+1)+"
	· ma	oks [i] = scanner next thell:
	,	
	All Site Standard	- 4 1 1 m 1 m -
6.5	Wall to bear the	000000 1 97400 15
- (11	public void	displayCIE Marks () {
	System.	out.println("Internals:");
- 1	for cint	120:155.1411



	import SEE Externals;
	import java util scanner;
	Public class Main of
	public Static void main (String[] angs)
	Scanner Scanner = new Scanner (Systemin
	System aut print (" Enter no. of Students:" int n = scanner nextint()
	int n = scanner nextInt()
	proposition of the profit of the second
	Externals[) students = new Externals[n];
100	estated Chables etempted early spirit
1.01	for (int i = 0; i < ∩; i++) <
214/1	Student (i] = new Externals();
	System out println (" details: "+ (i+1));
	Students[i] · Input Student Details[).
44.18	Students [i] input CIE macks ().
-	Students (i) input SEE malks ().
	Students (i). calculate Final Madics().
	for (inti=0; ien; i++) (
M En	Students (i) display Firel Marbo)
	System. out print has;
	y prince
	* College of address of the second
	Excess Strong on 21 University
	The second secon
Store or	

Outpu			a recoverable
Enter	no. of student	S: 1	
Enter	details for st	udent 1	
USN:	1BM23CS312		
Name	: ShoshanK		
Semes	Stex: 3		
Inte	inal monks:		
Coug	ise 1 : 78	1 1 1 1 1	
	z : 98	20Te Tel	
	3: 67		Terminal with
	4: 82	e di tol	15676-1
1)11	s : >9	mad 1-05	
Exte	rnal marks:	E10 H	WILL 55
Cou	nse 4: 79		
فيده)	nse 2 : 90	Anna Tarel	water to the
(bus	ase 3 : 39	Jack garde	2/4/2
(bus)	nse 4: 56	or search to	Sur.
Obus	se 5: 89		
USN:	1BM23CS312		
Name	: Shashank		No. 47 Barrier
Semes	Stes: 3	and make	1. 1.
	and the second of	il samid	44-4
Final	marks (Interne	l + External) for J (nuses.
	se 1: 157	MATERIAL SECTION	-0
5 113	2:188		
ii _	3: 106	- 2.50	· 1
Tita	4 · 138		1
*/	5: 168	r to bell	THE STATE OF THE S

CIE/Student.java

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;
File: CIE/Internal.java
package cie;
public class Internals {
public int[] internalMarks = new int[5];
public Internals(int[] marks) {
if (marks.length == 5) {
System.arraycopy(marks, 0, internalMarks, 0, 5);
} else {
System.out.println("Error: Please provide marks for
exactly 5
courses.");
38
File: SEE/External.java
package see;
import cie.Student;
public class External extends Student {
public int[] externalMarks = new int[5];
public External(String usn, String name, int sem, int[]
marks) {
super(usn, name, sem);
if (marks.length == 5) {
System.arraycopy(marks, 0, externalMarks, 0, 5);
} else {
System.out.println("Error: Please provide marks for
exactly 5
courses.");
```

```
File: FinalMarrks.java
import cie.*;
import see.*;
import java.util.Scanner;
public class FinalMarks {
public static void main(String[] args) {
Scanner sc = new Scanner(System.in);
System.out.print("Enter number of students: ");
int n = \text{sc.nextInt()};
Student[] students = new Student[n];
Internals[] internals = new Internals[n];
39
External[] externals = new External[n];
for (int i = 0; i < n; i++) {
System.out.println("Enter details for student " + (i +
1) + ":");
System.out.print("USN: ");
String usn = sc.next();
System.out.print("Name: ");
String name = sc.next();
System.out.print("Semester: ");
int sem = sc.nextInt();
System.out.println("Enter internal marks for 5
courses:");
int[] internalMarks = new int[5];
for (int i = 0; i < 5; i++) {
internalMarks[j] = sc.nextInt();
System.out.println("Enter SEE marks for 5 courses:");
int[] externalMarks = new int[5];
for (int j = 0; j < 5; j++) {
```

