## VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.



# LAB REPORT on

## **Object Oriented Java Programming**

Submitted by

SUSHANTH(1BM21CS227)

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



#### **B.M.S. COLLEGE OF ENGINEERING**

(Autonomous Institution under VTU)

## BENGALURU-560019 Oct 2022-Feb 2023

### 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" carried out by SUSHANTH(1BM21CS227), 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 2022-23. The Lab report has been approved as it satisfies the academic requirements in respect of Object Oriented Java Lab - (21CS3PCOOJ) work prescribed for the said degree.

**Dr.Nandini Vineeth** Assistant professor Department of CSE BMSCE, Bengaluru **Dr. Jyothi S Nayak**Professor and Head
Department of CSE
BMSCE, Bengaluru

## **Index Sheet**

SI. No.	Experiment Title	Page No.
1	Develop a Java program that prints all real solutions to the quadratic equation $ax2+bx+c=0$ . Read in a, b, c and use the quadratic formula. If the discriminate $b2$ -4ac is negative, display a message stating that there are no real solutions.	5
2	Develop a Java program to create a class Student with members usn, name, an array credits and an array marks. Include methods to accept and display details and a method to calculate SGPA of a student.	8
3	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.	12
4	Develop a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contain only the method printArea() that prints the area of the given shape	18
5	Develop a Java program to create a class Bank that maintains two kinds of account for its customers,	20

	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 Cur-acct 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.	
6	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.	29
7	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.	33
8	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	37

	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	
9	Demonstrate Inter process Communication and deadlock	43
10		

## **Course Outcome**

CO1	Apply the knowledge of Java concepts to find the solution	
	for a given problem.	
CO2	Analyse the given Java application for	
	correctness/functionalities	
CO3	Develop Java programs / applications for a given	
	requirement.	

CO4	Conduct practical experiments for demonstrating features	
	of Java	

#### **LAB PROGRAM 1:**

Develop a Java program that prints all real solutions to the quadratic equation ax2+bx+c=0. Read in a, b, c and use the quadratic formula. If the discriminate b2 -4ac is negative, display a message stating that there are no real solutions.

```
import java.util.Scanner;
import java.lang.Math;
class quadratic
{
    double d,val;
    void find(double a,double b,double c)
{
    if(a==0)
{
        System.out.println("a cannot be zero");
        return;
}
    else
{
        d=(b*b)-(4*a*c);
}
    if(d>0)
{
        System.out.println("The roots are real and unique");
        System.out.println((-b+Math.sqrt(d))/(2*a)+"\n"+(-b-Math.sqrt(d))/(2*a));
}
else if(d==0)
{
```

```
System.out.println("the roots are real and equal");
System.out.println(-b/(2*a));
else
System.out.println("there is no real root");
double img=Math.sqrt(-d)/(2*a);
double realpart=-b/(2*a);
System.out.println("real part is "+realpart+" imaginary part is "+img);
class Main
public static void main(String args[])
quadratic ob1=new quadratic();
System.out.println("enter the value of a,b and c");
Scanner sc=new Scanner(System.in);
double a1=sc.nextDouble();
double b1=sc.nextDouble();
double c1=sc.nextDouble();
ob1.find(a1,b1,c1);
```

	CANTE ET/IFEE	2 437 COMMENTS
4)	Develop a Java program that prints all real solutions to	etse
	the analysis to property axit bate = 0. Read in 0,6,0	{
	and we the acadratic himula. It the dischmak	System out-pantso (" There is no real solution"),
	67-Has is negative display a minage stating that	3
	there are no real Societions.	)
		У
	import jova. Uhl. Scanner's	Class Main
	impat jewa. Jorg. Matt.;	4
	class quadratis &	public static void main (string args[])
	double d, val;	1
	void find (double a, double b, double c)	quadratts obl = new quadrate (),
	1	System-out-print in ("Entre the value of a, b and i')
	if (a==0)	Scamer Scanner (Systeman);
	(	double at = Sc. next Double ();
	Systemical friction ("a council be zero");	double bi= sc. next Double();
	return;	double (1= St-next pouble ();
	3	abi-find(a), bis(i);
	alla	4
	e(3c	3
	d=b*b-+3a*c;	
	val = Moth. Synt (Math. abs (d));	Output:
	3	Enter the value of a, b and c
	il (9>0)	2
	-	/-11
/	System-out-printen ("The most are real and unique");	14
	System-out-printen ((-b+val) (2*0)+"   "+(-b-val)/	The work are not and original
	(2*9);	1001=3.5 300+2.0
	(2-41),	
	J .	Enter the value of a band c
(	$else\ if\ (d==0)$	
	4	3
	System-out-primen ("the roots are real and equal");	7 There is no real root
		70071=-1.5+2.17; 20072=-1.5-2.17
	Systeman-printer (-b((2*0));	100112 11312111
	t e e e e e e e e e e e e e e e e e e e	

