VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

Object Oriented Java Programming

Submitted by

Kanjika Singh(1BM21CS086)

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**" carried out by **KANJIKA SINGH(1BM21CS086),** who is ba onafide 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((22CS3PCOOJ)** work prescribed for the said degree.

Prof. Basavaraj Jakkali
Assistant Professor
Department of CSE
BMSCE, Bengaluru

Dr. Jyothi S Nayak
Professor and Head
Department of CSE
BMSCE, Bengaluru

`

TABLE OF CONTENTS

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

Github-link: https://github.com/KanjikaSingh/OOJ_LAB

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

Code:

```
import java.util.*;


class main{
public static void main(String args[])
{
 System.out.println("Enter the coefficeints of quadratic equation");
Scanner sc= new Scanner(System.in);
double a=sc.nextDouble();
double b= sc.nextDouble();
double c=sc.nextDouble();
double d=(b*b)-(4*a*c);
double r1,r2;
 if(a==0){
  System.out.println("invlaid quadratic expression");
 }
 else{
if(d>0){
```

```
System.out.println("The roots are real and distinct");
r1=(-b+Math.sqrt(d))/(2*a);
r2=(-b-Math.sqrt(d))/(2*a);
System.out.print("The root r1 is "+r1);
System.out.print("The root r2 is "+r2);
}
if(d==0){
r1=r2=(-b)/(2*a);
System.out.println("The roots are equal");
System.out.print("The root r1,r2 are equal to "+r1);
}
else{
System.out.println("Roots are imaginary");
r1=(-b)/(2*a);
r2=(Math.sqrt(-d))/(2*a);
System.out.println("The first root is "+ r1+ "+i"+r2);
System.out.println("The first root is "+ r1+ "-i"+r2);
}
 }
}
}
```

Output:

```
PS C:\Users\kanji\OneDrive\Desktop\JAVA> cd "c:\Users\kanji\OneDrive\Desktop\JAVA\" ; if ($?) { javac College.java } ; if
 ($?) { java College }
Enter the coefficeints of quadratic equation
1
-1
1
Roots are imaginary
The first root is 0.5+i0.8660254037844386
The first root is 0.5-i0.8660254037844386
PS C:\Users\kanji\OneDrive\Desktop\JAVA> cd "c:\Users\kanji\OneDrive\Desktop\JAVA\" ; if ($?) { javac College.java } ; if
 ($?) { java College }
Enter the coefficeints of quadratic equation
0
1
0
invlaid quadratic expression
PS C:\Users\kanji\OneDrive\Desktop\JAVA> cd "c:\Users\kanji\OneDrive\Desktop\JAVA\" ; if ($?) { javac College.java } ; if
 ($?) { java College }
Enter the coefficeints of quadratic equation
1
2
1
The roots are equal
The root r1,r2 are equal to -1.0
PS C:\Users\kanji\OneDrive\Desktop\JAVA>
```

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.