```
externalMarks[j] = sc.nextInt();
students[i] = new Student(usn, name, sem);
internals[i] = new Internals(internalMarks);
externals[i] = new External(usn, name, sem,
externalMarks);
System.out.println("\nFinal Marks of Students:");
for (int i = 0; i < n; i++) {
System.out.println("Student: " + students[i].name + "
(USN: "+
students[i].usn + ")");
40
for (int j = 0; j < 5; j++) {
int finalMarks = internals[i].internalMarks[j] +
externals[i].externalMarks[j] / 2;
System.out.println("Course" + (j + 1) + ":" +
finalMarks);
sc.close();
```

```
Enter details for student 1:
USN: 1RV23CS001
Name: John
Semester: 5
Enter internal marks for 5 courses:
18 19 20 17 16
Enter SEE marks for 5 courses:
70 60 80 90 50
Final Marks of Students:
Student: John (USN: 1RV23CS001)
Course 1: 53
Course 2: 49
Course 3: 60
Course 4: 62
Course 5: 41
```

LABORATORY PROGRAM – 7

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

5	class Son Extends Father of
	int SonAge:
	public Son (int father Age int cool -)
	THOUS WOODDAGE EXCEPTION >
	Super (father Age):
	if I sonAge >= father Age Id
	throw new Wrong for Evention (14h)
	DOSSI 6 (1)
	y
	if (son Age < 0) <
-	throw new Wrong Age Exception ("
	can't be neg.");
	9
	this . SonAge = SAge;
	1
	public class Exception Handling Demod
ľ	psym (String [) eags) &
	try
İ	Father father = new Father (40).
	S.O.P ("Son age: "+ son. son Age);
	y // // //
	catch wrong Age exception e)
	S.O. P(" Exception (aught: + egetmes
	/ y
-	
	+xy 1
1	Father invalid Father = New Father (-10)
1	y

	catch (wrong Age Exception e) &
	+ e.get message())
10	ALTON A DESCRIPTION OF THE PROPERTY OF THE PRO
	toy
	Son invalid son = new Son (30,401;
	Ly was harmon and part of the street
44	catch (wronglige Exception e) 1 5.0.P ("Exception caught:"te-getmong
	S.D.P ("Exception caught: te-gethering
)
_	5 32 1000 (52.1)
12.0	no miss and produce and mist of
	reflected ad strain
	Output:
	5 u
	Father created with age: 40
	Son created with age: 20
	Fxception caught: Father's age carnot be
	Exception caught: Son's age cannot be
	greater than or equal to Father's age.
	greates than or equal to raines age.
	eth .
	of Athingsay
	C Collins
	e chilare i i resultane il sur recenti
-	

```
Program 7:
Write a program that demonstrates
handling of exceptions in inhexitance toes.
Create a base class called Father and
dexived class salled "son" which extends
the base class. In Father class, implement
a constructor which takes the age and
throws the exception wrong Age () when
the input age <o. In son's class, implement
a constructor that uses both father and
Son's age and throws an exception if
son's age is >= father's age.
Class Wrong-Age Exception extends Exceptions
    public Wrong Age Exception (string message){
       Super (message);
class Father
    int fatherAge;
    public Father (int-father the ) throws
      Wrong Age Exception
        if (father Age < 0) 1
          throws new Namogage Exuption ("Father
       this father Age = father Age;
class WrongAgeException extends Exception {
public WrongAgeException(String message) {
super(message); } }
class Father {
int fatherAge;
public Father(int age) throws
```

WrongAgeException {

if (age < 0) {

```
throw new WrongAgeException("Father's age
cannot be
     negative!");
      this.fatherAge = age;
      System.out.println("Father's Age: " +
fatherAge); } }
     class Son extends Father {
      int sonAge;
      public Son(int fatherAge, int sonAge) throws
WrongAgeException {
      super(fatherAge);
      if (sonAge < 0) {
      throw new WrongAgeException("Son's age
cannot be negative!");
      if (sonAge >= fatherAge) {
      throw new WrongAgeException("Son's age
cannot be greater than
     or equal to father's age!");
      this.sonAge = sonAge;
      System.out.println("Son's Age: " + sonAge); } }
     public class ExceptionMain {
      public static void main(String[] args) {
      iava.util.Scanner sc = new
java.util.Scanner(System.in);
      try {
      System.out.print("Enter Father's Age: ");
      int fatherAge = sc.nextInt();
      System.out.print("Enter Son's Age: ");
      int sonAge = sc.nextInt();
      Son son = new Son(fatherAge, sonAge);
```