Enter the value or a shande
41
-H
1 0
The mote an real and equal with = 0.5 mote = 0.5
North = 0.5
11/27
11/1

#### Select Command Prompt

```
C:\Users\BMSCECSE\Desktop>java Main
enter the value of a,b and c

2
-11
14
The roots are real and unique
3.5
2.0

C:\Users\BMSCECSE\Desktop>java Main
enter the value of a,b and c

1
3
7
there is no real root
real part is -1.5 imaginary part is 2.179449471770337

C:\Users\BMSCECSE\Desktop>java Main
enter the value of a,b and c

4
-4
1
the roots are real and equal
0.5

C:\Users\BMSCECSE\Desktop>__
```

#### **LAB PROGRAM 2:**

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

```
import java.util.Scanner; class student
{float total;
  Scanner sc=new Scanner(System.in); int marks[]=new int[10]; int credit[]=new
int[10]; void display()
{ int i;
float sumofcredit=0;
System.out.println("Enter the name of the student:");
String name= sc.nextLine();
System.out.println("Enter the usn of the student:");
String usn=sc.nextLine();
System.out.println("Enter the credits for 5 subjects sequentially:");
for(i=0;i<5;i++)
   credit[i]=sc.nextInt();
System.out.println("Enter the marks for 5 subjects sequentially:");
for(i=0;i<5;i++)
 marks[i]=sc.nextInt();
for(i=0;i<5;i++)
total=total+credit[i];
for(i=0;i<5;i++)
if(marks[i]==100)
   sumofcredit+=(10*credit[i]);
else sumofcredit+=((marks[i]/10)+1)*credit[i];
}
```

```
System.out.println("name="+name);
System.out.println("usn="+usn);
System.out.println("the sgpa of student is "+(sumofcredit/total));
}
class Main
{
public static void main(String args[])
{
student st=new student();

st.display();
}
}
```

	Week-2 (mee no. 24/11/22)
7)	Develop a java program to create a class student with
4	mumber Uninam an and crem
	import java util Scanner;
	class student
	( front total)
	Scanner Sc = New Scanner (545thm - in);
	int mars[] = new int[ra];
	int credit]= run int[10]
	void dispayo
	(
	int Sumotoridit= 0, ij
	System. out. println (" Enter the name of the Student:");
	String.nam = Sconex/Line();
	System. out. printin (" Fater the USN or Student: ")
	String usn = sc-ruxt Linu();
	System. Out · Printer (" Enter credits for 5 subjects ="))
	for (1=0; i(5; i++)
	4
	(vidit[i] = Sc. runt Int();
	g.
	System out: Printen ("Enter marks for 9 subjects:");
	for (i=0; i<5; i++)
X	4
	morks[i] = sc-next[nt();
	q
	for(i=0; i(5; i++)
	1
	tota = total + endit [i];
	y
	for (1=0; 1<5; i++)
	4
	it (marks[i] ==100)

	Sumotordil = Sumotordil + (10 x cridit[1]);
	4
	Sund-credit += ((marks[i]/i]+i) + condit[i];
	System.out. Printin ("name="+ name+" "+ "USN="+ USNE
	"The SCIPA = "+ (sumoteredit / total));
	y
	3
	class Main
	( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )
	Public Static void main (String args[])  E Student St= new Student ();
11111	St-display();
	3
	ý
	outrus:
	Enter the name of Student
	Sushouth
	Enter the USN
	1 BM21 (SLZ)
	Enter the marks for 5 subject
X	93 84 30 90 80
	Enfor the credits for 5 subject
1	y 43 4321
11/1	name: Sushauth
1	USN: 1 BM21cs277
	5GPA: 9.44
	Corp. 2 al corp.
	The same of the sa

```
C:\Users\Admin\Desktop>java Main
Enter the name of the student:
sushanth
Enter the usn of the student:
227
Enter the credits for 5 subjects sequentially:
3
4
4
3
1
Enter the marks for 5 subjects sequentially:
90
89
90
80
name=sushanth
usn=227
the sgpa of student is 9.666667
C:\Users\Admin\Desktop>_
```

