VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.



LAB REPORT on

Object Oriented Java Programming (23CS3PCOOJ)

Submitted by

Aarush Garg (1BM23CS004)

in partial fulfillment for the award of the degree of BACHELOR OF ENGINEERING
in
COMPUTER SCIENCE AND ENGINEERING



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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 **Aarush Garg** (1BM23CS004), 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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Department of CSE, BMSCE	Department of CSE, BMSCE

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GitHub Link:

Program 1
Implement Quadratic Equation

L	AB TROUGHM 1 - Quadratic Equation.	
-	CO NOD ANALY	_
19	Import gava. util. *	
H		
P	public class quadratic {	_
10	Public state vold main (string [7 args) }	
H	Scanner scr- new Scanner (System. Pr);	
╀	system. out. paratin ("Enter a:");	
₽	double a = sex, next Double ();	
H	0.000	
H	System. out. pointln ("Enter to:");	
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╁	double co sex nextbouble();	
H	double discriminant = b*b-4*a*c;	
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	P de la constant	
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	Systemout printin ("These are no real estation	nd)"
	9	
	else if (discriminant == 0) }	
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	else {	
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	double root2 = (-b+ Math. sqrt(discriminant))]	1 a)
	System out println ("2 real solution: 11 ="+ root].	4",
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C:\Users\Admin\Desktop>java quadratic1
Enter coefficient a: 0
Enter coefficient b: 12
Enter coefficient c: 23
Not a Quadratic Equation
C:\Users\Admin\Desktop>java quadratic1
Enter coefficient a: 1
Enter coefficient b: 4
Enter coefficient c: 5
There are no real solutions.
C:\Users\Admin\Desktop>java quadratic1
Enter coefficient a: 1
Enter coefficient b: 4
Enter coefficient c: 4
There is one real solution: x = -2.0
C:\Users\Admin\Desktop> AARUSH GARG_1BM23CS004
```

Program 2

SGPA Calculator

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class	Student ?	2
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	String name;	, 8
	int [] credits;	Cample columbic of
	int[] marks; stiles	
	int no-of-subjects;	
210	41 - N. W. W. W. B. Ox 34	(Sar Sar YA)
· Void	details () {	19 Ast *
()	Scanner now = new !	Scanner (System. in);
	System out println ("E	
	usn = sc. nextline();	Notal
11.	System out println ("E	
1.00	name = sc. nextline ()	
-	applea is at a printle	9
	credits = new Int (no	- of - subjects);
	marks = new Int (no.	- 9 - Subjects :
	for (int (=0; i< no.	Q-subject (i++) }
	System out printin	(" Enter massa & Gradity for
	12 " + (Hi) + "	ubject: ");
1000	credity [i] = sc.	
		"Enter marks for (1+1)+" subject i
100	markitil = sc. ne	
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void	display 1 & Cozal	1011 17 143
	System out println ("In	Student Details : 1");
	System out printer (" Us	work under
	System. out. println ("No	mes trant):
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	the contract day)

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for (let i=0; ic no fi subjects; i++) &

system out prints (Subject "(let)": Condition

creditation "Marks " more (17);

global out prints ("seper" a catentore (1);

double coloulate (1) {

int total credit = 0; or of subjects; i++) }

int grade prints = calcap (more (1));

grade prints = calcap (more (1));

grade prints = credity;

grade prints = credity;

for all prints = credity;

return grade prints total credits;

grade prints = credity;

color grade prints;

gr
```

```
public static void main (string C) args): {

Student student - new student (3);

Student detaits (3);

Student detaits (3);

3

SUTPLY

Solve nome: Assumbly (ang the nome: Assumbly (ang the nome: Assumbly (ang the nome: Assumbly (ang the nome) for Subject: 3

Enter works for Subjec
```

```
import java.util.Scanner;
  class Student{
                 String usn;
                  String name;
int[] credits;
int[] marks;
                   int no_of_subjects = 3;
void details(){
Scanner sc = new Scanner (System.in);
System.out.println("Enter USN:");
usn = sc.nextLine();
System.out.println("Enter name:");
name = sc.nextLine();
credits = new int[no_of_subjects];
marks = new int[no_of_subjects];
for(int i=0;i<no_of_subjects;i++){
   System.out.println("Enter credits for" + (i+1) + "subject");
   credits[i] = sc.nextInt();
   System.out.println("Enter marks for" + (i+1) + "subject");
   marks[i] = sc.nextInt();
}</pre>
 credits - new int[no_of_subjects];
 void display(){
void display(){
System.out.println("\n Student Details: \n");
System.out.println("USN:" + usn);
System.out.println("Name:" + name);
System.out.println("Subjects & Credits:");
for(int i = 0;ixno_of_subjects;i++){
System.out.println("Subject " + (i+1) + ":Credits = " + credits[i] + ",Marks = " + marks[i]);
System.out.println("SGPA: " + calculate());
double calculate(){
int totalcredits - 0;
double grade_points = 0.0;
for(int j=0;j<no_of_subjects;j++){
int gradepoints = calcgp(marks[j]);
grade_points += gradepoints * credits[j];
totalcredits += credits[j];
 return grade_points/totalcredits;
```

```
int calcgp(int marks){
   if (marks>=90){
    return 10;
   }
   else if (marks>=80){
    return 9;
   }
   else if (marks>=70){
    return 8;
   }
   else if (marks>=60){
    return 7;
   }
   else if (marks>=50){
    return 6;
   }
   else if (marks>=40){
    return 5;
   }
   else if (marks>=40){
    return 5;
   }
   public static void main(String [] args){
    Student student1 = new Student();
    student1.details();
    student1.display();
    Student student2 = new Student();
    student2.display();
