# VISVESVARAYA TECHNOLOGICAL UNIVERSITY "JnanaSangama", Belgaum -590014, Karnataka.



LAB REPORT on

# **OBJECT ORIENTED JAVA PROGRAMMING**

Submitted by

PRAJWAL G (1BM21CS134)

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 PRAJWAL G(1BM21CS134), 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 Programming Lab- (21CS3PCOOJ) work prescribed for the said degree.

Syed Akram **Dr. Jyothi S Nayak** Assistant Professor Professor and Head Department of CSE Department of CSE BMSCE, Bengaluru BMSCE, Bengaluru

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#### **Course Outcome**

CO1	Apply the knowledge of Java concepts to find the solution for a given problem.
	given problem.

CO2	Analyze 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: QUADRATIC EQUATIONS**

## CODE:

```
import java.util.Scanner;
import java.lang.Math;
public class Trial
  public static void main(String[] args)
     {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter the coefficients:
        "); float a = s.nextFloat();
        float b = s.nextFloat();
        float c = s.nextFloat();
        double r1.r2;
        float d = (b*b)-(4.0f*a*c);
        if(d>0)
        {
           r1=(-b+Math.sqrt(d))/(2*a);
          r2=(-b-Math.sqrt(d))/(2*a);
           System.out.println("Roots are Real");
           System.out.println("Root 1: "+r1+" Root 2:
        "+r2); }
        else if(d==0)
        {
           r1=(-b)/(2*a);
           System.out.println("Roots are Equal");
           System.out.println("Root is: "+r1);
        }
```

```
else
    {
        double e =(-b)/(2.0f*a);
        double f =(Math.sqrt(-d))/(2*a);
        System.out.println("Roots are
        imaginary"); System.out.println("Root 1:
        "+e+"i+"+f);
        System.out.println("Root 2: "+e+"i-"+f);
    }
}
```

```
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inport your long Hath;
class graduati
public states void rien (String[] arys)
 Scanner Sc= rew Scanner (System in);
 double or 1.
 doubt 912;
 System. Out. print In ("enter values of a, b, c");
 () the trans = p this
 System out pied In ("ais +a);
 idb: scred fort ();
 System . Out . print ln (" bis" + b);
int C= 5(. pet 1st ();
System . out . pied sh (" (" is" + 0);
it d= (1+b) - (4+a+0;
 System out pried In ("dis"+d),
 if (d >0)
 System . out . print In (" saits are real and disterd");
```

```
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or ]: (- h- Math-sypt (d) / (2+a));
System . out . pied In (" the stook one" 1911 " and " +912)
cle it (d==0)
System . Out pietlin ("rests one real and equal");
817 = 215 = (-P) 1879 3
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clse
System out post In ("roots are mozerary");
 The (Math. Synt (Halls. alus (d))) / (dta);
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 System . out . print In (" or 2 = " + or 1 + " - i" + ord);
```

```
Select Command Prompt
C:\Users\student\Desktop>java Quad.java
enter the coefficients a,b,c:
Imaginary roots
Root 1: -0.5i+0.8660254037844386
Root 2: -0.5i-0.8660254037844386
C:\Users\student\Desktop> 1 4 2
'1' is not recognized as an internal or external command,
operable program or batch file.
C:\Users\student\Desktop> java Quad.java
enter the coefficients a,b,c:
1 4 2
Roots are real and distinct
Root 1:-3.414213562373095 root 2:-0.5857864376269049
C:\Users\student\Desktop>java Quad.java
enter the coefficients a,b,c:
Roots are equal and real
Roots are:-3.0
C:\Users\student\Desktop>_
```

#### LAB PROGRAM 2: SGPA CALCULATION

```
import java.util.Scanner;
class Student
{
    String USN;
    String name;
    int[] credits = new int[20];
    int[] marks = new int[20];
    void input(int n)
```

```
{
      Scanner s = new Scanner(System.in);
      System.out.print("Enter Student USN: ");
      USN = s.nextLine();
      System.out.print("Enter Student Name: ");
      name = s.nextLine();
     for(int i=0;i<n;i++)
      {
      System.out.print("Enter the Subject "+(i+1)+" marks and
credits respectively: ");
      marks[i] = s.nextInt();
      credits[i] = s.nextInt();
      }
      }
     float calculate(int n)
      {
      int sum_of_credits = 0;
     float result=0.0f;
     for(int i=0;i<n;i++)
      {
      sum_of_credits+=credits[i];
        if(calculate_grade_point(marks[i])==-1
            ) return -1.0f;
```