#### **LAB PRGRAM-3:**

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

```
import java.util.Scanner;
class books {
int k.l:
String name, author;
Scanner sc=new Scanner(System.in);
int price;
int numpages;
books()
price=0;
numpages=0;
void get()
System.out.println("Enter the name of the book:");
name=sc.nextLine();
System.out.println("Enter the name of the author:");
author=sc.nextLine();
System.out.println("Enter the price of the book:");
price=sc.nextInt();
System.out.println("Enter the no of pages of the book:");
numpages=sc.nextInt();
}
```

```
public String toString()
return name+"\n"+author + "\n"+price+"\n"+numpages+"\n";
/*System.out.println(" name of the boook:");
System.out.println(name);
System.out.println(" name of the author:");
System.out.println(author);
System.out.println("price of book:");
System.out.println(price);
System.out.println("pages of book");
System.out.println(numpages);*/
class book
public static void main(String args[])
Scanner sc = new Scanner(System.in);
int i,n;
System.out.println(" enter number of books:");
n=sc.nextInt();
books[] arr=new books[n];
books ident=new books();
for(i=0;i<n;i++) {
arr[i]=new books();
arr[i].get();
for(i=0;i<n;i++)
 System.out.println("\nThe details of book "+(i+1));
System.out.println(arr[i]);
System.out.println();
```

}
}

4 201	Week-3
-	Executia class book which contains four members:
1	hami a author, price , num-fages. Include a
1	constructor to Set the values for the members. Include
1	muthods to set and get the details of the objects
+	Include a tosting () muthad that could display
-	The touthous complete details on the book.
	DEVELOP a Jora Program to creak a book
	objects.
	12 Marie Marie Carlos C
	import java-otil. Scanner
	class book &
	int k, 2;
	String name, author;
	Scanner Sc = new Scanner (system.in);
	int proc;
	int numpages;
	books()
	{
	PH(0=0)
	numpagu= 0
	Fallenned man = no 1 January
	Void 9et()
	<
	System. out. Println (" Enter the name or book.");
	name = Sc. nextLine ();
	System.out. PHOI en ("Enter the name of author");
	Quithor = Sc. ruxt Lihu();
	System-out-Printsn ("Enter the price of the book");
	ent = St. next Line();
	System .out . printer ("Enter number of pages");
	numpage = Sc. next();
	3

TROSE MO)
number of books
im of book: Toronga
a norm author: quehanth
, pau : 100
mbu of Pages: 117
<i>d</i>
book 1:
book: Tarang a
outhor: suspants
100
so roges: 117
*
AND AND DESCRIPTION OF THE PARTY OF THE PART

```
C:\Users\Admin\Desktop>java book
enter number of books:
Enter the name of the book:
wings of fire
Enter the name of the author:
kalam
Enter the price of the book:
322
Enter the no of pages of the book:
223
Enter the name of the book:
nannna kathe
Enter the name of the author:
unknown
Enter the price of the book:
234
Enter the no of pages of the book:
434
The details of book 1 wings of fire
kalam
322
223
The details of book 2
nannna kathe
unknown
234
434
```

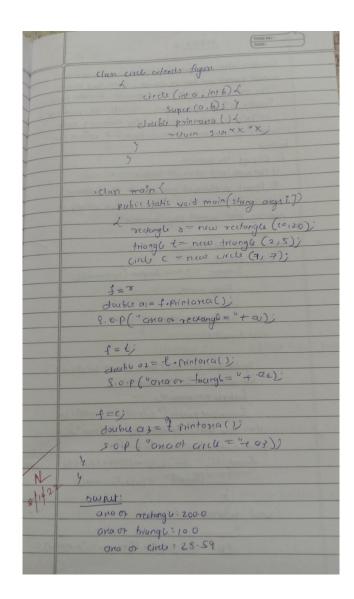
#### **LAB PROGRAM -4:**

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

```
abstract class figure
  int x,y;
  figure(int a,int b){
    x=a;
    y=b;
  abstract double area();
class rectangle extends figure{
  rectangle(int a,int b){
    super(a,b);}
    double area(){
       return x*y;
  }
class triangle extends figure{
  triangle(int a, int b){
    super(a,b);}
    double area(){
       return 0.5*x*y;
    }
  }
class circle extends figure{
  circle(int a){
```

```
super(a,a);}
    double area(){
      return 3.14*x*x;
    }
  }
class abst{
  public static void main(String args[]){
    rectangle r=new rectangle(10,20);
    triangle t=new triangle(4,5);
    circle c=new circle(3);
    figure f;
    f=r;
     double a1=f.area();
       System.out.println("area of rectangle:"+a1);
      f=t;
     double a2=f.area();
       System.out.println("area of triangle:"+a2);
     f=c;
     double a3=f.area();
       System.out.println("area of circle:"+a3);
 }
```