    Student student3 = new Student();
    student3.details();
    student3.details();
```

```
C:\Users\Admin\Desktop>javac Student.java
C:\Users\Admin\Desktop>java Student
Enter USN:
1BM23C5004
Enter name:
Aarush Garg
Enter credits for1subject
4
Enter marks for1subject
90
Enter credits for2subject
37
Enter marks for2subject
38
Enter marks for3subject
90
Student Details:
USN:1BM23C5004
Name:Aarush Garg
Subject 2:Credits = 4,Marks = 90
Subject 1:Credits = 3,Marks = 87
Subject 2:Credits = 3,Marks = 90
SGPA: 9.7
Enter USN:
1BM23C5012
Enter name:
Ashish Solanki
Enter credits for1subject
4
Enter marks for2subject
39
Enter marks for2subject
30
Enter credits for2subject
30
Enter credits for2subject
31
Enter credits for3subject
32
Enter marks for3subject
33
Enter marks for3subject
34
Enter marks for3subject
35
Enter marks for3subject
36
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37
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38
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Book Class

	WEEK-3	Page
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	for (int 1-0; len; in SOP ("Entre rame String name = 1) SOP ("Entre autor Hing autor = 1; SOP ("Entre price of	A Book" *(i+) + ":") A Book * (i+) + ":") Book * (i+) + ":")
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	for (int 1-0; len in SOP ("Enter rame String name = in SOP ("Enter gutter iting author = in SOP ("Enter price of int price = in enter sor ("Enter myles Int numfager = in enter books [i] = new & \$OP(" \n Book Details"); for (took book : books); \$OP(" \n Book : books); \$OP(book); \$ there ();	Book " ((is) 4 ":) Book " ((is) a ":) book ((is) a "is) a" book ((is) a "is
	for (int 1-0; len in SOP ("Enter rame String name = in SOP ("Enter gutter iting author = in SOP ("Enter price of int price = in enter sor ("Enter myles Int numfager = in enter books [i] = new & \$OP(" \n Book Details"); for (took book : books); \$OP(" \n Book : books); \$OP(book); \$ there ();	Book " ((is) 4 ":) Book " ((is) a ":) book ((is) a "is) a" book ((is) a "is
	for (int 1=0; (cn; in SOP ("Enter rame String name" = s. For ("Inter author String name" = s. For ("Enter price" int price = snuttre sor ("Enter price" sor ("Enter price") sor	A Book "+(i+) 4":) A Book "+(i+) 4":) Book "+(i+) +": Logy "+(i+) +":
18	for (int 100; (cn) is SOP ("Enter rame String name" : s.) For ("Inter author String name" : s.) For ("Enter price author int price = snutter sor ("Enter price and some author books [(1] = new Boo SOP ("In Back Details); for (Rock books); SoP ("No Back Details); J. (Lace t); Sor (Lock book); Sor (Lock books); Sor (Lock bo	A Book " ((is) a ":) A Book " ((is) a ":) Sook () Book " ((is) a ":) Book " ((is) a ":) A Book " ((is) a ":) Book " ((is
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```
Enter the number of books: 3
Enter name of book 1: Pride and Prejudice
Enter author of book 1:
Jane Austen
Enter price of book 1:
890
Enter number of pages in book 1:
677
Enter name of book 2: The Great Times
Enter author of book 2:
Charles Darwin
Enter price of book 2:
Charles Darwin
Enter number of pages in book 2:
800
Enter number of pages in book 2:
800
Enter number of book 3:
800
Enter number of book 3:
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Enter number of book 3:
800
Enter number of pages in book 3:
800
Enter number of book 3:
800
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Program 4 Abstract class Shape

Algorithm:
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WEEK-4
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public Snape () was directe, intester (
this dimberos
this oline = 0;
fublic shape (int din1, int din2) {
this distraction 190%
2 this, dlu 2 = dlu 2 ;
g public abstract void pointArea (1);
3 10 10 10 10 10 10 10 10 10 10 10 10 10
class rectangle extends shape {
public rectargle (Int len 1 th wilder) &
public rectargle (int len, int width) &
a sent solding of coders and
public void printarea () & show and
Int area = din * din 2 :
3 sop ("Area of rectangle: " + area); sour
3 whereful by abid anor you
Author vary: San more
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Poge
class treangle extends shape ?
public toplangle (int base, int height) {
to the din ar height;
Carlbert Dand care - Mills squell
public word print Area () {
soft " Area of triangle: " + area)
3
3
class circle entereds shape &
(The state of the
dint = radius;
9
public used pint Area () { dint dint ; t
SOP("Area glirde:"+ area);
3
3
public class shapes & promise from promise pro
Scanner in = new scanner andrew in 1:
SDP ("Enser length & width of Rectargle:");
Int Un = In. MOUTINT();
not width 2 in next Int();
Shape Hertangle - new rectangle (len, windth); rectangle printhrea ();
SOP ("Enter base & height of Friangle:");
int have = in. nentint();
int height = in. rent Int ();
Shape Triangle: nun triangle (book, reight);

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triangle printings (17th: ");

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(nt radius - in months ();

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(interprintings ();
```

```
import java.util.Scanner;
abstract class Shape {
    int dim1;
    int dim2;

public Shape() {
        this.dim1 = 0;
        this.dim2 = 0;
}

public Shape(int dim1, int dim2) {
        this.dim2 = 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 Irlangle extends Shape {
    public Iriangle(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;
        dim2 = 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();
    }
}
```

```
Enter length and width for Rectangle:
12
16
Area of Rectangle: 192
Enter base and height for Triangle:
12
6
Area of Triangle: 36.0
Enter radius for Circle:
36
Area of Circle: 4071.5040790523717
C:\Users\Admin\Desktop>AARUSH GARG_1BM23CS004
```