else

```
{
            result = result +(float)
(calculate_grade_point(marks[i])*credits[i]);
      }
      }
      return (result/sum_of_credits);
      int calculate_grade_point(int
      marks) {
      if(marks>=90)
      return 10;
      else if
      ((marks>=80)&&(marks<90))
      return 9;
      else if
      ((marks>=70)&&(marks<80))
      return 8;
      else if
      ((marks > = 60) & (marks < 70))
      return 7;
      else if
      ((marks > = 50) & (marks < 60))
      return 6;
```

```
((marks > = 40) & (marks < 50))
      return 5;
      return -1;
      }
     void display(int n,float
      result) {
      System.out.println("\n");
      System.out.println("Student Details");
      System.out.println();
      System.out.println("Student USN: "+USN);
      System.out.println("Student Name: "+name);
      System.out.println("Student Marks and Credits");
     for(int i=0;i<n;i++)
      {
      System.out.println("Subject 1 -->\tMarks: "+marks[i]+"
Credits: "+credits[i]);
      }
      System.out.println("SGPA: "+result);
      }
}
public class Lab_02_SGPA
```

else if

```
public static void main(String[] args)
      {
      Scanner s = new Scanner(System.in);
      Student s1 = new Student();
      System.out.print("Enter the number of subjects: ");
      int n = s.nextInt();
      s1.input(n);
      float result = s1.calculate(n);
      if(result == -1.0f)
      {
      System.out.println();
      System.out.println("The Student has failed in a subject. SGPA cannot
be calculated!");
      System.exit(0);
      }
      s1.display(n,result);
      }
}
```

```
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inport jour util . +;
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double prin ;
in run Poges ;
 Book()
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  in P, n;
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```
Command Prompt
```

```
C:\Users\bmsce>javac BookDetails.java

C:\Users\bmsce>java BookDetails
Enter the number of Books

1
Enter the Title of the Books
jesus
Enter the Author of the Books
inshallah
Enter the Price of the Books
200
Enter the Number of pages of the Books
100
Title Author Price Pages
jesus inshallah 200.0 100
```

## LAB PROGRAM 3: IMPLEMENTING ARRAY OF OBJECTS

```
import java.util.*;
import java.io.*;

class Book
{
    String title,author;
float price;
int num_pages;

Book()
{
    title = "Default Value";
```

```
author = "Default Value";
price = 0.0f;
num_pages = 0;
}
void setTitle(String title)
this.title=title;
}
void setAuthor(String author)
{
this.author=author;
}
void setPrice(float
price) {
this.price=price;
}
void setPages(int num_pages)
{
this.num_pages = num_pages;
}
```

```
public String toString()
return
title+"\t\t"+author+"\t\t"+price+"\t\t"+num_pages+"\n"; }
}
public class BookDetails
{
public static void main(String args[])
{
String t, a;
float p;
int np,n;
Scanner s = new Scanner(System.in);
System.out.print("Enter the number of Books:
"); n = s.nextInt();
Book[] b = new Book[n];
for(int i=0;i<n;i++)
{
```

```
System.out.println();
System.out.print("Enter the book name: ");
t = s.next();
System.out.print("Enter the author name:
"); a = s.next();
System.out.print("Enter the book price: ");
p = s.nextFloat();
System.out.print("Enter the number of pages:
"); np = s.nextInt();
b[i] = new Book();
b[i].setTitle(t);
b[i].setAuthor(a);
b[i].setPrice(p);
b[i].setPages(np);
System.out.println("Title \t\t Author \t\t Price \t\t
Pages\n"); for(int i=0; i<n;i++)
{
System.out.println(b[i]);
}
}
}
```

```
importigano io .+;
royall jour util . Scanner .
News student &
  Steery rane;
 Steem USN;
 ist nod Courses;
int Gulits [] - new Ind [10];
indernates []= new 500 [10];
Scanners = New Scannor (System: (n).
```

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    St: Wedels [.i];
  3 relia d/(5 8 + 10);
  3 public dues sapa {
puller Blater land reien (Steens (Jarge) {
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i siteries (n); signt (1; double of: 5. Toles SUPA ();
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```