Observation:
MEEK-H (DATE: 8/12)
1. Develop a jevo Program to trade an abstract class named
Shapel figure that control Provide their classes rectoryly
brigger could be the meters
abstract class types
'I N' Int U'
figure (int a vint b)
x=a;
Y = 6;
Y
abstract double print area();
class rectangle extends figure
1
rectargle (intarint b) of
Super (aib), y
Jouble photosia () L
return x*4:
y v
<i>y</i>
class triangle extends figure
1
triong (int a, int b) { Super (a, b); y
double Printaxal){
return 0.5 * X * 4;
4
y y



```
C:\Users\Admin>set path="C:\Program Files\Java\jdk-19\bin"
C:\Users\Admin>cd "Desktop"
C:\Users\Admin\Desktop>javac abst.java
C:\Users\Admin\Desktop>java abst
area of rectangle:200.0
area of triangle:10.0
area of circle:28.25999999999998
C:\Users\Admin\Desktop>
```

#### **LAB PROGRAM -5:**

Develop a Java program to create a class Bank that maintains two kinds of account for its customers, one called savings account and the other current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class Account that stores customer name, account number and type of account. From this derive the classes Cur-acct 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.

balance.

c) Compute and deposit interest

double intrest=0; double rate=0.3;

d) Permit withdrawal and update the balance Check for the minimum balance, impose penalty if necessary and update the

import java.util.Scanner; class account{
Scanner sc=new Scanner(System.in); String name; int acct\_no; int balance,deposit; // String type;
void deposit()
{
System.out.println("Enter amount for deposit\n"); int amount=sc.nextInt(); balance+=amount;
System.out.println("deposite is successfull\n do you want to check your balance");
System.out.println("1.YES\n2.NO"); int choice=sc.nextInt(); check\_balance();
}
void details()
{
System.out.println("Name: "+name);
System.out.println("account\_no: "+acct\_no);
System.out.println("balance :"+balance);
}
void check\_balance()
{
System.out.println("Balance is "+balance);
}
class savings extends account
{

```
savings(String n,int a,int d)
name=n; acct_no=a; deposit=d; balance=deposit;
void details()
System.out.println("Account type: Savings"); super.details();
void withdrawal()
System.out.println("Enter amount for withdrawal\n"); int amount=sc.nextInt();
if(balance<amount)
System.out.println("You can withdraw the amount less than "+balance); else
balance=balance-amount;
System.out.println("withdrawal is successfull..!!!!!! \nparty leda "+name);
System.out.println("\nDo you want check your balance\n"); System.out.println("1.YES\n2.NO");
int choice=sc.nextInt(); if(choice==1) check_balance(); return;
}
void get_intrest(int month)
month/=3;
intrest=(balance*rate*month/4);
System.out.println("Previous balance: "+balance+"\nIntrest: "+intrest+"\nCurrent balance:
"+(balance+intrest)); balance+=intrest;
class current extends account
int cheque_no;
current(String n,int a,int d)
name=n; acct_no=a; deposit=d; balance=deposit;
void details()
System.out.println("Account_type: Current"); super.details();
void withdrawal()
System.out.println("Do you have cheque"); System.out.println("1.YES\n2.NO"); int
choice1=sc.nextInt(); if(choice1==1)
System.out.println("enter check number"); cheque_no=sc.nextInt();
```

```
System.out.println("Enter amount for withdrawal\n"); int amount=sc.nextInt();
if(balance<amount)
System.out.println("You can withdraw the amount less than "+balance); else
balance=balance-amount;
System.out.println("Do you want check your balance\n");
System.out.println("1.YES\n2.NO"); int choice=sc.nextInt(); if(choice==1) check_balance();
return;
class Main
{ public static void main(String[] args)
Scanner sc=new Scanner(System.in); String name; int acct no; int deposit; int choice;
System.out.println("Enter your name\n"); name=sc.nextLine();
System.out.println("Type of account\n"); System.out.println("1.current\n2.Savings");
choice=sc.nextInt(); if(choice==2)
System.out.println("Enter amount for deposition and minimum amount 1000 rupees\n"); int
x=sc.nextInt(); if(x<1000){
System.out.println("cant deposit less tahn 1000");
} else { deposit=x;
System.out.println("Create account number \n"); acct_no=sc.nextInt(); savings s=new
savings(name,acct_no,deposit); while(true)
System.out.println("\nEnter your choice\n1.depost\n2.withdrawal\n3.Details of
account\n4.Intrest Calculate\n5.exit\n");
int ch=sc.nextInt(); if(ch==1)
s.deposit(); else if(ch==2)
s.withdrawal();
}else if(ch==3)
s.details(); }
else if(ch==4)
{ int m;
System.out.println("Enter duration for intrest calculate\n"); m=sc.nextInt();
s.get_intrest(m);
else if(ch==5)
break;
```

```
else
System.out.println("Invalid Choice..!!!!!\n"); }
else
System.out.println("Enter amount for deposition\n"); deposit=sc.nextInt();
System.out.println("Create account number \n"); acct_no=sc.nextInt(); current c=new
current(name,acct_no,deposit); while(true)
System.out.println("\nEnter your choice\n1.depost\n2.withdrawal\n3.Details of
account\n4.exit"); int ch=sc.nextInt(); if(ch==1)
c.deposit(); else if(ch==2)
c.withdrawal();
}else if(ch==3)
c.details(); }
else if(ch==4)
break;
else
System.out.println("Invalid Choice..!!!!\n"); }
```