Program 5 Bank Class

```
WEEK- 5
  # BANK
        class Account {
                  private string name;
private string account;
private double bal;
              public Account ( storing name, storing account doubt but) {
                this name name;
                this account = account
           public void deposit (double ant) {;
                       bal+= aut;
                       lout (" Deported" + am+);
                   else &
                       sout ("Towalid deposit");
          public void display Bali) {

Sout ("Balanu" + bal);
           public world withdraw (double ont) { { lant 70 & 8 ant <- bal) {
                            bal- =ant;
                              jout (" withdraw: "+ ant);
                                  7 1 Tob 30 5
                     elve ! sout (" Insufficient Fund ");
                     public double get Ball () {
                       public usid set Bal (double tal) {
                       I thur bod = bal)
         Class Sav Act extends Account &

private stable final double int xate = 0.05;

public Sav Act (String saw, String account, double be)

que duper [ row, account, boll )
                double indeuent () }

double indeuent = getPart() * Part rate;

letPart (getPart) + interest);

lout ("Takust added : " + interest);
         class lurAct extends Account {
               private chatic final double win-bal = 500;
private chatic final double perolly = 50;
public current litting rosses, thing accounts, double bal) of
duper (name, account bal);
                public woid withdraw (double ant) }
                   Tour 0 88 getsal () - and ~ 0) {

Settal (getsal () - ant);

sout ("withdraw: " + ant);
                         Check MinBal ()
                     else f
                       Sout ("Insufficient hund");
```

```
rh (quithall) < Min. bod () {

rh (quithall) < Min. bod () = penalty );

sout ("Boton minibalanu penalty" + proly);
public class Bank &

public class Bank &

public crottle vaid vair ( string 62 args) &

SavRet - navace - new SavRet ( Rabo) "Rebuild", 1000)

Complet curace - new Goract ( Rabon "Rebunild", 100)
                     Sout ("Savings Account?");
SavAnt. deport (100);
SavAnt. adaptit (100);
SavAnt. add Interest (1);
SavAnt. add Interest (1);
SavAnt. adisplay Bal (1);
                     CONFIC Appart (1979);

CONFACT Appart (1979);

CONFACT Adoption (1979);

CONFACT ADOPTION (1979);

CONFACT ADOPTION (1979);

CONFACT ADOPTION (1979);
               Savinge Account!

Deposite: (50).0

Colony: (50).0

Survey+ odded: 86.0
                Withdraw: 200.0
                Balance : 305.0
                Current Account:
               eposited: 1000.0.
              Withdraws: 1000.0
              belove: 10000
               Withdraw: 200.0,
```

```
double interest = getBal() * int_rate;
setBal(getBal() + interest);
System.out.println("Interest added:" + interest);
class CurAct extends Account{
    public static final double win_bal = 500;
               public static final double penalty = 50;
public CurAct(String name, String accnum, double bal){
    super(name, accnum, bal);
              public void withdraw (double amt){
   if (amt>0 && getBal() - amt>=0){
      setBal(getBal() - omt);
      System.out.println("Withdraw: " + amt);
}
                                            checkMinBal();
                                           System.out.println("Insufficient Funds");
               private void checkMinBal(){
                             if (getBal() < win_bal){</pre>
                                          setbal(getBal()-penalty);
System.out.println("Below min balance, penalty: "+penalty);
public class Bank{
              class bank(
public static void main(String[] args){
    SavAct savacc = new SavAct("Rahul","Rahul13",1000);
    CurAct curacc = new CurAct("Rohan","Rohan14",500);
    System.out.println("Savings Account: ");
    savacc.deposit(500);
                             savacc.displayBal();
                             savacc.addInterest();
                             savacc.withdraw(200);
                             savacc.displayBal();
                             curacc.deposit(1000);
curacc.displayBal();
                             curacc.withdraw(1000);
                            curacc.displayBal();
curacc.withdraw(200);
```

```
C:\Users\Admin\Desktop\src>java Main
Student 1 Info:
USN: USN123
Name: Alice
Semester: 3
Internal Marks:
20 30 25 28 22
External Marks:
60 70 55 65 50
Final Marks (Internal + External):
80 100 80 93 72

Student 2 Info:
USN: USN124
Name: Bob
Semester: 3
Internal Marks:
18 25 20 23 28
External Marks:
50 65 60 58 45
Final Marks (Internal + External):
68 90 80 81 73
```