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```
C:\Users\bmscecse\Desktop>java SGPA
Enter the number of subjects: 5
Enter Student USN: 1BM21CS180
Enter Student Name: ABCXYZ
Enter the Subject 1 marks and credits respectively: 99 4
Enter the Subject 2 marks and credits respectively: 91 3
Enter the Subject 3 marks and credits respectively: 92 2
Enter the Subject 4 marks and credits respectively: 81 1
Enter the Subject 5 marks and credits respectively: 78 1
Student Details
Student USN: 1BM21CS180
Student Name: ABCXYZ
Student Marks and Credits
Subject 1 --> Marks: 99 Credits: 4
Subject 1 --> Marks: 91 Credits: 3
Subject 1 --> Marks: 92 Credits: 2
Subject 1 --> Marks: 81 Credits: 1
Subject 1 --> Marks: 78 Credits: 1
SGPA: 9.727273
```

## LAB PROGRAM 4: CALCULATING AREA OF SHAPES (ABSTRACT CLASS)

```
import java.util.Scanner;
public class Shape1
{
    public static void main(String args[])
    {
      int choice;
      Scanner s = new Scanner(System.in);
      do
```

```
{
      System.out.println("1. Calculate Area of Rectangle\n2. Calculate Area
of Triangle\n3. Calculate Area of " +
            "Circle\n4. Exit the Program\n\nEnter the choice: ");
      choice = s.nextInt();
      switch(choice)
      {
            case 1: Rectangle r = new Rectangle();
                  r.printArea();
                  break;
            case 2: Triangle t = new Triangle();
                  t.printArea();
                  break;
            case 3: Circle c = new Circle();
                  c.printArea();
                  break;
            case 4: System.out.println("Exiting the
                  program!"); System.exit(0);
                  break;
            default: System.out.println("\nInvalid Choice!\n");
      }
      }while(true);
      }
```

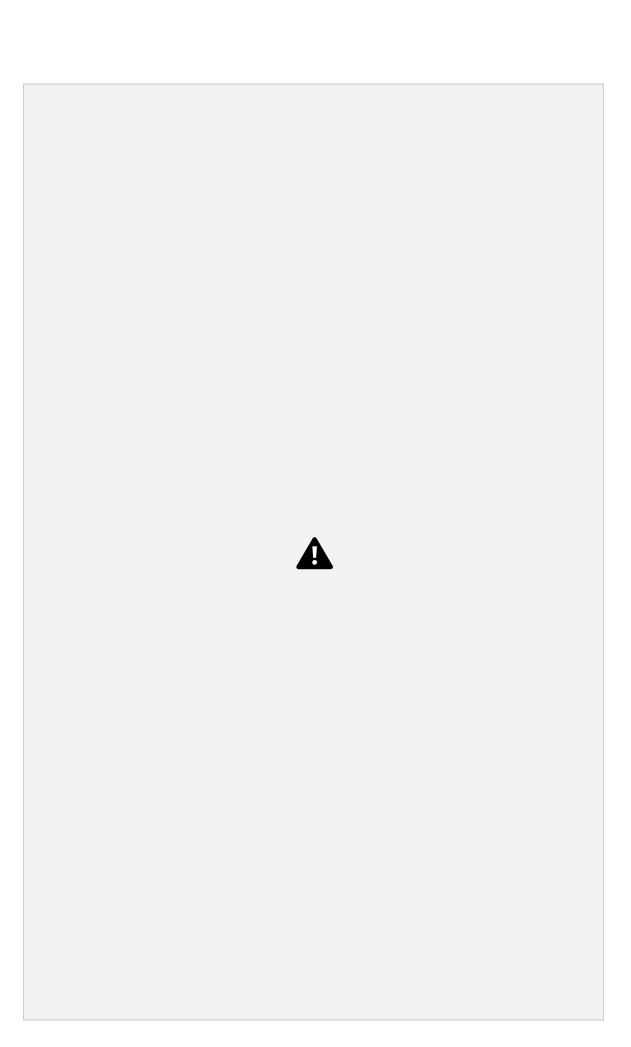
}

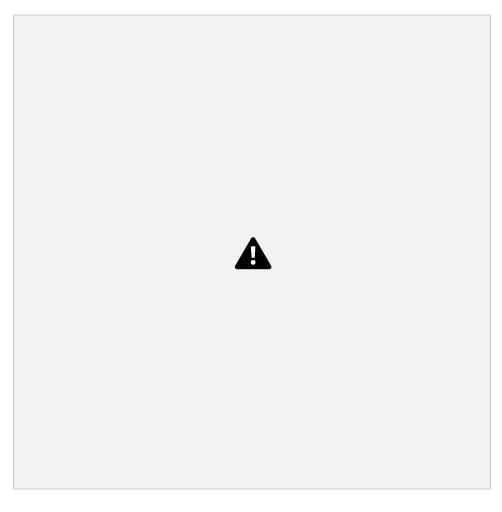
```
abstract class Shape
{
      int a,b;
      abstract void printArea();
}
class Rectangle extends Shape
     void printArea()
      {
      int area;
      Scanner s = new Scanner(System.in);
      System.out.println("Enter the length and breadth of rectangle:
      "); a = s.nextInt();
      b = s.nextInt();
      area = a*b;
      System.out.println("\nArea of Rectangle:
      "+area+"\n"); }
}
class Triangle extends Shape
{
     void printArea()
```

```
{
     float area;
      Scanner s = new Scanner(System.in);
      System.out.println("Enter the base and height of triangle:
      "); a = s.nextInt();
      b = s.nextInt();
      area = 0.5f*a*b;
      System.out.println("\nArea of triangle:
      "+area+"\n"); }
}
class Circle extends Shape
{
     void printArea()
      {
      double area;
      Scanner s = new Scanner(System.in);
      System.out.println("Enter the radius of circle:
      "); a = s.nextInt();
      area = Math.PI*a;
      System.out.println("Area of Circle:
      "+area+"\n"); }
}
```

1 Stape inpost java atel. +. distrod class a { dould x,y; aldouble is double i) X=1;

Holum 0. 3+ x+y class in extends a Boulek area () Othan 314+x+y; Class week 4 { qualitic states wastrain ( string wegs 7) System. out pied in ("Inter the length and brusht of double 1-8. verd 1,00; double &= screet for ();





## **LAB PROGRAM 5: BANK PROGRAM**

```
import java.util.Scanner;
class Account
{
    String customer_name;
    long acc_no;
    float bal;
    Scanner s = new Scanner(System.in);
    public void input()
    {
}
```

```
System.out.print("\nEnter the Customer Name: ");
     customer name = s.nextLine();
     System.out.print("\nEnter the Account Number: ");
     acc_no = s.nextLong();
     System.out.print("\nEnter the Starting Amount (Minimum Amount
= 5000): ");
     bal = s.nextFloat();
     if(bal<5000f)
    {
       System.out.println("\nAccount Balance cannot be less than
5000.0 \n");
       System.exit(0);
    }
  public void display()
  {
     System.out.println("\nCustomer Name:
     "+customer_name); System.out.println("Account Number:
     "+acc_no); System.out.println("Amount: "+bal);
  }
}
class Savings extends Account
{
  Scanner s = new Scanner(System.in);
  float deposit, withdraw, interest;
  public void deposit()
```

```
System.out.print("\nEnter the amount to be deposited:
     "); deposit = s.nextFloat();
     bal+=deposit;
     System.out.println("\nBalance: "+bal);
  }
  public void withdraw()
  {
     System.out.print("\nEnter the amount to be withdrawn:
     "); withdraw = s.nextFloat();
     if(bal<5000)
     {
       System.out.println("\nInsufficient Balance");
     }
     else
       bal-=withdraw;
       System.out.println("\nAmount Withdrawn: "+withdraw+"\nBalance:
"+bal);
     }
  }
  public void check_Bal()
     if(bal<5000)
     {
        System.out.println("\nInsufficient Balance!\\nBalance:
     "+bal); }
     else
```