Code:

```
Import
java.util.Scanner;
                    class Student{
                    String name;
                    String  USN;
                    int total_credits=0;
                    int sum=0;
                    void accept(String n,String USN){
                    this.name=n;
                    this.USN=USN;
                    }
                    void display(){
                    System.out.println("The name of student is  "+ this.name);
                    System.out.println("The USN of student is  "+ this.USN);
                    }
                    void calculate(int credits[],int marks[]){
                      for(int i=0;i<5;i++){
                    total_credits+=credits[i];
                    if(marks[i]>=90 && marks[i]<=100){
                       sum= sum+10*credits[i];
                    }
                    else if(marks[i]>=80 && marks[i]<90){
                       sum=sum+9*credits[i];
                    }
                    else if(marks[i]>=70 && marks[i]<80){
                       sum=sum+8*credits[i];
                    }
                    else if(marks[i]>=60 && marks[i]<70){
                       sum=sum+7*credits[i];
                    }
```

```
else if(marks[i]>=55 && marks[i]<60){
   sum=sum+6*credits[i];
}
else if(marks[i]>=50 && marks[i]<55){
   sum=sum+5*credits[i];
}
else if(marks[i]>=40 && marks[i]<50){
   sum=sum+4*credits[i];
}
else if(marks[i]<40){
   sum=sum+0*credits[i];
}
}


System.out.println("The total credits are " + total_credits);
System.out.println("The creditS x by your score grade point is
"+ sum);
double SGPA= (double)sum/total_credits;
System.out.println("Your SGPA is " + SGPA);




}
}


class kanji{
   public static void main(String[] args) {
int []credits= new int [10];
int [] marks=new int[10];
      Scanner sc= new Scanner(System.in);
      System.out.println("enter the name of student");
       String a=sc.nextLine();
        System.out.println("enter the usn of student");
        String b=sc.nextLine();
        Student s1= new Student();
```

```
        s1.accept(a,b);
        System.out.println("enter the marks of following subject
one by one \n 1.Maths\n 2.DBMS\n3.DST\n4.OOj\n5.LD");
        for(int i=0;i<5;i++){
            marks[i]=sc.nextInt();
        }
        System.out.println("enter the credits of following subject
one by one 1.Maths/n 2.DBMS\n3.DST\n4.OOj\n5.LD");
        for(int i=0;i<5;i++){
            credits[i]=sc.nextInt();
        }
        s1.display();
        s1.calculate(credits,marks);

    }
}
```

Output:

```
PS C:\Users\kanji\OneDrive\Desktop\JAVA> cd "c:\Users\kanji\OneDrive\Desktop\JAVA\" ; if ($?) { javac College.java } ; if
 ($?) { java College }cd "c:\Users\kanji\OneDrive\Desktop\JAVA\" ; if ($?) { javac College.java } ; if ($?) { java Colleg
e }
enter the name of student
Kan
enter the usn of student
1BM21CS099
enter the marks of following subject one by one
1.Maths
2.DBMS
3.DST
4.OOj
5.LD
78
84
92
45
67
enter the credits of following subject one by one
1.Maths
2.DBMS
3.DST
4.OOj
5.LD
4
4
3
3
2
The name of student is  Kan
The USN of student is  1BM21CS099
The total credits are 16
The creditS x by your score grade point is 124
Your SGPA is 7.75
```

LAB PROGRAM 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.

Code:

```
import
java.util.*;
                class book{
                String name,author;
                int price,num_pages;
                 void book(){
                Scanner sc=new Scanner(System.in);
                System.out.println("Enter book name");
                name=sc.nextLine();
                System.out.println("Enter author name");
                author=sc.nextLine();
                System.out.println("Enter price");
                price=sc.nextInt();
                System.out.println("Enter number of pages");
                num_pages=sc.nextInt();
                }
                void get(){
                System.out.println("The details of the book are as follows");
                System.out.println("");
                System.out.println("Book-Name : " + name+"\n");
                System.out.println("Book-Author : " + author+"\n");
                System.out.println("Book-Price : " + price+"\n");
                System.out.println("Book-Pages: " + num_pages+"\n");
                System.out.println("");
                System.out.println("");
                }
```

```
}


class week3{
public static void main(String args[]){
   Scanner sc= new Scanner(System.in);
 int n;
System.out.println("Enter the number of books ");
n=sc.nextInt();
book b[]=new book[n];
for(int i=0;i<n;i++){
b[i]=new book();
}
for(int i=0;i<n;i++){
b[i].book();
// b[i].display();
}
for(int i=0;i<n;i++){

b[i].get();
}
}
}
```

Output:

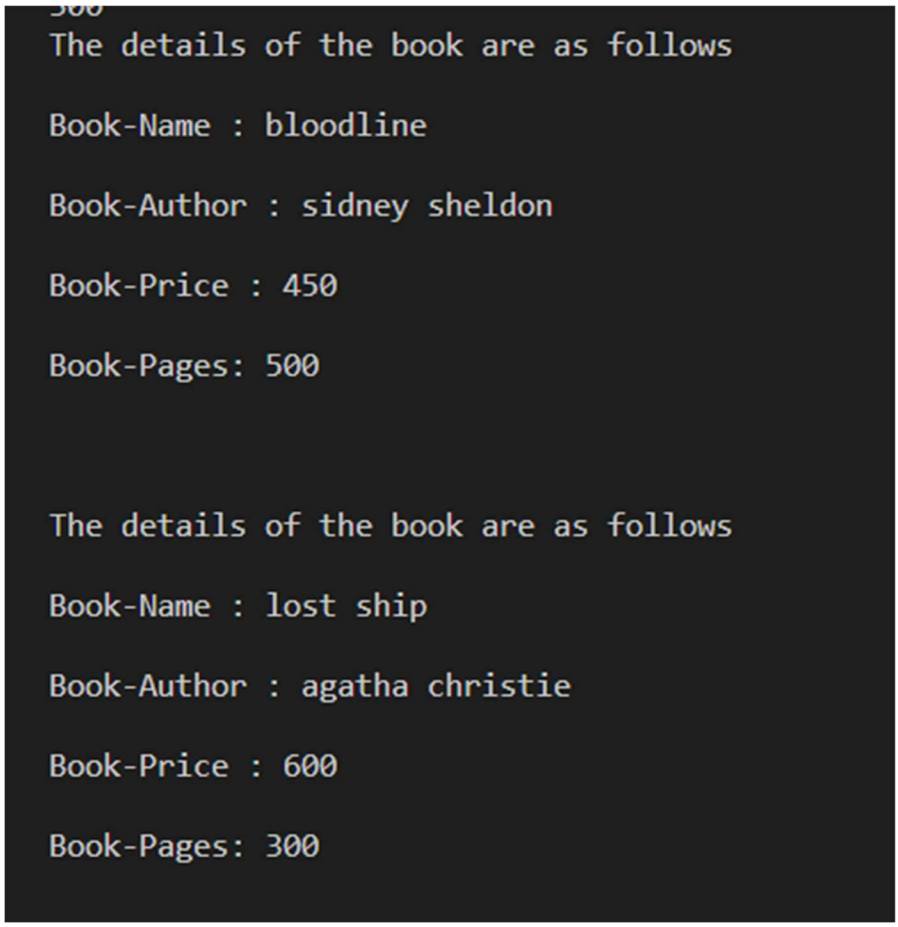
```
PS C:\Users\kanji\OneDrive\Desktop\JAVA> cd "c:\Users\kanji\OneDrive\Desktop\JAVA\" ; if ($?) { javac College.java } ; if
 ($?) { java College }
Enter the number of books
2
Enter book name
bloodline
Enter author name
sidney sheldon
Enter price
450
Enter number of pages
500
Enter book name
lost ship
Enter author name
agatha christie
Enter price
600
Enter number of pages
300
The details of the book are as follows

Book-Name : bloodline

Book-Author : sidney sheldon

Book-Price : 450

Book-Pages: 500
```



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.

Code:

```
import
java.util.*;

 abstract class shape{
int a,b;
double area;
double pi=3.14;
 public shape(int x,int y)
{ this.a=x;
 this.b=y;
}
abstract void  PrintArea();
}

class Rectangle extends shape{
 public Rectangle(int a,int b){
super(a,b);
}
void PrintArea(){
area=a*b;
System.out.println("Area of rectangle is " +area);
}
}


class Triangle extends shape{
```

```
public Triangle(int a,int b){
super(a,b);
}
void PrintArea(){
area=0.5*a*b;
System.out.println("Area of Triangle is " +area);
}
}


class Circle extends shape{
 public Circle(int a){
super(a,-1);
}
void PrintArea(){
area=pi*Math.pow(a,2);
System.out.println("Area of is  Circle " +area);
}
}




class weekyayy4{
public static void main(String args[]){
int choice;
int l,b;
Scanner sc=new Scanner(System.in);
while(true){
System.out.println("Enter your
choice\n1.Rectangle\n2.Circle\n3.Triangle\n4.Exit");
choice=sc.nextInt();
switch(choice){
case 1: System.out.println("enter length and breadth");
      l=sc.nextInt();
```

```
        b=sc.nextInt();
        Rectangle r1=new Rectangle(l,b);
        r1.PrintArea();
        break;
case 2: System.out.println("enter  radius");
      l=sc.nextInt();
//        b= sc.nextInt();
      Circle c=new Circle(l);
       // c.a= sc.nextInt();
       // c.b= sc.nextInt(c.a)
       c.PrintArea();
       break;
case 3: System.out.println("enter perpendicular and base");
l=sc.nextInt();
   b=sc.nextInt();
      Triangle t=new Triangle(l,b);

       t.PrintArea();
       break;
// case 4: exit(0);




 }
}
}
}
```