```
} catch (WrongAgeException e) {
       System.out.println("Exception: " +
e.getMessage());
        } catch (Exception e) {
       System.out.println("Unexpected Exception: " +
e);} } }
       PS D:\3rd sem\00J JAVA\Git-hub> java ExceptionMain
       Enter Father's Age: 40
       Enter Son's Age: -10
       Father's Age: 40
       Exception: Son's age cannot be negative!
       PS D:\3rd sem\00J JAVA\Git-hub> java ExceptionMain
       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!
       PS D:\3rd sem\00J JAVA\Git-hub> java ExceptionMain
       Enter Father's Age: -40
       Enter Son's Age: 20
       Exception: Father's age cannot be negative!
```

LABORATORY PROGRAM - 8

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

Program 8:		
-	Ferral Transf	santa Asissa
Noite a po	ogram which	xentes
one thread	displaying "BMS	College of Engineeri
once every	ten seconds	and another
displaying "C	SE" once every	two seconds
	27 1 297	
class BMS	Display extends	Thread (
public	> () aux biov	1-2
whi	le (tone) (V
	System-out-	orintin ("BMS college of
D. Carrier	Engineering "); : +mylan
	Thread-sleep	(10000);
3	banda D. Da	LOSES CALLED
) catch	(Interpupted E	xception e){
	System out prin	Hn(e); 000
4	- A	282
y	2	723
1		122
(4.1)	- prierd to	a college 2 Part
class cseT	haread Implements	Runnable
Thread	t;	2.0
		3,1
	void suntia	25.0
+	ry (19.1
	while (toue) 4	apellot 1977
		·println ("cse");
	The state of the s	ep (2000)
	y	Emples ald
y cato	h (Intersupted	exuption e) {
	Suctem allt.	DXIIII (C. I.

```
public class Demo Thread
            public Static vold main (String [] augs)
               Bms Thread b = new Bms Thread ().
               Runnable ase = new ase Thread ()
               Thread + = new Threact (cse).
               b. start ().
               t1. Stoot ().
      Output:
       BMS college of Engineering
        cse.
       cse.
       cse
       Cse
       Cse
       BMS college of Engineering
       cse.
      Cse
      Cse
      Cse
      Cse
      BMS college of Engineering
      Ge
      Ge
      Cse
      cse
class BmsThread extends Thread{
public void run(){
try{
while (true) {
System.out.println("BMS college of Engineering");
Thread.sleep(10000);
```

}catch(InterruptedException e){

```
System.out.println(e);
class CseThread implements Runnable{
Thread t;
public void run(){
try{
while (true) {
System.out.println("Cse");
Thread.sleep(2000);
}catch(InterruptedException e){
System.out.println(e);
49
public class DemoThread {
public static void main(String[] args) {
BmsThread b=new BmsThread();
Runnable cse=new CseThread();
Thread t1=new Thread(cse);
b.start();
t1.start();;
```

```
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
```

LABORATORY PROGRAM - 9

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

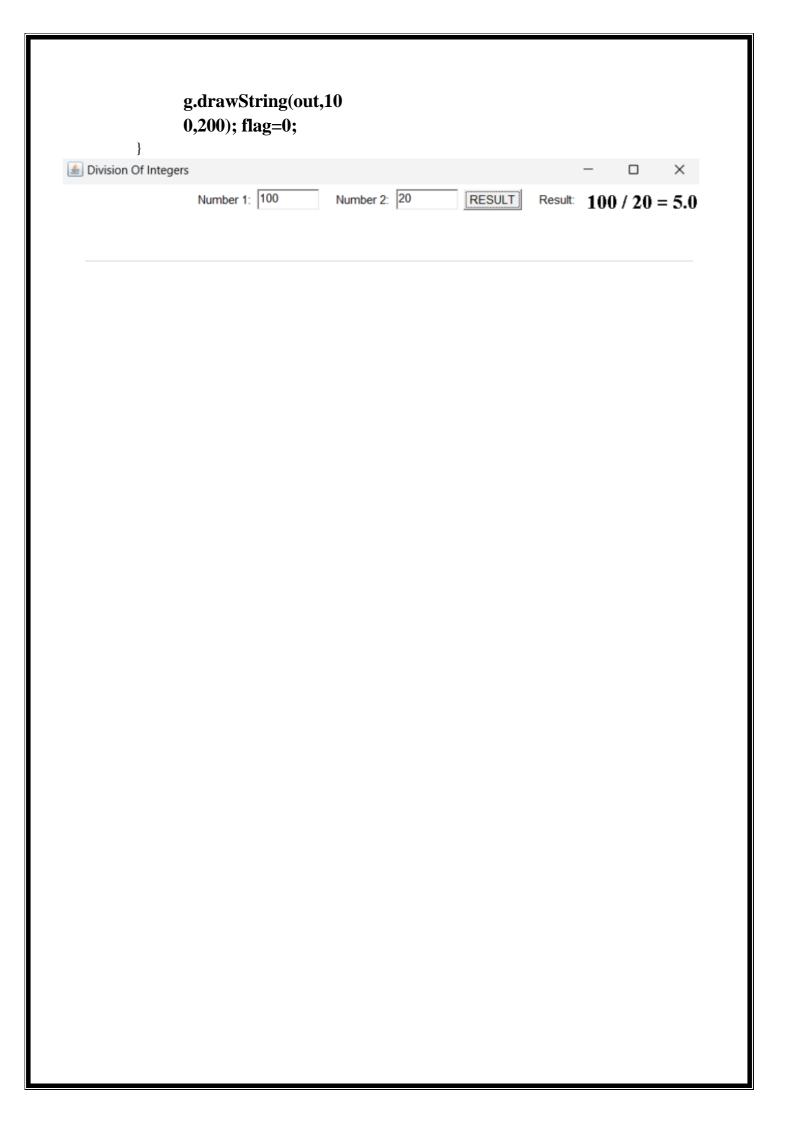
	Program 4:				
-	The state of the s				
_	write a program that creates a user				
-	THE SPACE OF DE OND INTO A STATE OF THE STAT				
_	used enters two numbers in the text				
	BICIUS TOTAL WILL WILM 7 The It.				
	INUITI I CUITO IVITO I LE Aliant				
	DESIGN TICIO WITHI SHIP DAMAA.				
	Clicked. It willy to UX Will 3				
	Number Format Exception. If Num2 were Zero,				
	Number Format Exception IF Num2 were Zero,				
	The Baddadil Would Thiow a Michael				
	Format Exception. If Num 2 were Zero.				
	the program would throw an Anithmetic				
	Exception Display the exception in a				
	message dialog box				
	import java aut +;				
n novel	import jan awt event +;				
5.1	the active tendents and a standard a				
	Public class Maindemo extends Frame imp Aclistered TextField num1, num2;				
	Button d Result;				
	Label out Result;				
	String out = "";				
	clouble result Num;				
	ing start of				
	Public Maindemo() {				
	Set Layout (New FlowLayout ());				
	d Result = new Button ("RESULT").				
	CIKESUT = HEN STATE				

-	: francos :	1
-	Label number 1 = new Label ("Number 1:	-
-	Label Number 12 lieu (Label):	1
-	label RIGHT);	-
431	(abel number = new label ("Number	2
-	(abel-RIGHT);	-
-	reconstraint attraction transfer to the state of the stat	-
	num1 = new Tex+Field(5);	-
_	num2 = new Text Field (5)	-
	out result = new label l"Result:", leb	d.k
-10	add(number 1)	-
-	add (num 1)	_
	add (number 2).	_
35	add (number 2).	_
	add blesuit);	
	add (out result);	
	num 1 · add Action (Istened (this)	
	num2 - addAction Listenes (this):	
	dresult add Action Listened (this);	
	add windows Listener Lnew Window Ada	DA
	public void windowclosing (window	E
á	and some state System exit to be some	
	January January List Has T	
	- Huspan postud	
	Elicals 40 a Hadia C	
	public void action Performed (Action Event a	c.)
	int ni,n2.	
	tru d	
1	if (ae. getSouxael) == dResult/	
	DI = Integer panse Int (num/. get te	xff
	n2 = Integer pause Int (nun 2-get Te	th(
	117 = ILITEGET DOISE INT (INON 2-9GF 18)	-