```
System.out.println("\nBalance: "+bal);
     }
  }
  public void interest()
     interest=(bal*6)/100;
     bal+=interest;
     System.out.println("\nInterest Credited: "+interest+"\nBalance:"+bal)
  ; }
}
class Current extends Account
{
  float deposit, withdraw, penalty;
  public void deposit()
  {
     System.out.print("\nEnter Amount to be deposited: ");
     deposit = s.nextFloat();
     bal += deposit;
     System.out.println("Balance: " + bal);
  }
  public void check_Bal()
  {
     if (bal < 5000)
        penalty = (0.1f * bal);
```

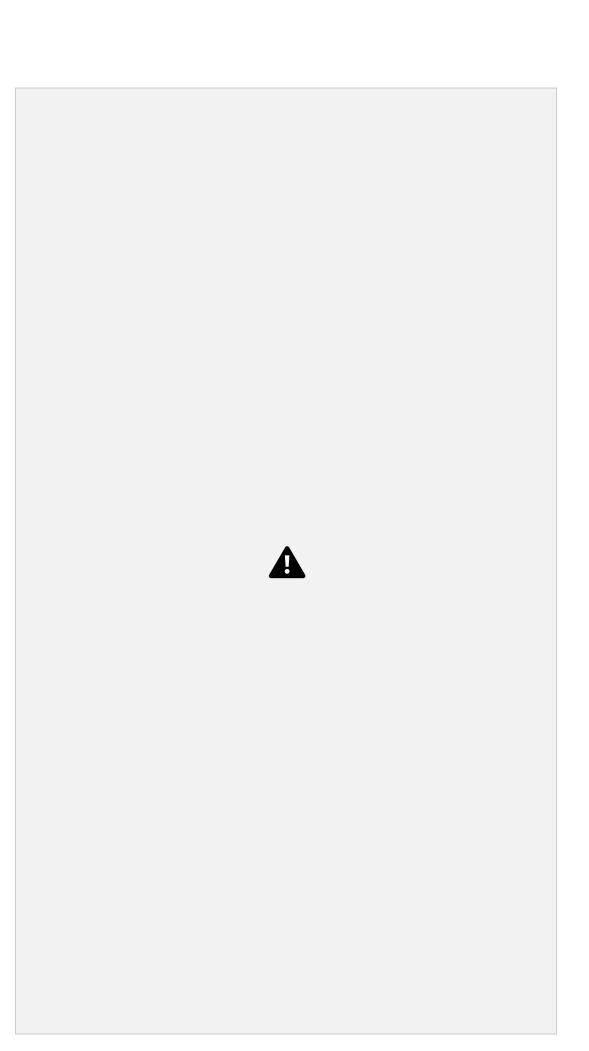
```
System.out.println("\nInitial Account Balance: "+bal);
       bal = bal-penalty;
       System.out.println("\nLow balance!\nPenalty Amount: " + penalty +
"\nAccount balance: " + bal);
    }
     else
       System.out.println("\n Balance: " + bal);
     }
  }
  public boolean check_Bal_part_2()
     if (bal < 5000)
    {
       penalty = (0.1f * bal);
       System.out.println("\nInitial Account Balance: "+bal);
       bal = bal-penalty;
       System.out.println("\nLow Balance!\nPenalty Amount: " + penalty +
"\nAccount balance: " + bal);
       return false;
    }
     return true;
  }
  public void withdraw()
  {
     System.out.print("\nEnter Amount to withdraw: ");
    withdraw = s.nextFloat();
```

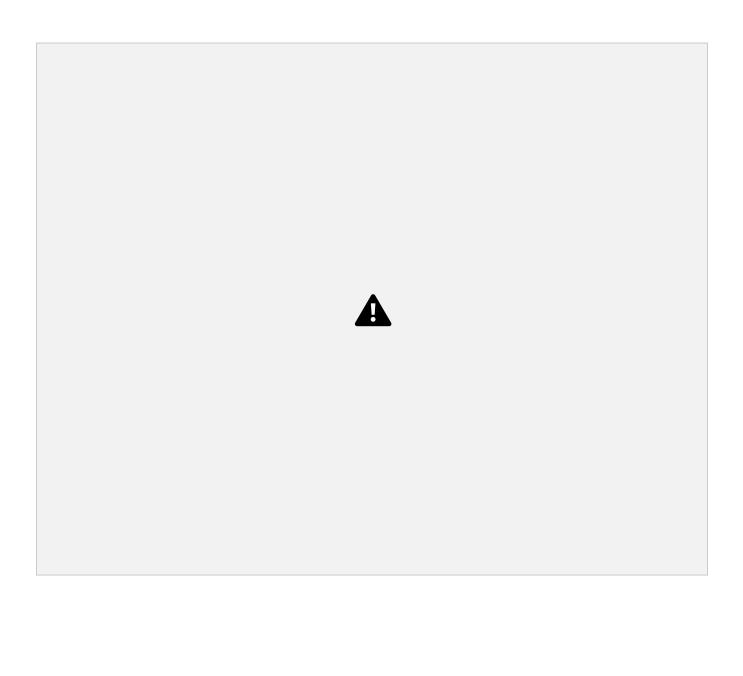
```
if(check_Bal_part_2())
     {
       bal-=withdraw;
       System.out.println("\nAmount Withdrawn:
"+withdraw+"\nBalance: "+bal);
     }
  }
  public void chequebook()
  {
     System.out.println("\nCheque Book has been
  Issued!"); }
}
public class Bank
  public static void main(String[] args)
     Scanner s = new Scanner(System.in);
     String ch;
     int n;
     Current c = new Current();
     Savings sa = new Savings();
     System.out.print("\nEnter the Account Type (S for Savings, C
for Current): ");
     ch = s.next();
     switch(ch.toLowerCase())
     {
```

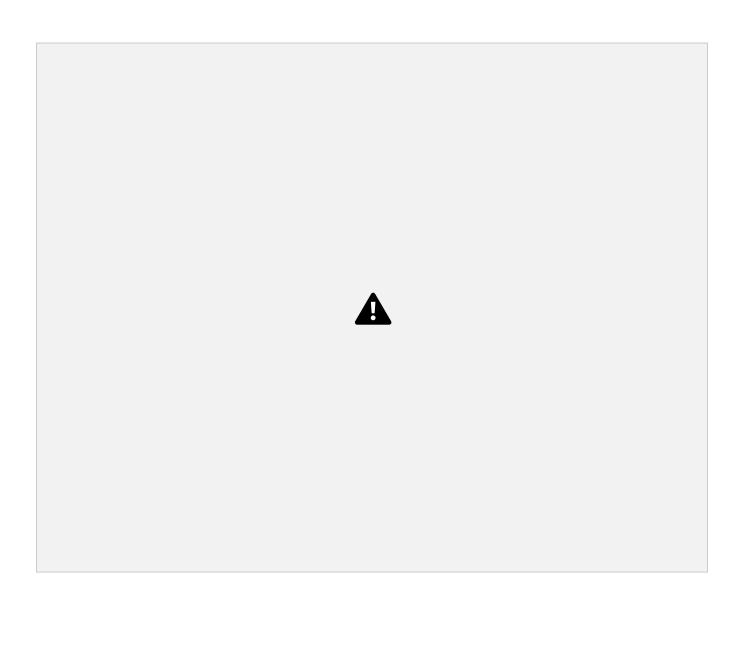
```
case "s" : sa.input();
               do
                  System.out.print("\n1. Deposit \n2. Withdrawal \n3.
Check Balance \n4. Check Interest"
                       +"\n5. Show Account Details \n6. Exit
Transaction\n\nEnter your choice: ");
                  n = s.nextInt();
                  switch(n)
                  {
                     case 1 : sa.deposit();
                           break:
                     case 2 : sa.withdraw();
                           break;
                     case 3 : sa.check_Bal();
                           break;
                     case 4 : sa.interest();
                           break;
                     case 5 : sa.display();
                           break;
                     case 6 : System.out.println("\nExiting Transaction!");
                           System.exit(0);
                           break;
                     default : System.out.println("\nInvalid Operation");
                  }