Packages CIE and SEE

MEEK-6	bete//_
-	
	Student java
_	Declared at
_	public class student ?
_	public class student?
	public stoing usn;
	public string name; public int sem;
	public int son;
	and touch a
	Oublic thids of their and the
	public student (string usn, strling name, int con) {
	this, was nen;
	this mans = name;
	Hux. sen = sen ,
- 1	
24.7	public void display (Induting () {
	Sout (" Usn: "+ ven);
	public woid display (triduction () () () Sout (" vs. 0: "+ vs. n);
	Sout (" Semester: " sens);
	4
	2 manual style Emales Super 2 L
	and the state of t
2.	et
W.	Externals Jana
-	21 2 3 3 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1
	pockage cie;
-	public class Enternals entends student &
	public inters internal Marks - new Put [0];
	qublic Shhelmalo (string van, String name, Int seas, int c)
	Internal Had
	[super (user, name, sen);
	this. Inhernal Marks: Internal Marks;
	5 March our brane
	public word display Internal Marks U.S.
	Sout ("Internal Marks: ");
	1.
	Pap
-	for (int malk: internal realts) (
-	for (mark + " ");
	1 tour chairs
	The the said the
	System out, private ();
	3 my gold thing
	5 come youth about
3.	S grade girls allery
3.	
3.	Educat java
3.	External favo
3.	Futural java factoria see:
3.	Sukunal java Salkage see; import cie. suudent; import cie. suudent;
3.	Subtract java factorist cie. Sudert; public clast teteral extends condect [public list co extends must - new int [5];
3.	Subtract favo package see; import cic student; public last tuberal restorals student (public inter contental table - new int (5); public cultural fished year student and int see.
3.	Sukunal java Salkage see; import cie. suudent; import cie. suudent;
3.	Subtral java package see; import sie student; public than Enteral extends student (public int so external Make - new Int (5); public int so external Make - new Int (5); public enternal (String ven, thing come int see, int so automathable) (
3.	Subtract java fackage see; import sie student; public that Enternal extends student (public int so enternal Harles - new Int (5); public external (Littling view, Milling many, int see, public external (Littling view, Milling view, Milling view, many, see,)
3.	Subtral java package see; import sie student; public than Enteral extends student (public int so external Make - new Int (5); public int so external Make - new Int (5); public enternal (String ven, thing come int see, int so automathable) (
3.	Subtract java package see; import sie student; public than Enternal extends student (public int co enternal Marks - rus Int (5); public int co enternal Marks - rus int (5); public enternal (student very string some int see, int co automathable); apper (ver, rance seen); this advanal Marks - outomathable;
3.	Subtract java package see; import sie student; public than Enternal extends student (public int co enternal Marks - rus Int (5); public int co enternal Marks - rus int (5); public enternal (student very string some int see, int co automathable); apper (ver, rance seen); this advanal Marks - outomathable;
3.	Geberal java farkage see; import sie suidert; public clast Enternal extends suidert (public int co enternal Harbs - and Int (5); public eidernal (litting vero, station come, int see, public eidernal (litting vero, station come, int see, public eidernal Marks - enternal Harbs) (this cultural Marks - enternal Harbs); public void display External Marks; grupt ("Enternal Marks");
3.	Substantifue factory see: fa
3.	Geberal java farkage see; import sie suidert; public clast Enternal extends suidert (public int co enternal Harbs - and Int (5); public eidernal (litting vero, station come, int see, public eidernal (litting vero, station come, int see, public eidernal Marks - enternal Harbs) (this cultural Marks - enternal Harbs); public void display External Marks; grupt ("Enternal Marks");
3.	Substantifue factorial force package see; import sie student; public ist of enternal tendent (public ist of enternal Marks - new int (5); public enternal (string ven, string come, int see, int of notional Marks - enternal Marks); fuel calenal Marks - enternal Marks; public void display Enternal Marks (5); for (int real Marks ");
3.	Extend java Falkage see; Import cie. sundert; public lieut Extends extends sundert [public int co external Marks - new Int (5); public int co external Marks - new Int (5); public int co external Marks - new Int (5); this cubracal Marks - external Marks; public void display External Marks (5); public void display External Marks (7); public void display External Marks (7); Sout ("Extend Marks (7); Sout (areas (7));
3.	Substantifue factory see: fa
3.	Extend java Falkage see; Import cie. surdert; public last Extends extends surdert [public int co external Marks - new Int [5]; public external (Singley seen, Mingrown, Int See, public external (Singley seen, Mingrown, Int See, public external Marks - external Marks; public void display External Marks; public void display External Marks; public void display External Marks; fout ("External Marks:"); for (int reach: external Marks); Sout (areas. "");
3.	Extend java Falkage see; Import cie. surdert; public last Extends extends surdert [public int co external Marks - new Int [5]; public external (Singley seen, Mingrown, Int See, public external (Singley seen, Mingrown, Int See, public external Marks - external Marks; public void display External Marks; public void display External Marks; public void display External Marks; fout ("External Marks:"); for (int reach: external Marks); Sout (areas. "");
3.	Extend java Falkage see; Import cie. sundert; public lieut Extends extends sundert [public int co external Marks - new Int (5); public int co external Marks - new Int (5); public int co external Marks - new Int (5); this cubracal Marks - external Marks; public void display External Marks (5); public void display External Marks (7); public void display External Marks (7); Sout ("Extend Marks (7); Sout (areas (7));
3.	Gebernal java Falkage see; Import cie. Sendert; public liate External rexterds (sendert (public int co external Hacks - new Int (5); public external (singly very string-ward, int see, more automathdule) (Apper (very name, seen); this cultural Marks - external reacks; public void display External Marks (*); fout ("External Marks "); for (int walk : nathrad Marks) (Sout (area of the seen); Systemant printle ();
TO THE STATE OF TH	Extend java Falkage see; Import cie. sundert; public lieut Extends extends sundert [public int co external Marks - new Int (5); public int co external Marks - new Int (5); public int co external Marks - new Int (5); this cubracal Marks - external Marks; public void display External Marks (5); public void display External Marks (7); public void display External Marks (7); Sout ("Extend Marks (7); Sout (areas (7));
TO THE STATE OF TH	Subtract java Subtract java South is the Entered curdent (public int co entered curdent (public int co entered (public int colored (public void display Entered Marker); South ("Entered Marker");
TO THE	Geberal java Parkage cce; parkage cce; proport cie surdent; public last Experal contend tendent (public int co external Musta - mus Int (5); public int co external Musta - mus int ser, public internal Musta - external Musta; public void display External Musta;
TO THE	Gebernal java Falkage see; Import cie. Sendart; public liate External rexterds sendart [public int co external Hacks = new Int [5]; public external listing were, string ware, int see, in co automathdule) [hoper(ver, nour, see); this cultural Marks = external ranks; public void display tirkeral Marks !!) for (int walk : nathrad warts) [Sout ("Faterlal Marks !"); for (int walk : nathrad warts) [Sout (auch : "); Sout (auch : "); Sout (auch : "); I word ite Toteral; hoport ite Toteral;
S Park	Geberal java Parkage cce; parkage cce; proport cie surdent; public last Experal contend tendent (public int co external Musta - mus Int (5); public int co external Musta - mus int ser, public internal Musta - external Musta; public void display External Musta;