```
if (n2==0)1
          throw new Arithmetic Exeption ("
            Division by gero "); 5
        result Num = (double) n1/n2.
        OUT = 11 + "/" 12+ "= + result Non.
    3 catch (Number Format el) 1
        flagle; because in the
        OUT = " Number Format Exception! Please
           enter valid";
  public Static void main (String() angs)
    Main demp dm = new Maindemp();
    dm . setSize (new Dimension (800, 400)):
    dm · set Title ("Division of Integers").
   dm . setvisible (toue);
                  Num 2: 120 Result.
      Result = 100/20=50
import
java.awt.*;
import
java.awt.event.*;
public class DivisionMain1 extends Frame implements ActionListener
     TextField
     num1,num2;
     Button dResult;
     Label
     outResult;
     String
```

```
out="";
double
resultNum;
int flag=0;
public DivisionMain1()
     setLayout(new FlowLayout());
     dResult = new Button("RESULT");
     Label number1 = new Label("Number
     1:",Label.RIGHT); Label number2 = new
                           2:",Label.RIGHT);
     Label("Number
     num1=new TextField(5);
     num2=new TextField(5);
     outResult = new Label("Result:",Label.RIGHT);
     add(number1
     );
     add(num1);
     add(number2
     );
     add(num2);
     add(dResult);
     add(outResul
     t);
     num1.addActionListener(this);
     num2.addActionListener(this);
     dResult.addActionListener(this);
     addWindowListener(new
     WindowAdapter()
           public void windowClosing(WindowEvent we)
               System.exit(0);
     });
```

```
public void actionPerformed(ActionEvent ae)
      int
      n1,n2;
      try
           if (ae.getSource() == dResult)
                 n1=Integer.parseInt(num1.getText());
                 n2=Integer.parseInt(num2.getText());
                 /*if(n2==0)
                       throw new
                 ArithmeticException();*/out=n1+"
                  "+n2+" ";
                 resultNum=n1/n2;
                 out+=String.valueOf(result
                 Num); repaint();
            }
     catch(NumberFormatException e1)
           flag=1;
           out="Number Format Exception!
           "+e1; repaint();
     catch(ArithmeticException e2)
           flag=1;
           out="Divide by 0 Exception!
            "+e2; repaint();
      }
public void paint(Graphics g)
      if(flag==0)
     g.drawString(out,outResult.getX()+outResult.getWidth(),outRes
     ult.getY()+outResult. getHeight()-8);
      else
```



LABORATORY PROGRAM – 10

ļ	
	Program 10:
	MIRCH Share 244-4 sport spreads
	Demonstrate Inter process Communica
	and dead lock.
	Decar to the action of the second state.
	class Qf
	int n;
_	boolean valveset = false;
_	Synchronized intget()
	while (! value set) {
	+8U d
	System-out-println 1" In con.,
	walt().
	I catch (Interrupted Exception e) 6
	The state of the s
	Sustem out print In (" Excep-
	System.out.print In (" Exap.
	System. Out print ("Got: "In).
	System. Out print ("Got:"+ D); Yalve Set = false;
	System. Out print In (" Exap. System. Out printh ("Got:" + D); value Set = false; notify ();
	System. Out print In (" Exap. System. out printh ("Got: "In); value Set = false; notify (); return;
	System. Out print In (" Exap. System. Out printh ("Got: "+ D); value Set = false; notify (); return; Synchronized void put (int D)?
	System. Out print In (" Exap. System. Out printh ("Got: "+ D); value Set = false; notify (); return; Synchronized void put (int D)?
	System. out. print In (" Exap. System. out printh ("Got: "In); value Set = false; notify (); vetwon; Synchronized void put (int n) 2 while (value set) (tryk
	System. Out print In (" Exap. System. Out printh ("Got: "In); value Set = false; notify (); return; Synchronized void put (int n) 2 while (value set) (tryk
	System. out print In (" Exap. System. out printh ("(60+:"+ n); value Set = false; notify (); xeturn; Synchronized void put (int n) 2 while (value Set) (tryk S. D. P ("In Produces was; wait ();
	System. out. print In (" Exup. System. out printh ("Got: "In); value Set = false; notify (); return; Synchronized void put (int n) 2 while (value set) (tryk S.O.P ("In Produces wass wait (); Y catch (Interrupted exacts
	System. Out print ("(not: "In); System. Out printh ("(not: "In); value Set = false; notify(); xeturn; Synchronized void put(int n)2 while (value Set) (tryh S.O.P ("In Produces wass wait(); Y catch (Intersupted exapts S.O.P (" (nucht"): "H
	System. out. print In (" Exap. System. out printh ("Got: "In); value Set = false; notify (); setuan; Synchronized void put (int n) 2 while evalue set) (tryk S. D. P. ("In Produces was: wait ();) catch (Intersupted exapte