               }while(true);
        case "c" : c.input();
               do {
                  System.out.print("\n1. Deposit \n2. Withdrawal \n3.
Check Balance \n4. Issue Cheque Book"
```

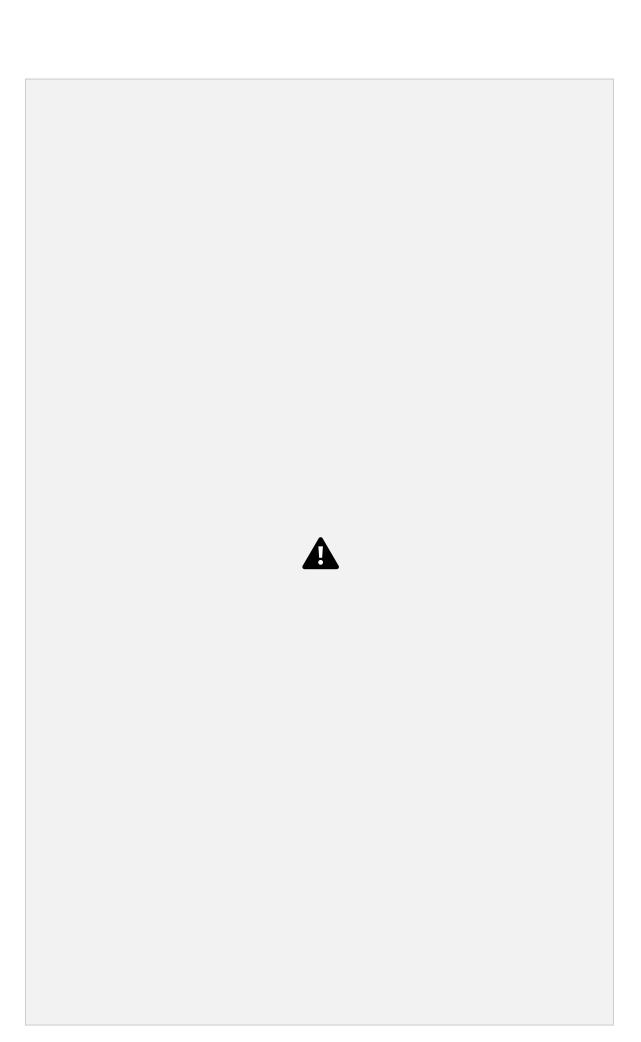
```
+ "\n5. Show Account Details \n6. Exit
Transaction\n\nEnter your choice: ");
                  n = s.nextInt();
                  switch (n) {
                    case 1:
                       c.deposit();
                       break;
                    case 2:
                       c.withdraw();
                       break;
                    case 3:
                       c.check_Bal();
                       break;
                    case 4:
                       c.chequebook();
                       break;
                    case 5:
                       c.display();
                       break;
                    case 6:
                       System.out.println("\nExiting Transaction!");
                       System.exit(0);
                       break;
                    default:
                       System.out.println("\nInvalid Operation");
                  }
               }while(true);
        default : System.out.println("\nInvalid Choice");
```

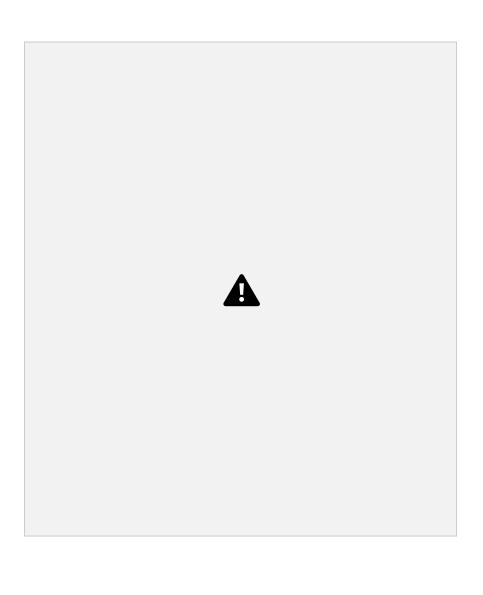
```
break;
}
}
```

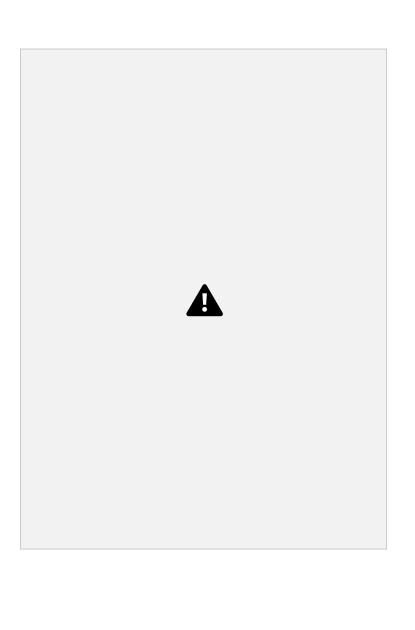


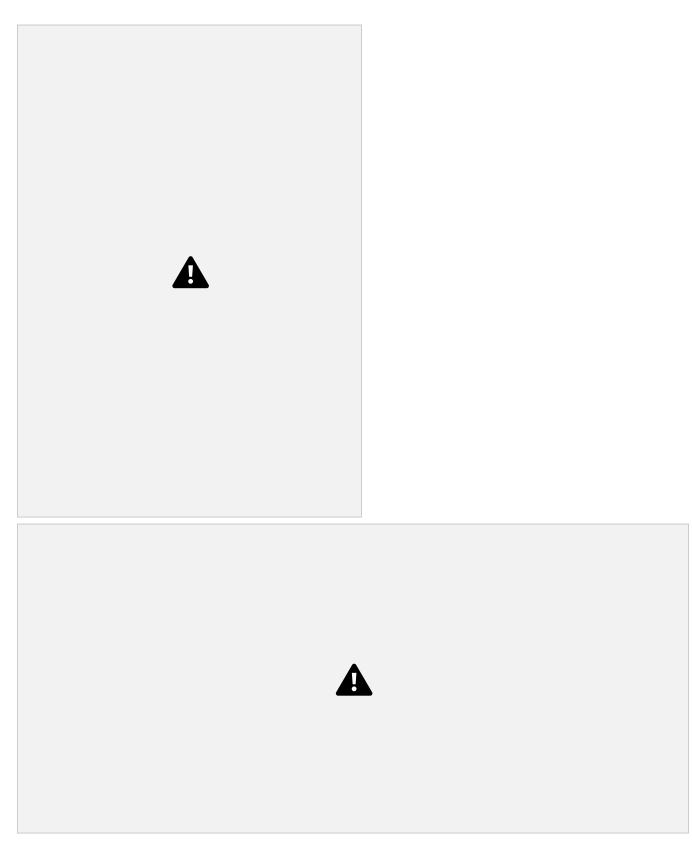












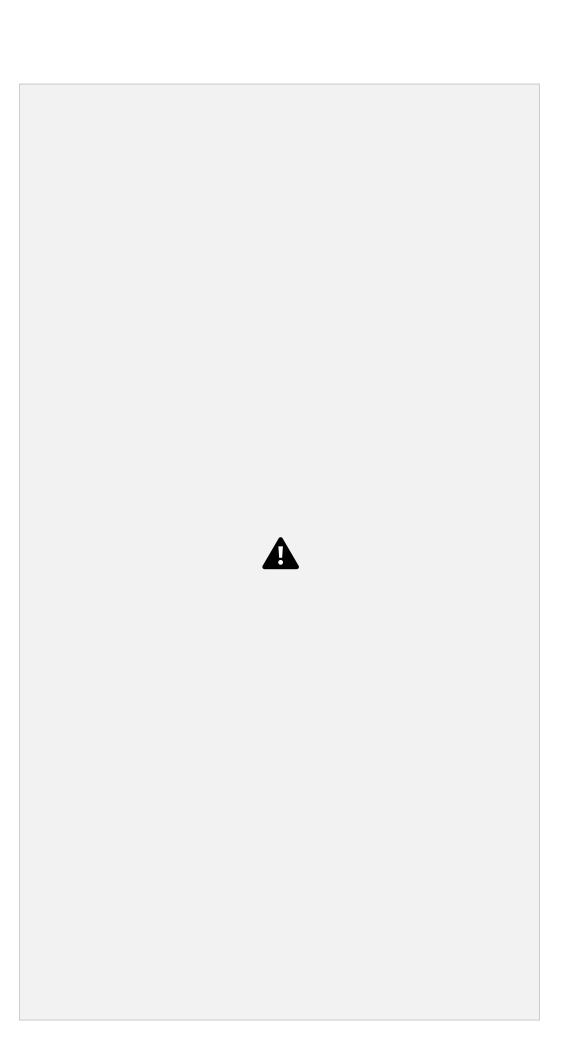
LAB PROGRAM 6: AGE EVALUATION - EXCEPTION HANDLING

```
import java.util.Scanner;
public class Age
{
     public static void main(String[] args) throws
     WrongAge,InvalidAge {
     new Son();
     }
}
class WrongAge extends Exception
{
     public String getMessage()
     return "Age Cannot Be Negative";
     }
class InvalidAge extends Exception
{
     public String getMessage()
     return "Son's Age cannot be greater than
     Father's!"; }
```

```
}
class Father
{
      Scanner s = new Scanner(System.in);
      int f;
      Father() throws WrongAge
      {
      System.out.print("Enter the Father's Age:
      "); f = s.nextInt();
     try
      {
      if(f<0)
     throw new WrongAge();
      }
      catch(WrongAge e1)
       System.out.println(e1.getMessage())
      ; System.exit(0);
      }
      }
}
class Son extends Father
{
      int son;
```

```
Son() throws WrongAge,InvalidAge
{
super();
System.out.print("Enter the Son's Age:
"); son = s.nextInt();
try
{
if(son<0)
throw new WrongAge();
}
catch(WrongAge e2)
{
 System.out.println(e2.getMessage());
  System.exit(0);
}
try
{
if(son>f)
throw new InvalidAge();
}
catch(InvalidAge e3)
{
 System.out.println(e3.getMessage())
  ; System.exit(0);
```

```
}
System.out.println("Ages are
appropriate"); }
```





## **LAB PROGRAM 7: MULTI-THREADING**

## **CODE**

```
class MyThread extends Thread
{
    long time;
    private volatile boolean running =
        true; MyThread(){
        System.out.println("Default");
}
MyThread(String name, long
time) {
        super(name);
        this.time = time;
}
public void pause()
{
    running = false;
```

```
}
public void run()
     try
     {
           while(running)
                 System.out.println(this.getName());
                 Thread.sleep(time*1000);
           }
     }
      catch(InterruptedException ie)
     {
           System.out.println("Exception caught in
     method"); }
}
}
class ThreadRunner
{
     public static void main(String [] args)
     {
           MyThread mt1 = new MyThread("BMS", 10);
           MyThread mt2 = new MyThread("CSE", 2);
           mt1.start();
           mt2.start();
           Try
```

```
{
    Thread.sleep(20*1000);
    mt1.pause();
    mt2.pause();
}
catch(InterruptedException ie)
{
    System.out.println("Exception caught in main");
}
}
```