	MEEK-5
	Create a class account that Stever contens narry,  Create a class account that Stever contens that derive
-	a c. to their training to the
	without in order to achieve
	mustads in order to achieve the sound update the  a) Accept deposit from customer and update the
- 1	
- 1	
	D) Display the bound of court interst c) compute and object interst the bounds.
	d) permit withdraws and update the basance.
	H. minimum boudi
-	numy and update the bosonu.
	numy of the
	impat jova. Util . Scorner;
=	,
	class account { Scanner Scanner (system-In);
	String name,
	int autro;
	int balonu, dupoiti
	void dipait ()
	1
	System-cut-PHOLIN (" Enter amount for diposit");
	int amount = Sc next Int(0)
	balonu += amount;
	Systemous printen (" Depait 1's successfull y
	do you want to their your barance "Di
	System out product "1. yes (n 2. mo);
	Scort Sqr int choir = sc. nextInt()
	Cheerof Cheer-forwards
	4
	void difaiuly
	1
	System-out-printer ("Nam: "+ nom)

Spins	(190) 160)
	(DATE)
1	System-out-proton ("account-no: "tacet-no);
Y	System out-proton ("basons: "+ besons);
	9
1	void cheek_bourte()
1	System out-Printen ("Bouance is"+ boulance");
1	3
1	<b>)</b>
1	Clan Sovings extends account
	Int introst 1 = 0; double rate = 0.03;
	Savings (string n, inta, intd)
	1
	nom=n)
	acct-no=a)
	diposit = dj
	balant=deros/tj
	9
	Void dutails ()
	4
	Syltemow: Println (" Account type: 3 crying
	Super-dutails ();
	y
	void withdrawl()
	4
1119	System-out-profile (" Enter amount for
	withdrawl (u");
	int amount = SC-rexPInt ();
	It ( bound < amount)
	System-out-Printing you can withdraw the
Je Col	amount lens than "+ balance);
	elx experience

```
balance = Brunne-amount
   System out prof Int with draws 13 sucurs har-)
   System out protect "be you want to chew barany
                                                            if (choice == 1)
                                                                    System out rooken ( Enter cheque number ")
    int choid = Sc. next Int()
                                                                    chiqueno=Sc-rextInt()
      if (choice = 1)

Chur-batana ()
           yetuin)
                                                               System out-Printer (" Enter amount for with diand " "
                                                                in amount = SunextInt();
if (balance comount)
                                                                      Systeman printer ( you can withdraw the
                                                                  double schange = 0; servicedage (amount)
clan current extends com account
                                                                 Systemout Printer (" Sucinful authorous");
                                                                  System out Prolen (" now you want to cheer
    int cheque-roj
                                                                  barance (4")
    Tunert (string n, int a, int d)
                                                                  System out printen ("1-40) 2 nolu")
                                                                      Check-balance ()
       dirait =d;
       bosons = cupart)
                                                                  Public state void main (string arg [])
      System-out-printen ("Account type: curry")
                                                                        Scorner Scenew Sconner (System-in)
        Super-details()
                                                                       String name;
    9 0
     W/hdrawlo
                                                                        int duposit, cholu;
                                                                        Pystemout Printer (" Enfer your norm!"
      System out-prince (" po you have dryw")
                                                                         nome = Sc. next Line (1)
      Sylamout Pholen (1,405 2.no/ ")
                                                                         System out-proper ("Type or account")
    int choice = Screxf Int()
```

```
System out Panler (" Faler amount by
                                                                               while (true)
deposition and minimum amount is see [m].
                                                                                   System out-printer ( Friter your choice
                                                                              deron 2 windiaw 3 delais HERITUI)
      System out Printer ("Create account number Jury)
    autro 8 new total)
Soungs 5 new Soungs (nome, out-no, deposit)
Will (tru)
                                                                             Cix i+ (ch==2)
(.withdrawa())
Cix i+ (ch==3)
Syromous foodlo (" (a Enter choice I depost 2 withdraws 3. Details of accepting of exit (u"))
     of the sc. Next Int ();
                                                                                        System out forsen ("Tovalid choice [")
     eln it (ch==2)
3. withdraws
clr it (ch==3)
      c1x 1+ (ch== H)
                                                                                   void get-introt (int moth)
      System out printent " Invalid choice !!! [4"]
                                                                                           introt = (balance x rak x month/4);
                                                                                         Sellem out proton (" provinces boutons: "+ bolone +
"In Intrest: "+ intrest +" y cumnt believe."
                                                                                         + (balance + Intrest))
                                                                                          bounce = balant introl
  System-out-printen (" Enter amount for deposit (")
      diport = SCREXTIATU)
     System out-Printen (" Create august number")
```