-	Date/I
-	public class Main s) {
	public static word main (string () aurs) !
	int n-2; int () internal Marker 1 = {20,30,25, 28,227.
_	int () Axternal Marks #= {60,70,55,65,50};
_	Internals student I Internal - new Internals ("USN12)"
_	"Alice", 3, internal Marks 1);
7/10	Enternals students Enternal = new Enternal ("US N123")
11 7	"Hici", 3, external Marty 1);
	moce, s, emechanical);
	intrinternal Marks 1 = £18,25,20,23,283,
	int () enternal Marks 1 = { 70, 65, 60, 50, 45};
	Internals students Internal = new Internals ("Usin 124", "Bob",
	3, internal Marks 2);
	Enternale students Enternal = new Enternal "USN 124", #55",
	3, enternal Marks 2):
	position that the state of the
	Sout ("Student) Tuto: "):
	Gudent 2 Internal, display student Into ();
	Student 1 Taberral display Internal Marks (1;
	Shident Enternal alsoplay Enternal Martis & 1;
	Company of the party of the second
	intro final Marks 1 = columbate final Marks (SII IM 1 52 E. EM);
	display find Marks (final Marks 1);
	Sout ("In student 2 Info: ");
	3 hudent 2 Internal, displaystudent Infol);
	Student 2 Int. display Ent Marks (1);
	Students Int. display cult Marks (1)
	internal tracked a contract of the best of the contract of the
	int (3) final marks 2 = calculate final Nauts (22 E. Dr. se F. Eng)
	displayfinal Halds (final Marks2);
	Date
	int Page 1 Text, int I fee
	public static int 13 calculate final flaver (stade Int Par 12) Exe
1/	- 1 DA Li alala Illa = nom lan 13 - 3
	for (in i=0; i < C; 1++) 5 final Marks (ii) - instanal Marks CD+ Enterel Mills
- 3 3	3 mal Marco et 1 - marco
	return final Marking
	The state of the s
Trong	public static void display final Marks (intis final Marks)
	fublic static void displayth our marked ("Texternal" "Tour our count ("Final Marker ("Texternal" External" "); for (but mark: final harks)
	for (int mark: finalitation)
	Sout (mark + x 1);
20.00	sout ();
	· Carly Mandell C
7 43 6	Talle 10" I constant our hornous ser was all and all
-	State found as P
91	
	USN: VINIZZ: " MAT C TALLES" 1
	Name: Alice and opiniones and
	Servetor British 20 20 20 22
	Internal Marks: 20,30,2528 27.
149	Hiral Marks (Internal + Foreral):
/	80 100 80 93 1 td.
1000	7 5 5 1 4 1 4 1 4 1 4 1 4 1 4 1 4 1 4 1 4
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13/11	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	of I ad again to a graph of a star (12).
Tax 24	Carp wat and a
THE PARTY NAMED IN	

```
package cie;
public class Student {
   public String usn;
   public String name;
   public int sem;
              public Student(String usn, String name, int sem) {
   this.usn = usn;
   this.name = name;
   this.sem = sem;
              public void displayStudentInfo() {
   System.out.println("USN: " + usn);
   System.out.println("Name: " + name);
   System.out.println("Semester: " + sem);
}
 package cie;
 public class Internals extends Student {
    public int[] internalMarks = new int[5];
          public Internals(String usn, String name, int sem, int[] internalMarks) {
                   super(usn, name, sem);
this.internalMarks = internalMarks;
         public void displayInternalMarks() {
    System.out.println("Internal Marks: ");
    for (int mark : internalMarks) {
        System.out.print(mark + " ");
    }
}
                   System.out.println();
package see;
 import cie.Student;
public class External extends Student {
   public int[] externalMarks = new int[5];
                  super(usn, name, sem);
this.externalMarks = externalMarks;
        public void displayExternalMarks() {
    System.out.println("External Marks: ");
    for (int mark : externalMarks) {
        System.out.print(mark + " ");
    }
}
                   System.out.println();
 import cia.internals;
import see.External:
   ublic class Main (
public static void main(String[] args) {
              int[] internalMarks1 - {20, 10, 25, 20, 22};
int[] oxtonsDMarks1 - {00, 70, 50, 50, 50};
InternalS studentInternal - new Internals("USM123", "Alice", 3, internalMarks1);
External studentIExternal - men External("USM123", "Alice", 3, externalMarks1);
              int[] internelMerks2 {18, 25, 20, 23, 28};

Int[] externelMerks2 = 150, 55, 60, 56, 45];

TornenalS kindenelTainsend = new Internals("USW124", "Bob", 3, internalMerks2);

External StudentZixternal = new External("USW124", "Bob", 4, externalMerks2);
              System.out.println("Student 1 Info: ");
studentlInternal.displayStudentInfo();
studentlInternal.displayInternalMarks();
studentlExternal.displayExternalMarks();
              int[] finalMerks1 = calculatefinalMerks(studentiInternal.internalMarks, studentiExternal.externalMarks);
dtsplay+thalMarks(+thalMarks);
              System.out.println("\nStudent 2 Info: ");
srudent2Tnternal.displaySrudentTnfe();
student2Internal.displayInternalMarks();
student2External.displayExternalMarks();
             int[]\ finalMarks2 = calculate[inalMarks(student2Internal.internalMarks,\ student2External.externalMarks);\\ displaye[inalMarks(finalMarks2),\ ]
       public static void displayfinalMarks(int[] finalMarks) [
    Systam.out.println("final Marks (Internal + External): ");
    for (int mark : finalMarks) {
        System.out.print(mark + " ");
    }
}
             System.out.printin();
```

Program 7 Exceptions in inheritance tree

	per 1.1
3000	Sans 191 Comment
rentp	out favo. will. Scorner;
cha	wrong Age Exception extends Exception { public wrong Age Exception (Extent except) {
	public wrong Age Exception (cooling munge) [
	3 ruper (merioge);
3	Tan sools Trees
-	Court 12 posts I show that they
day	
	public Sontgetxaption (sorting newage) {
	3 (upa (muage);
3	at an ile in
	A STATE OF THE PARTY OF THE PAR
CMA	sofute int ase
90	policate int age; public father int age; thouse wrong the Exception of Command whom Age Exception (Womand Age Exception)
=	of this age age;
	public but getage () {
	relurn out
1	3
7	22, 484, 45
clas	s Son extends fathers
	s Son extends fallers policete for Sonfige;
	public Son (Int fatherings int Sange Horasse Wrong Est Est Langue
	Augen ((alter 1942); " (Confly or later 1942); " (Confly or later 1942) thouse was ben't Enter pièce. this hange sonlige;
	of (configure fatherage) throw new Son My Exception
	("Son's age more than full
=	this Sange . Sonlige;
	Date/_ Props
	to the second second
	3
H	public int gersonage CD [
	setum forty
1	· Consideration
pu	the class Agel
-	
Н	Starren ce : new Starren (Eyetenesin);
	sour ("Farrer's age; ");
	int later box sc. nent Int ();
	int fathurge : sc. nentint (); sout ("son's Age: ");
	Put Sonage = sc. next Int ();
-	tou S
Н	nus son (farminge, sonnge);
The same	I catch (Exception e) [
	sout (e. get Munage ());
	Jan (Jana Mary
	sout ("Re-enter details (4/0)?");
	(tr. next () equals Ignore (ase ("n"))
	3 break;
1 11	St. Ume C1;
1	Jacks and and said
-	Complement to the Control of the Control
4	and a state of the state of the state of
1	Defe Pege
0/	
2	Mini's Ann. 1973
So	their Age: 47
Acc	epted successfully.
-	The state of the s
Ka	enter details (y/n)? Y
_	ther's Age: 25
fa	to Day 1 Day
Fa So	1's Age: 30
So	
So	
Sor	's type cannot be greater than father !!! enter details (ylm)? y
Sor Re-	is Age cannot be greater than father !!! enter details (y/m)? y
Sor Re-	is Age cannot be greater than father !!! enter details (y/m)? y
Sor Re	"s Age cannot be greater than father !!!! enter detaits (3/4)? y than's Age :-1 rong Age :>20
Sor Re	is Age cannot be greater than father !!! enter details (y/m)? y
Sor Re	"s Age cannot be greater than father !!!! enter detaits (3/4)? y than's Age :-1 rong Age :>20
Sor Re-	"s Age cannot be greater than father !!!! enter detaits (3/4)? y than's Age :-1 rong Age :>20
Sor Re	"s Age cannot be greater than father !!!! enter detaits (3/4)? y than's Age :-1 rong Age :>20
Sor Re	"s Age cannot be greater than father !!!! enter detaits (3/4)? y than's Age :-1 rong Age :>20
Sor Re-	"s Age cannot be greater than father !!!! enter detaits (3/4)? y than's Age :-1 rong Age :>20
Sor Re-	"s Age cannot be greater than father !!!! enter detaits (3/4)? y than's Age :-1 rong Age :>20
Sor Re-	"s Age cannot be greater than father !!!! enter detaits (3/4)? y than's Age :-1 rong Age :>20

```
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;</pre>
    public int getAge() { return age; }
class Son extends Father {
    private int sonAge;
public Son(int fatherAge, int sonAge) throws WrongAgeException, SonAgeException {
        super(fatherAge); In sonage) throw new SonageException("Son's age cannot be greater than or equal to father's!!!"); this.sonAge = sonAge;
    public int getSonAge() { return sonAge; }
int somme = striketin();
try {
    new Son(fatherAge, sonAge);
    System.out.println("Accepted Successfully");
} catch (Exception e) {
    System.out.println(e.getMessage());
}
            System.out.print("Re-enter details (Y/n)? ");
if (sc.next().equalsIgnoreCase("n")) break;
C:\Users\Admin\Desktop>java Age
Father's Age: 47
Son's Age: 20
Accepted Successfully
Re-enter details (Y/n)? y
Father's Age: 25
Son's Age: 30
Son's age cannot be greater than or equal to father's!!!
Re-enter details (Y/n)? y
Father's Age: -1
Son's Age: 20
Wrong Age!!!
Re-enter details (Y/n)? n
C:\Users\Admin\Desktop>AARUSH GARG 1BM23CS004
```