```
System. out printly ("Put"+n
                     Produces implements
                Produces
                         Thread (this, "Produces"). Start (
               public void runt) &
                    While (ic 15)
                        int r= 9.9e+();
               Pc Fixed K
      class
             Dublic Static upid main (Stoling ages
                   QQ = new Q();
                   new Produces (9):
                   System. Out. println 1"Press (ontool-c
class Q {
int n;
boolean valueSet = false;
synchronized int get() {
while(!valueSet)
try {
System.out.println("\nConsumer waiting\n");
wait();
} catch(InterruptedException e) {
System.out.println("InterruptedException caught");
System.out.println("Got: " + n);
valueSet = false;
System.out.println("\nIntimate Producer\n");
```

```
notify();
return n;
}
synchronized void put(int n) {
while(valueSet)
System.out.println("\nProducer waiting\n");
} catch(InterruptedException e) {
System.out.println("InterruptedException caught");
this.n = n;
valueSet = true;
System.out.println("Put: " + n);
System.out.println("\nIntimate Consumer\n");
notify();
}
class Producer implements Runnable {
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);
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.");
```



ii. Demonstration of deadlock

	Deadlock:
	class Ad . id foo(Bb) d
	String name = Thread · current Threat
	String name = mees
	get Name (); Cystem. out - point n (name + "ented as
	Cystem. our - per - j
1 11-1	thread sleep (1000);
	System but printly ! A Interrupted
11,7	System out proint to (name + "toying to)
	b. 195+ ();
is Denie	and the life of the same of th
	synchromised upid last ()}
	System Out pointh ("Inside A.lest");
	<u> </u>
	Jane 1 to 1 the state of the st
	Class Peodlock implements Rumable 2
	fa = new A(1;
I le-	Bb = news ()
	Deadlock () <
	Thread current thread (). set Namel
	Thread t = new Thread
	t. Start ();
	a. foo (b);
	System. out. proint ("Back in main)
	g

```
public void pun(){
     b. bax (a);
System: out. printin!" Back in other
        thread ");
   public Static void main (String ongs []) {
       new Deadlock(),
 Output:
Main Thread entered A.foo
Racing Thread entered B.ban
 Racing Thread trying to call A last()
 Main thread trying to call Blasf ()
class A
synchronized void foo(B b)
 { String name = Thread.currentThread().getName();
  System.out.println(name + " entered A.foo");
   try { Thread.sleep(1000); }
  catch(Exception e) { System.out.println("A Interrupted"); }
  System.out.println(name + " trying to call B.last()"); b.last(); }
  synchronized void last() { System.out.println("Inside A.last"); }
}
class B {
 synchronized void bar(A a) {
 String name = Thread.currentThread().getName();
 System.out.println(name + " entered B.bar");
 try { Thread.sleep(1000); }
catch(Exception e) { System.out.println("B Interrupted"); }
System.out.println(name + " trying to call A.last()"); a.last(); }
synchronized void last() { System.out.println("Inside A.last"); }
}
class Deadlock implements Runnable
A a = \text{new } A(); B b = \text{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 main thread");
  }
  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(); }
```

MainThread entered A.foo
RacingThread entered B.bar
RacingThread trying to call A.last()
MainThread trying to call B.last()

