B.M.S COLLEGE OF ENGINEERING BENGALURU

Autonomous Institute, Affiliated to VTU

LAB REPORT

23CS3PCOOJ

Submitted in partial fulfillment of the requirements for

Lab Bachelor of Engineering

in

Computer Science and Engineering

Submitted by:

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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.*;
public class Quadratic2{
public static void main(String[] args){
Scanner scan = new Scanner(System.in);
System.out.print("Enter a coefficient a: ");
double a = scan.nextDouble();
System.out.print("Enter a coefficient b: ");
double b=scan.nextDouble();
System.out.print("Enter a coefficient c: ");
double c=scan.nextDouble();
 double dis=b*b-4*a*c;
if(dis>0)
{
double r1=(-b+Math.sqrt(b*b-4*a*c)/(2*a));
double r2=(-b-Math.sqrt(b*b-4*a*c)/(2*a));
System.out.println("Two real solutions: " + r1 + " and " + r2);
}
else if(dis==0)
{
double r=-b/(2*a);
System.out.println("Both roots are equal:"+r);
}
else
{
System.out.println("Roots are not equal");
```

```
}
System.out.println("Name:Akshat jain.");
System.out.println("USN:1BM22CS030.");
}
}
```

Output:

```
C:\Users\AKSHAT\Documents\akshat 3aooj>javac Quadratic2.java

C:\Users\AKSHAT\Documents\akshat 3aooj>java Quadratic2
Enter a coefficient a: 1
Enter a coefficient b: 2
Enter a coefficient c: 1
Both roots are equal:-1.0
Name:Akshat jain.
USN:1BM22CS030.

C:\Users\AKSHAT\Documents\akshat 3aooj>javac Quadratic2.java

C:\Users\AKSHAT\Documents\akshat 3aooj>java Quadratic2
Enter a coefficient a: 4
Enter a coefficient b: 5
Enter a coefficient c: 3
Roots are not equal
Name:Akshat jain.
USN:1BM22CS030.

C:\Users\AKSHAT\Documents\akshat 3aooj>javac Quadratic2.java

C:\Users\AKSHAT\Documents\akshat 3aooj>java Quadratic2
Enter a coefficient a: 1
Enter a coefficient b: 5
Enter a coefficient c: 2
Two real solutions: -2.9384471871911697 and -7.061552812808831
Name:Akshat jain.
USN:1BM22CS030.
```

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
{
   Scanner s = new Scanner(System.in);
   String usn;
   String name;
   int[] credits = {4,4,3,3,3,1,1,1};
   int[] marks = new int[8];
   public void enterdet()
   {
      System.out.print("Enter  usn : ");
      usn = s.next();
      System.out.print("Enter name : ");
      name = s.next();
      for(int i=0;i<8;i++)
      {
        System.out.print("Enter marks for subject "+(i+1)+" : ");
        marks[i] = s.nextInt();
      }
   }
   public void displaydet()
   {
      System.out.println("usn is : "+usn);
      System.out.println(" name is : "+name);
      for(int i =1;i<8;i++)
```

```
      {
        System.out.println(" marks for subject "+i+" is : "+marks[i]);
      }
    }
    public void sgpa()
    {
      float g = 0;
      for(int j=0;j<8;j++)
      {
        int v;
        v = credits[j]*((marks[j]/10)+1);
        g = g+v;
      }
      System.out.println("Your sgpa is : "+(g/20));
    }

}
public class Main1
{
 public static void main(String[] args) {
  student p = new student();
  p.enterdet();
  p.displaydet();
  p.sgpa();

 }
}
```

OUTPUT:

```
C:\Users\AKSHAT\Documents\akshat 3aooj>javac Main1.java

C:\Users\AKSHAT\Documents\akshat 3aooj>java Main1
Enter  usn : 1BM22CS030
Enter name : Akshat
Enter marks for subject 1 : 55
Enter marks for subject 2 : 65
Enter marks for subject 3 : 70
Enter marks for subject 4 : 45
Enter marks for subject 5 : 52
Enter marks for subject 6 : 85
Enter marks for subject 7 : 96
Enter marks for subject 8 : 68
usn is : 1BM22CS030
 name is : Akshat
 marks for subject 1 is : 65
 marks for subject 2 is : 70
 marks for subject 3 is : 45
 marks for subject 4 is : 52
 marks for subject 5 is : 85
 marks for subject 6 is : 96
 marks for subject 7 is : 68
Your sgpa is : 6.75
```