Void Sementage (double amount) double charge = 0) Systement protent " Service change 6 %. is System out protent service Long : "fclorge);

System out promier (" service charge: "fclorge); barons - = Charge; return) Outrut: Forter your name Sushangh Type or account 1. Lument 2. sarvings Enler amount for deposition [0000] creak your account number 301987 Enter your choice 1. deposit 2. willedraw 3. Detail H. Exit Sushanla (0000) current

```
Account type: Current
Name: sushanth
account_no: 22233
balance :214
Enter your choice
1.depost
2.withdrawal
3.Details of account
4.exit
C:\Users\Admin\Desktop>java Bank
Enter your name
sushanth
Type of account
1.current
2.Savings
Enter amount for deposition
122
Create account number
12
Enter your choice
1.depost
2.withdrawal
3.Details of account
4.exit
```

#### **LAB PROGRAM-6:**

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.

```
import java.util.*; class father extends Exception{
  int f_age;
               father(int a)
     f_age=a;
  public String toString()
    return "Age: "+f_age+"\n Wrong age Input\nage should be greater than 0";
class son extends father{ int s_age;
                                       son(int f,int s)
     super(f);
                   s_age=s;
  public String toString()
    return "\nson age:"+s_age+"\n"+"father age:"+f_age+"\n"+"Son age should be
less than father age";
  }
class MyException
  static void WrongAge(int f_age,int s_age) throws son,father
     if(f_age \le 0 \parallel s_age \le 0)
                                   throw new father(f_age);
                                                                  else
if(s_age)=f_age)
                       throw new son(f_age,s_age);
  static void WrongAge(int age) throws father{
     if(age \le 0)
     throw new father(age);
```

```
public static void main(String []args)
    int f_age,s_age;
    Scanner sc=new Scanner(System.in);
    try{
       System.out.println("Enter father age\n");
f_age=sc.nextInt();
      WrongAge(f_age);
      System.out.println("Enter son age\n");
s_age=sc.nextInt();
      WrongAge(s_age);
       WrongAge(f_age,s_age);
       System.out.println("No error occured\n"+"son age:"+s_age+"\n"+"father
age:"+f_age);
    catch(son s)
       System.out.println("\nError caught\n"+s);
    catch(father f)
       System.out.println("\nError caught\n"+f);
```

WEEK-6 write a program that demensioner handling of Cranton in inhertance tree - excepted base class called "Father" and derived clan "bo" which extends have class In falker dan, implement a constructor which takes the age and throws the exertion wrong Agel ) When the input age <0. In son don, implement a constructor that Easer both father and son's age and throws an exception if son's age >= father's æge. import Java. UHL \*; clan father extends Exceptions Int Sage: fuller (int a) fage = a; Public String to Storry () return "Age:"+ fage "In wrong rage input should be qualer than o's clan son extends fatherd Son(int 3) son(intf, ints) age: "+ f-age \n"fa/het age should be grain than son";

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	(ROSE NO)
clan My Exaphered	System out control " Face 1 and
	System and problem (" From (ought")
throws sen folker	4
1) ( M Lage <= 0 11 Sage <= 0)	4
How new folker (f-cage);	output:
eix il ( s-cge > = f-age)	Enter falker sige
those one son (Lage, Lage)	50
those are my feet, make	Enter son age
	70
( a pu) H	Emor caught
State word prograge lint age thour father-	Son age: \$0
H(agisa)	Sulfu Aage: 50
Three rue for all	son age should be ten thou father
public State wid mula (Stong orge)	Enter father Age
Sunnar sc = rew Sconner (System.in)	0
Reduct of = Liens required shiften in)	Error caught
try <	wrong againment
System-out-Protein ("Err father age")	
f. agy = Si. next Int();	Age should be greater than o
curang Acqu (1-agr);	
System our Parley (" Tenter Sonage").	Enter father Age
	12
Sagr = Sinext Int () herong age (sag)	Enter son Age
wrong Age (faylo, sage)	/ -1
System out profiler ("No error occurd	Emor caught .
tather age: "+6-age +" In son age: "+	/ .
5.age);	Whongs Age input
4	Age should be greater them o
Cotch (son s)	Enter father Age
later the state of	
Submant Codes ( *	50
System ow Printer ( "e mor caught   149)	Entu sor Age

```
C:\Users\HP\Desktop>java MyException
Enter father age
50
Enter son age
78
Error caught
son age:78
father age:50
Son age should be less than father age
C:\Users\HP\Desktop>java MyException
Enter father age
Error caught
Age: 0
Wrong age Input
age should be greater than 0
C:\Users\HP\Desktop>java MyException
Enter father age
12
Enter son age
-1
Error caught
Age : -1
Wrong age Input
age should be greater than 0
```