Threads

Algorithm:

```
MEEK-8
         class BMS entends Thread &
            public void run US
                 1 yet
                     3 (eurs) elados
                         sout (" pors college of Engineering ");
Thread sleep (10000);
                Icatch (Interrupted Exception e) {}.
        class CSE entends Thread {
            public vold run() {
                try [
                     whole (true) {
                        Sout ("CSE");
                        Thread. sleep (2000);
               I catch ( Interrupted Exception e) {}
        public class hullithroading (
public challe world main (String C) args) (
                 BMS bMS = NEW BMS();
                the cse = new csect;
                cse. Start ();
DIP CSE
       ous college of Engineering
       626
```

User interface for integer divisions

WEEK- 3	Date/ Page
Neo	Puport Javox swing. " , more thanks were
	import java, aust. ";
	Import jour ant event. "; " the said
	class Swing Deno {
	Swing Deno () E
	Thrane Jam = new Trame ("Divides App").
	jfm. setsize (275, 150);
	Am settayout (new Flowlayout 13); (1)
	ifry. Set Default hose Operation (3 Frans. Ex17 an acose);
	Tlabel j'ab: nu Jubal ("Enser divider & divident:")
	Itenticed aiff = new Itenticed (B);
	I Textfield bit = New ITextfield (8);
	I Button button = new IButton ("Calculate");
	Rabol err = new Ilabel !!;
	Ilabel Alab = new Itabel ();
	Itabel blab: new slabel ():
	Tabel and = new Itabel ();
	itm. add (err);
	form and (a/th);
	Ffin. add 1 button).
	Action listened = new Action Ustened () {
	public world Aution performed (Authon French evt) [
	mut ("Aution over trom a best field");
	-
	3)
	a) H. add Autismtisterer (new ALLI) [
	public vota action lengthmed (Action event ent) {
	try?
	int a- Integu. passe Int (aft, get Tent ());
	inth - Enterger . parse Tat (b) 7 glt Text (3);
	int ans = a/b)
	alab, settent ("INA="+a);
-	a blab. set Tent ("Insa"+6);

```
catch (Number tomasterception of alaborettent("");

alaborettent("");

flab rettent("");

andab settent("");

public statts world main ("Aarman Gray (setescess"));

35);

public statts world main ("Aarman Gray (setescess"));

35);

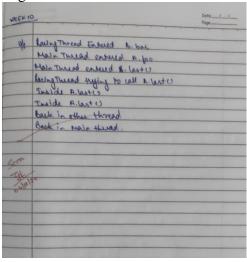
The divides and divident on the set of the setescess of the set o
```

```
Code:
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;
class SwingDemo{
SwingDemo(){
JFrame jfrm = new JFrame("Divider App");
jfrm.setSize(275, 150);
jfrm.setLayout(new FlowLayout());
jfrm.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
JLabel jlab = new JLabel("Enter the divider and divident:");
JTextField aitf = new JTextField(8);
JTextField bjtf = new JTextField(8);
JButton button = new JButton("Calculate");
JLabel err = new JLabel();
JLabel alab = new JLabel();
JLabel blab = new JLabel();
JLabel anslab = new JLabel();
jfrm.add(err);
jfrm.add(jlab);
jfrm.add(ajtf);
jfrm.add(bjtf);
ifrm.add(button);
jfrm.add(alab);
ifrm.add(blab);
ifrm.add(anslab);
ActionListener l = new ActionListener() {
public void actionPerformed(ActionEvent evt) {
System.out.println("Action event from a text field");
```

```
};
aitf.addActionListener(1);
bitf.addActionListener(l);
button.addActionListener(new ActionListener() {
public void actionPerformed(ActionEvent evt) {
try{
int a = Integer.parseInt(ajtf.getText());
int b = Integer.parseInt(bjtf.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!");
});
jfrm.setVisible(true);
public static void main(String args[]){
System.out.println("Aarush Garg 1BM23CS004");
SwingUtilities.invokeLater(new Runnable(){
public void run(){
new SwingDemo();
});
C:\Users\Admin>cd desktop
C:\Users\Admin\Desktop>javac SwingDemo.java
C:\Users\Admin\Desktop>java SwingDemo
Aarush Garg 1BM23CS004
             Enter the divider and divident:
          Calculate A = 55 B = 5 Ans = 11
```

IPC and Deadlock

Algorithm:



```
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();
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();
void last() {
System.out.println("Inside A.last");
class Deadlock implements Runnable
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 thisthread.
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();
C:\Users\Admin>cd desktop
C:\Users\Admin\Desktop>javac Deadlock.java
C:\Users\Admin\Desktop>java Deadlock
RacingThread entered B.bar
MainThread entered A.foo
MainThread trying to call B.last()
RacingThread trying to call A.last()
Inside A.last
Inside A.last
Back in main thread
Back in other thread
C:\Users\Admin\Desktop>
```