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.

```
import java.util.Scanner;
class Book{
 String name;
 String author;
 double price;
 int num_pages;
 Book(String name, String author, double price, int num_pages){
  this.name = name;
  this.author = author;
  this.price = price;
  this.num_pages = num_pages;
 }
 void setDetails(String name, String author, double price, int num_pages){
   this.name = name;
  this.author = author;
  this.price = price;
  this.num_pages = num_pages;
 }
 void getDetails(){
   String S = "Book : " + name +" by author : "+ author + " with pages : "+num_pages+" is of price : "+price;
   System.out.println(S);
 }
 public String toString(){
  String S = "Book : " + name +" by author : "+ author + " with pages : "+num_pages+" is of price : "+price;
  return S;
 }
```

```
}



public class Lab3 {
public static void main(String [] args){

    Scanner scanner = new Scanner(System.in);

    System.out.print("Enter the number of books to create: ");
    int n = scanner.nextInt();
    Book[] books = new Book[n];

    for (int i = 0; i < n; i++) {

      scanner.nextLine();
      System.out.println("\nEnter details for Book " + (i + 1) + ":");
      System.out.print("Name: ");
      String name = scanner.nextLine();
      System.out.print("Author: ");
      String author = scanner.nextLine();
      System.out.print("Price: ");
      double price = scanner.nextDouble();
      System.out.print("Number of Pages: ");
      int numPages = scanner.nextInt();

      books[i] = new Book(name, author, price, numPages);
    }

    System.out.println("\nDetails of the Books:");
    for (int i = 0; i < n; i++) {
```

```
            System.out.println("\nBook " + (i + 1) + ":\n" + books[i].toString());
        }
        System.out.println("Akshat jain");
        System.out.println("1BM22CS030");
        scanner.close();

    }
}
```

OUTPUT:

```
C:\Users\AKSHAT\Documents\akshat 3aooj>javac Lab3.java

C:\Users\AKSHAT\Documents\akshat 3aooj>java Lab3
Enter the number of books to create: 2

Enter details for Book 1:
Name: you can
Author: shiv
Price: 299
Number of Pages: 243

Enter details for Book 2:
Name: you will
Author: adi
Price: 499
Number of Pages: 567

Details of the Books:

Book 1:
Book : you can by author : shiv with pages : 243 is of price : 299.0

Book 2:
Book : you will by author : adi with pages : 567 is of price : 499.0
Akshat jain
1BM22CS030
```

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.

```
import java.util.Scanner;
abstract class Shape{
 int a,b;
 abstract void printArea();
}
class Rectangle extends Shape{
 Rectangle(int l,int br){
  a=l;
  b=br;
 }
 void printArea(){
  double area=a*b;
  System.out.println("Area of the rectangle is:"+area);
 }
}
class Triangle extends Shape{
 Triangle(int ba,int h){
  a=ba;
  b=h;
 }
 void printArea(){
  double area=a*b;
  System.out.println("Area of the Triangle is:"+area);

 }
```

```
}
class Circle extends Shape{
 Circle(int r){
  a=r;
 }
 void printArea(){
  double area=a*a*3.14;
  System.out.println("Area of the Circle is:"+area);
 }
}
public class Lab4{
 public static void main(String[] java){
  Scanner in=new Scanner(System.in);
  System.out.println("Enter length and breadth:");
  Rectangle rec=new Rectangle(in.nextInt(),in.nextInt());
  rec.printArea();
  System.out.println("Enter base and height:");
  Triangle tr=new Triangle(in.nextInt(),in.nextInt());
  tr.printArea();
  System.out.println("Enter Radius:");
  Circle cr=new Circle(in.nextInt());
  cr.printArea();
  System.out.println("Akshat jain");
  System.out.println("1BM22CS030");

 }
}
```

OUTPUT:

```
C:\Users\AKSHAT\Documents\akshat 3aooj>javac Lab4.java

C:\Users\AKSHAT\Documents\akshat 3aooj>java Lab4
Enter length and breadth:
10
20
Area of the rectangle is:200.0
Enter base and height:
5
12
Area of the Triangle is:60.0
Enter Radius:
23
Area of the Circle is:1661.0600000000002
Akshat jain
1BM22CS030
```