#### **LAB PROGRAM -7:**

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

```
class one extends Thread{
public void run(){
try{
for(int i=0; i<5; i++){
System.out.println("\nBMS College of Engineering\n");
Thread.sleep(10000);
catch(InterruptedException e){
System.out.println("sleep exception\n");
class two extends Thread{ public void run(){ try{
for(int i=0; i<5; i++){
System.out.println("\nCSE\n");
Thread.sleep(2000);
catch(InterruptedException e){
System.out.println("sleep exception\n");
class Main{ public static void main(String args[]){
System.out.println("\nin main class\n");
new one().start();
new two().start();
```

I write a program which excelled his threads one thereof	PRODUCTION OF THE PROPERTY OF
displaying "Bus college of Engineering" one every	class malax
fen seconds and another dispropring "UE" and	Public Steady world main (String angel ))
Curry two seconds	- I GO ONE ():
	two be = new two ( );
class one extends Thread 1	tlistart();
Publis void min() {	tr.sport(2)
tryk	7
for (inti=0; ic3; i++){	4
System-out-product of Bons college of	
Enginery (n')	outrut:
Thread. sleep (10000);	BMS college on Friginiany
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,	Brus Cologe or Engineering
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Sy Vimout probleh (" Steel Crue hours)	CSE
4	COE
)	Para Landa de la companya del companya del companya de la companya
}	
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Pubmic void run() {	
Try (	
for (int-1=0; 123; 1++) {	
System-out-printer (" CNE");	
Toxad. s (exp (2000);	
4	
call le	
Catch (Exuption c) (	
341km.oub.pdalen (" Steef exaption");	
4	

```
in main class
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
BMS College of Engineering
BMS College of Engineering
BMS College of Engineering
```

#### **OPEN ENDED PROGRAM -8:**

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

```
package cie;
public class Internals {
       public int internal[]=new int[5];
package cie;
public class Student {
       public String name;
       public int usn;
       public int sem;
package see;
import cie. Internals;
public class External extends Student {
       public int external[]=new int[5];
import java.util.Scanner;
import cie. Internals;
import see.External;
public class Marks {
       public static void main(String[] args) {
                 int n:
                 Scanner sc=new Scanner(System.in);
                       System.out.println("enter number of students");
                       n=sc.nextInt();
                       External student[]=new External[n];
                       Internals internals[]=new Internals[n];
```

```
int final_marks[][]=new int[n][5];
                      for(int i=0;i<n;i++)
                              student[i]=new External();
                              internal[i]=new Internals();
                              System.out.println("Enter Student "+(i+1)+" name and usn and
sem respectively");
                              student[i].name=sc.next();
                              student[i].usn=sc.next();
                              student[i].sem=sc.nextInt();
                              System.out.println("Enter Internal marks of 5 subject in respective
order");
                              for(int j=0; j<5; j++)
                                      internal[i].internal_marks[j]=sc.nextInt();
                              System.out.println("Enter external marks of 5 subject in respective
order");
                              for(int k=0;k<5;k++)
                                      student[i].external[k]=sc.nextInt();
                      for(int i=0;i< n;i++)
                              for(int j=0; j<5; j++)
       final_marks[i][j]=internal[i].internal_marks[j]+(int)(student[i].external[j]/2);
                      for(int i=0;i<n;i++)
                              System.out.println("Name: "+student[i].name);
                              System.out.println("USN: "+student[i].usn);
                              System.out.println("Sem: "+student[i].sem);
                              System.out.println("Marks of the student "+(i+1)+" is");
                              for(int j=0; j<5; j++)
                                      System.out.println(final_marks[i][j]);
       }}
```

WEEK-S Comments	(FROM MO):
Chartea package CTE and which has his clared  - student and Internation. The clar personal has  - student and Internation. The clar personal has  mumbers life than, Norme, Jem. The clare  marks have an array fact shores the internal  marks scord in five subjects on a student. Charte  marks scord in five subjects on a student.  canother package SEE, which the has the  clare Extend which is downed alon or student.  clare Extend which is downed stores the SEE  This clare has an array that stores the SEE	imput CFE.*  imput SEE.*  imput SEE.*  Arbus claim mains (  public static void main (story args ()) (  Int 1)
the current semesher. Impart the two Packagerina till their declare the hard marks or the fill their declares the hard marks or the or stucked in all five causes.	Scanner Scenner (Sprimin);  System cuttification ("False number or structure");  m = Scenext Int();  External Student[] = new External [n];
Packeys (IE;	Student detent [] = new student [n];  int final marks [][] = new int [][5];  tor (int 1=0; icn; i++)
public int internal []= new int[s];  gublic class spectrot <	Student (i) = new External ();  defails (i) = new Student ();
Public int sem;	System och printer (" False studed USN order Sen ");  defails[i]. USN = SC. Next Int ();  defails[i]. Sen = Sc. Next Int ();  System och printer (" Enter Internal mane ont Judicat
Package SEE; import CTF.*;	for (in + j=0; i < 5; j++) {  student [i] · interned [i] = sc. rest(ine());
Public clan Fxtural Extends Student of  public int external (] = new int [s];	System out printer ("Entir Externed mans & Subject")  Hot (Int k=0; K(s; k+f) )  Student[]. Externed [k] = sc. next Int();

	(Figure No.
for (int 1=0; 1 < n; 1+1)	Enter Student War sem
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	226
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	3
	Foly Tolongs - A - A
(int) shuller (Ei). Externed [ * [ ] /2);	Foliar Internal marks or 5 subjects
1	2.8
1 4	34
ter(int)=0; icn; ith) 1	no
System and Amelia ("USN: "+ defeals [i]-USN);	tt3
Pyram our proble ("sem"+ defects [1] sem).	Enter External masts of 5 subjects
3 12 Windows (" months on the student ")	84
In ( a) = 0 , 12 , 1+1) 1	87
Syphonous enalen ("Hocal_mours[i] []].	76
y	65
1	34
1	USN: 227
4	
Output:	Scm: 3
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Enter structural vino and som	66
227 3	7.5
	77
Enter Interior munis on S Subjects	79
3 H 3 B	UIN: 224
	Sem: 3
32	Marks or should is
28	7H
ho	71
Entr extends many or ssubjects	72
hs many of stables	72
61	
8-1	70

```
C:\Users\ sushanth \OneDrive\Desktop\Java Notepad>java Marks
enter number of students
Enter Student 1 name and usn and sem respectively
Subhash
cs221
Enter Internal marks of 5 subject in respective order
34
45
43
Enter external marks of 5 subject in respective order
67
78
89
90
Name: Subhash
USN: cs221
Sem: 2
Marks of the student 1 is
51
67
84
87
77
```

## **LAB-PROGRAM-9:**

### **Demonstrate Inter process Communication and deadlock**

```
class printer{
      String str;
      printer()
            str="";
      synchronized void print(String str)
            System.out.print("["+str);
            try {
                   Thread.sleep(1000);
             }catch(InterruptedException e)
                   System.out.println("Error occured");
            try {
                   System.out.println("]");
                   Thread.sleep(1000);
             } catch (InterruptedException e) {
                   // TODO Auto-generated catch block
                   e.printStackTrace();
             }
      }
class SampleThread implements Runnable
      String msg;
      printer pt;
      Thread t;
      public SampleThread(printer pr,String message)
```

```
pt=pr;
            msg=message;
            t=new Thread(this);
            t.start();
      }
      @Override
      public void run() {
            // TODO Auto-generated method stub
            pt.print(msg);
      }
public class InterThread {
      public static void main(String[] args) {
            printer pt=new printer();
            SampleThread s1=new SampleThread(pt,"HELLO");
            SampleThread s2=new SampleThread(pt,"CSE");
            SampleThread s3=new SampleThread(pt,"WORLD");
            SampleThread s4=new SampleThread(pt,"BMS");
            try {
                  s1.t.join();
                  s2.t.join();
                  s3.t.join();
                  s4.t.join();
            } catch (InterruptedException e) {
                  // TODO Auto-generated catch block
                  e.printStackTrace();
      }
}
```

```
PS C:\Users\HP\Desktop\dark mode> cd "c:\Users\HP\Downloads\"
[HELLO]
[BMS]
[WORLD]
[CSE]
PS C:\Users\HP\Downloads>
```