Output:

```
PS C:\Users\kanji\OneDrive\Desktop\JAVA> cd "c:\Users\kanji\OneDrive\Desktop\JAVA\" ; if ($?) { javac College.java } ; if
 ($?) { java College }
Enter your choice
1.Rectangle
2.Circle
3.Triangle
4.Exit
1
enter length and breadth
5
3
Area of rectangle is 15.0
Enter your choice
1.Rectangle
2.Circle
3.Triangle
4.Exit
2
enter  radius
7
Area of is  Circle 153.86
Enter your choice
1.Rectangle
2.Circle
3.Triangle
4.Exit
3
enter perpendicular and base
5
6
Area of Triangle is 15.0
Enter your choice
1.Rectangle
2.Circle
3.Triangle
4.Exit
```

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. 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.

Code:

```
import
java.util.Scanner;
                    import java.lang.Math;
                    class Account
                    {
                    String name, acc_type;
                    int acc_no;
                    double bal,dep;
                    Scanner scan= new Scanner(System.in);
                    void setd()
                    {
                    System.out.println("Enter your Name:");
                    name=scan.next();
                    System.out.println("Enter your Account Number:");
                    acc_no=scan.nextInt();
```

```
System.out.println("Enter your Account type:
(Savings/Current)");
acc_type=scan.next();
System.out.println("Enter the Bank Balance:");
bal=scan.nextInt();
}
void disp()
{
System.out.println("Name: "+name);
System.out.println("Account Number: "+acc_no);
System.out.println("Account Type: "+acc_type);
System.out.println("Current balance is: "+bal);
}
void deposit()
{
System.out.println("Enter the amount to be deposited:");
dep=scan.nextInt();
bal+=dep;
System.out.println("BALANCE AMOUNT: "+bal);
}

}
class Cur_acct extends Account
{
int penal()
{
double min, pen;
System.out.println("Enter Minimum balance & penalty
amount if not followed:");
min=5000; pen=min*0.05;
if(bal<min)
{
bal-=pen;
System.out.println("Penalty imposed for having insufficient
balance"); return 0;
}
else
```

```
   {System.out.println("No penalty");
   return 1;}
}
void withdrawal()
{
double amt;
System.out.println("Enter amount to be withdrawn:");
amt=scan.nextInt();
          int a= penal();
if(a==1)
{
if(bal>=amt)
             { bal=bal-amt;
System.out.println("Account Balance after withdrawal is:"
+bal);}
}
else
            System.out.println("The amount can't be
withdrawn");
     }
}
class Sav_acct extends Account
{
void calc_interest()
{
System.out.println("Enter Time in years and Rate of interest");
double t=scan.nextDouble(); double r=scan.nextDouble();
double CI = bal*Math.pow((1 + r/ 100), t);
System.out.println("ACCOUNT BALANCE:" + bal);
System.out.println("Compounding interest:"+ CI);
}
void withdrawal()
{
double amt;
System.out.println("Enter amount to be withdrawn:");
amt=scan.nextInt();
if(bal>=amt)
```

```
            { bal=bal-amt;
System.out.println("Account Balance after withdrawal is:"
+bal);}
else
            System.out.println("The amount can't be
withdrawn");
    }
}
class bank
{
  public static void main(String arg[])
  {
Scanner ss=new Scanner(System.in);
Account b1=new Account();
b1.setd();
if(b1.acc_type.equals("Savings"))
{
Sav_acct s1=new Sav_acct();
//s1=b1;
s1.name=b1.name; s1.acc_no=b1.acc_no;
s1.acc_type=b1.acc_type; s1.bal=b1.bal;
while(true)
{
System.out.println("Enter your
choice:\n1.Deposit\n2.Calculate
interest\n3.Withdraw\n4.Display\n5.Exit");
int choice=ss.nextInt();
switch(choice)
{
case 1: s1.deposit(); break;
case 2: s1.calc_interest(); break;
case 3: s1.withdrawal(); break;
case 4: s1.disp(); break;
case 5: System.exit(0);
default: System.out.println("Invalid input");
}
}
```

```
}
else if(b1.acc_type.equals("Current"))
{
Cur_acct c1=new Cur_acct();
c1.name=b1.name; c1.acc_no=b1.acc_no;
c1.acc_type=b1.acc_type; c1.bal=b1.bal;
while(true)
{
System.out.println("Enter your choice:\n1.Deposit\n2.Penalty
Check\n3.Withdraw\n4.Display\n5.Exit");
int choice=ss.nextInt();
switch(choice)
{
case 1: c1.deposit(); break;
case 2: c1.penal(); break;
case 3: c1.withdrawal(); break;
case 4: c1.disp(); break;
case 5: System.exit(0);
default: System.out.println("Invalid input");
}
}
}
else
 System.out.println("Invalid Account type");
  }
}
```

Output:

```
        at College.main(College.java:3540)
PS C:\Users\kanji\OneDrive\Desktop\JAVA> cd "c:\Users\kanji\OneDrive\Desktop\JAVA\" ; if ($?) { javac College.java } ; if
 ($?) { java College }
Enter your Name:
Kanjika
Enter your Account Number:
1234
Enter your Account type: (Savings/Current)
Savings
Enter the Bank Balance:
120000
Enter your choice:
1.Deposit
2.Calculate interest
3.Withdraw
4.Display
5.Exit
1
Enter the amount to be deposited:
150
BALANCE AMOUNT: 120150.0
Enter your choice:
1.Deposit
2.Calculate interest
3.Withdraw
4.Display
5.Exit
2
Enter Time in years and Rate of interest
5
0.5
ACCOUNT BALANCE:120150.0
Compounding interest:123183.93806334415
Enter your choice:
1.Deposit
2.Calculate interest
3.Withdraw
4.Display
5.Exit
3
Enter amount to be withdrawn:
15000
Account Balance after withdrawal is:105150.0
Enter your choice:
1.Deposit
2.Calculate interest
3.Withdraw
4.Display
5.Exit
```

```
2
Enter Time in years and Rate of interest
5
0.5
ACCOUNT BALANCE:120150.0
Compounding interest:123183.93806334415
Enter your choice:
1.Deposit
2.Calculate interest
3.Withdraw
4.Display
5.Exit
3
Enter amount to be withdrawn:
15000
Account Balance after withdrawal is:105150.0
Enter your choice:
1.Deposit
2.Calculate interest
3.Withdraw
4.Display
5.Exit
4
Name: Kanjika
Account Number: 1234
Account Type: Savings
Current balance is: 105150.0
Enter your choice:
1.Deposit
2.Calculate interest
3.Withdraw
4.Display
5.Exit
5
```

```
PS C:\Users\kanji\OneDrive\Desktop\JAVA> cd "c:\Users\kanji\OneDrive\Desktop\JAVA\" ; if ($?) { javac College.java } ; if ($?) { java College }
Enter your Name:
kanva
Enter your Account Number:
1456
Enter your Account type: (Savings/Current)
Current
Enter the Bank Balance:
70000
Enter your choice:
1.Deposit
2.Penalty Check
3.Withdraw
4.Display
5.Exit
1
Enter the amount to be deposited:
200
BALANCE AMOUNT: 70200.0
Enter your choice:
1.Deposit
2.Penalty Check
3.Withdraw
4.Display
5.Exit
2
Enter Minimum balance & penalty amount if not followed:
No penalty
Enter your choice:
1.Deposit
2.Penalty Check
3.Withdraw
4.Display
5.Exit
4
Name: kanva
Account Number: 1456
Account Type: Current
Current balance is: 70200.0
Enter your choice:
1.Deposit
2.Penalty Check
3.Withdraw
4.Display
5.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.

Code:

```
import java.util.*;
class WrongAge extends Exception
{
 int a;
 String s;
 WrongAge(int x)
 {
 a=x;
 }
 public String toString()
 {
 if(a<=0)
 s="Invalid Age!";
 return s;
 }
}
class WrongSonAge extends Exception
```

```
{
 int s_a,f_a;
 String str;
 WrongSonAge(int x, int y)
 {
 s_a=x;
 f_a=y;

 }
 public String toString()
 {
 if(s_a>=f_a)
 str= "Son's age cannot be more than or equal to father's age!";
 return str;
 }
}
class Father
{
 Scanner sc=new Scanner(System.in);
 int f_age;
 Father() throws WrongAge
 {
 System.out.println("Enter father's age:");
 f_age=sc.nextInt();
 if(f_age<=0)
```

```
 throw new WrongAge(f_age);
 }
}
class Son extends Father
{
 Scanner sc=new Scanner(System.in);
 int son_age;
 Son() throws WrongAge
 {

 System.out.println("Enter son's age:");

 son_age=sc.nextInt();
 }
 void check()throws WrongAge{
 if(son_age<=0)

 throw new WrongAge(son_age);
 }
 void compare() throws WrongSonAge
 {
 if(son_age>=f_age)
 throw new WrongSonAge(son_age,f_age);
 else
 {
```

```
System.out.println("Father's age: "+f_age);
System.out.println("Son's age: "+son_age);
}
}
}
public class oojLabProg6
{
public static void main(String[] args)
{

Scanner sc=new Scanner(System.in);
try
{
Son obj2=new Son();
obj2.check();
obj2.compare();
}

catch(WrongAge e)
{
System.out.println(e);
}
catch(WrongSonAge e)
{
System.out.println(e);
```

```
 }
 sc.close();
}
}
```

Output

```
PS C:\Users\kanji\OneDrive\Desktop\JAVA> cd "c:\Users\kanji\OneDrive\Desktop\JAVA\" ; if ($?) { javac College.java } ; if
 ($?) { java College }
Enter father's age:
12
Enter son's age:
19
Son's age cannot be more than or equal to father's age!
PS C:\Users\kanji\OneDrive\Desktop\JAVA> cd "c:\Users\kanji\OneDrive\Desktop\JAVA\" ; if ($?) { javac College.java } ; if
 ($?) { java College }
Enter father's age:
-1
Invalid Age!
PS C:\Users\kanji\OneDrive\Desktop\JAVA>
```

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.

Code:

```
class Thread1 extends Thread
{
 public void run()
 {
 try
 {
 for(int i=1;i<=5;i++)
 {
 System.out.println("BMS College of Engineering");
 Thread.sleep(10000);
 }
 }
 catch(InterruptedException e)
 {
 System.out.println(e);
 }
 }
}
```

```
class Thread2 extends Thread
{
 public void run()
 {
 try
 {
 for(int i=1;i<=5;i++)
32
 {
 System.out.println("CSE");
 Thread.sleep(2000);
 }
 }
 catch(InterruptedException e)
 {
 System.out.println(e);
 }
 }
}
public class oojLabProg8
{
 public static void main(String args[])
 {
 Thread1 t1=new Thread1();
 t1.start();
```

```
 Thread2 t2=new Thread2();
 t2.start();
 }
}
```

Output:

```
PS C:\Users\kanji\OneDrive\Desktop\JAVA> cd "c:\Users\kanji\OneDrive\Desktop\JAVA\" ; if ($?) { javac College.java } ; if
 ($?) { java College }
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
BMS College of Engineering
```