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.

```
import java.util.Scanner;

class account

{

   String c_name;

   int acc_num;

   String acc_type;

   double bal=1000;


}

class savingacct extends account

{

   Scanner s1 = new Scanner(System.in);

   public savingacct(String a,int b,String c){

   c_name=a;

   acc_num=b;

   acc_type=c;

   System.out.println(" name is :"+c_name);

   System.out.println(" account number is:"+acc_num);

   System.out.println(" account type is:"+acc_type);
```

```
  }
  public void deposit()
  {
System.out.println("Enter the amount to be Deposit in your saving account:");
int A=s1.nextInt();
     bal = bal+A;
     System.out.println("Your Current balance is : "+bal);
  }
  public void withdrawl()
  {
     System.out.println("Enter the amount to be withdrawn From your saving account : ");
     double q1 = s1.nextDouble();
     if(q1>bal)
     {
        System.out.println("Insuficient Bal!!");

     }
     else
     {
        System.out.println("You have withdrawn "+q1);
        bal = bal-q1;
        System.out.println(" Your Current balance is : "+bal);
     }
  }
  public void compinterest()
  {
     double A=1/100;
double w=bal*A;
     System.out.println("Current interest is : "+w);

  }
```

```
}
class curentacct extends account
{
   double e;
   Scanner s2 = new Scanner(System.in);
   public curentacct(String a,int b,String c){
   c_name=a;
   acc_num=b;
   acc_type=c;
   System.out.println("Customer name is :"+c_name);
   System.out.println("Customer account number is:"+acc_num);
   System.out.println("Customer account type is:"+acc_type);
   }

   public void deposit()
   {
      System.out.println("Enter the amount to be Deposit in your current account:");
 int B=s2.nextInt();
      bal = bal+B+2000;
      System.out.println("Your Current balance is : "+bal);
   }
   public void withdrawl()
   {
      System.out.println("Enter the amount to be withdrawn from your current account : ");
      double q2 = s2.nextDouble();
      if(q2>bal)
      {
         System.out.println("Not enough amount!!");

      }
      else
```

```
    {
        System.out.println("You have withdrawn "+q2);
        bal = bal-q2;
        System.out.println("Current balance is : "+bal);
        if(bal<3000)
        {
            bal = bal-100;
            System.out.println("Your balance is below require balance!!,a penalty has been imposed");
            System.out.println("Current balance is : "+bal);
        }
    }
}
public void getchq()
{
    System.out.println("Enter the amount for which cheque has to be issued");
    e = s2.nextDouble();
}
public void cashchq()
{
    if(e>bal)
    {
        System.out.println("Cheque bounced!!");
    }
    else
    {

        System.out.println("Via cashing a cheque you have withdrawn "+e);



        bal = bal-e;
        System.out.println("Current balance is : "+bal);
```

```
        if(bal<3000)
        {
           bal = bal-100;
           System.out.println("Your balance is below require balance!!,a penalty is Applied");
           System.out.println("Current balance is : "+bal);
        }
      }
   }

}



public class Lab5
{
 public static void main(String[] args) {
  Scanner s=new Scanner(System.in);
  savingacct sav = new savingacct("Akshat",199,"Savings");
  sav.deposit();
  sav.compinterest();
  sav.withdrawl();
  curentacct cur = new curentacct("Akbar",200,"Current");
  cur.deposit();
  cur.withdrawl();
  cur.getchq();
  cur.cashchq();
  System.out.println("Akshat jain");
  System.out.println("1BM22CS030");


 }}
```

OUTPUT:

```
C:\Users\AKSHAT\Documents\akshat 3aooj>javac Lab5.java

C:\Users\AKSHAT\Documents\akshat 3aooj>java Lab5
 name is :Akshat
 account number is:199
 account type is:Savings
Enter the amount to be Deposit in your saving account:
100000
Your Current balance is : 101000.0
Current interest is : 0.0
Enter the amount to be withdrawn From your saving account :
5222
You have withdrawn 5222.0
 Your Current balance is : 95778.0
Customer name is :Akbar
Customer account number is:200
Customer account type is:Current
Enter the amount to be Deposit in your current account:
850
Your Current balance is : 3850.0
Enter the amount to be withdrawn from your current account :
256
You have withdrawn 256.0
Current balance is : 3594.0
Enter the amount for which cheque has to be issued
2565
Via cashing a cheque you have withdrawn 2565.0
Current balance is : 1029.0
Your balance is below require balance!!,a penalty is Applied
Current balance is : 929.0
Akshat jain
1BM22CS030
```

Lab Program-6

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

```
package CIE;

import java.util.*;

public class Student

{

   public int sem;

   public String usn;

   public String name;

   public void accept()

   {

      Scanner scan = new Scanner(System.in);

      System.out.println("Enter U, N, S:\n");

      usn=scan.nextLine();

      name=scan.nextLine();

      sem=scan.nextInt();

   }

}

package CIE;


public class Internals

{

   public int im[]=new int[5];

}
```

```
package SEE;


import CIE.Student;
public class External extends Student
{
   public int sm[]=new int[5];
}


import java.util.*;
import SEE.*;
import CIE.*;
public class Lab6
{
   public static void main(String args[])
   {
      int fm[]=new int[5];
      Scanner sc= new Scanner(System.in);
      System.out.println("Enter n: ");
      int n=sc.nextInt();
      SEE.External st[]=new SEE.External[n];
      CIE.Internals s[]=new CIE.Internals[n];
      for(int i=0; i<n; i++)
      {
         st[i]=new SEE.External();
         s[i]=new CIE.Internals();
         System.out.println("Enter details "+(i+1));
         st[i].accept();
         for(int j=0; j<5; j++)
         {
           System.out.println("Enter marks sub "+(j+1));
           s[i].im[j]=sc.nextInt();
```

```
            st[i].sm[j]=sc.nextInt();


            fm[j]=s[i].im[j]+st[i].sm[j];
          }
          System.out.println("Final marks of "+st[i].name);
          for(int k=0; k<5; k++)
          {
             System.out.println("Course "+(k+1)+" = "+fm[k]);
          }
          System.out.println("Akshat jain");
          System.out.println("1BM22CS030");


       }
    }
}
```

OUTPUT:

```
C:\Users\AKSHAT\Documents\akshat 3aooj>javac -d . Student.java Internals.java External.java Lab6.java

C:\Users\AKSHAT\Documents\akshat 3aooj>java Lab6
Enter n:
2
Enter details 1
Enter U, N, S:

21
Akshat
3
Enter marks sub 1
45
45
Enter marks sub 2
85
96
Enter marks sub 3
75
86
Enter marks sub 4
75
53
Enter marks sub 5
96
65
Final marks of Akshat
Course 1 = 90
Course 2 = 181
Course 3 = 161
Course 4 = 128
Course 5 = 161
Akshat jain
1BM22CS030
```

LAB Program-7

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

```
class WrongAge extends Exception {
    public WrongAge() {
        super("Invalid age provided");
    }
}

class Father {
    private int age;

    public Father(int age) throws WrongAge {
        if (age < 0) {
            throw new WrongAge();
        }
        this.age = age;
    }

    public int getAge() {
        return age;
    }
}

class Son extends Father {
    private int sonAge;
    public Son(int fatherAge, int sonAge) throws WrongAge {
```

```
        super(fatherAge);
        if (sonAge >= fatherAge) {
            throw new WrongAge();
        }
        this.sonAge = sonAge;
    }

    public int getSonAge() {
        return sonAge;
    }
}

public class Lab7 {
    public static void main(String[] args) {
        try {
            Father father = new Father(50);
            System.out.println("Father's age: " + father.getAge());
            Son son1 = new Son(50, 25);
            System.out.println("Son's age: " + son1.getSonAge());
        } catch (WrongAge e) {
            System.out.println(e.getMessage());
        }
 System.out.println("Name:Akshat jain.");
 System.out.println("USN:1BM22CS030.");
    }
}
```

OUTPUT:

```
C:\Users\AKSHAT\Documents\akshat 3aooj>javac Lab7.java

C:\Users\AKSHAT\Documents\akshat 3aooj>java Lab7
Father's age: 50
Son's age: 25
Name:Akshat jain.
USN:1BM22CS030.
```

Lab Program 8

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

```
public class Lab8 {
   static class DisplayBMS extends Thread {
      @Override
      public void run() {
         while (true) {
            System.out.println("BMSCE");
            try {
               Thread.sleep(10000); // 10 seconds
            } catch (InterruptedException e) {
               e.printStackTrace();
            }
         }
      }
   }

   static class DisplayCSE extends Thread {
      @Override
      public void run() {
         while (true) {
            System.out.println("CSE");
            try {
               Thread.sleep(2000); // 2 seconds
            } catch (InterruptedException e) {
               e.printStackTrace();
            }
         }
```

```
        }
    }

    public static void main(String[] args) {
        DisplayBMS displayBMS = new DisplayBMS();
        DisplayCSE displayCSE = new DisplayCSE();

        displayBMS.start();
        displayCSE.start();
 System.out.println("Name:Akshat jain.");
 System.out.println("USN:1BM22CS030.");

    }
}
```

OUTPUT:

```
C:\Users\AKSHAT\Documents\akshat 3aooj>javac Lab8.java

C:\Users\AKSHAT\Documents\akshat 3aooj>java Lab8
Name:Akshat jain.
USN:1BM22CS030.
BMSCE
CSE
CSE
CSE
CSE
CSE
BMSCE
CSE
CSE
CSE
CSE
CSE
BMSCE
CSE
CSE
CSE
^C
```

Lab Program 9:

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

```
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 ajtf = 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);

      jfrm.add(button);

      jfrm.add(alab);

      jfrm.add(blab);
```

```
jfrm.add(anslab);


ActionListener l = new ActionListener() {
   public void actionPerformed(ActionEvent evt) {
      System.out.println("Action event from a text field");
   }
};
ajtf.addActionListener(l);
bjtf.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[]){
      SwingUtilities.invokeLater(new Runnable(){
         public void run(){
            new SwingDemo();
         }
      });
   }
}
```

OUTPUT: