B.M.S. COLLEGE OF ENGINEERING
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

LAB REPORT
On

Object Oriented Java Programming
(23CS3PCOOJ)

Submitted By:
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LAB-1

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.

```java
import java.util.*;

class quadratic
{
    int a,b,c;
    double d, r1, r2;
    void get()
    {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter the values of a,b and c\n");
        System.out.println("Enter the value of a: \n");
        a = s.nextInt();
        System.out.println("Enter the value of b: \n");
        b = s.nextInt();
        System.out.println("Enter the value of c: \n");
        c = s.nextInt();
    }
    void compute() {
        while (a == 0) {
        System.out.println("Not a quadratic equation");
        System.out.println("Enter a non-zero value of a");
        Scanner s = new Scanner(System.in);
        a = s.nextInt();
        }
```

```java
        d = (b*b) - (4*a*c);


        if (d==0)
        {
            r1=r2=-b/(2*(double)a);
            System.out.println("The roots are equal \nRoot 1 = Root 2 = "+ r1);
        }
        else if(d>0)
        {
            r1 = (-b + Math.sqrt(d))/(2*(double)a);
            r2 = (-b - Math.sqrt(d))/(2*(double)a);
            System.out.println("The roots are real and distinct \nRoot 1 = "+r1+"\nRoot 2 = "+ r2);
        }
        else{
            r1 = -b/(2*(double)a);
            r2 = Math.sqrt(Math.abs(d))/(2*(double)a);
            System.out.println("Roots are imaginary and Root 1=" + r1+ "+i" + r2 + " and Root 2="
+ r1 + "-i" + r2);
        }
    }

}


public class QuadraticMain{
    public static void main(String[] args) {
        System.out.println("Aneesh K P");
        System.out.println("1BM22CS040");
        quadratic q = new quadratic();
        q.get();
        q.compute();
```

```
    }
}
```

OUTPUT :

```
PS C:\Users\anees\Desktop\coding\Java> java QuadraticMain
Aneesh K P
1BM22CS040
Enter the values of a,b and c

Enter the value of a:

1
Enter the value of b:

-5
Enter the value of c:

6
The roots are real and distinct
Root 1 = 3.0
Root 2 = 2.0
```

LAB-2

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.

```java
import java.util.*;

public class Student {
    String usn, name;
    int credits[] = {4,4,3,3,3,1,1,1};
    int no_of_sub = 8;
    int marks[] = new int[no_of_sub];
    Scanner s = new Scanner(System.in);

    Student()
    {
        System.out.println("Enter your details below to calculate SGPA\n");
        get_details();
        get_marks();
        // sgpa();
        display();
    }
    public void get_details()
    {
        System.out.println("Enter your USN: ");
        usn = s.next();
        System.out.println("\nEnter your name: ");
        name = s.next();
    }
```

```java
public void get_marks()
{
    System.out.println("Enter your marks in order:\n");
    for(int i = 0; i < no_of_sub; i++){
        marks[i] = s.nextInt();
    }



}
public double sgpa()
{
    double sgpa=0;
    double temp=0;
    for(int i = 0; i < no_of_sub; i++){
        if(marks[i]>=40)
        {
            if(marks[i]==100)
            {
                temp += credits[i] * (marks[i]/10);
            }
            else{
                temp += credits[i] * ((marks[i]/10)+1);
            }
        }
        else{
            temp+=0;
        }
    }
    sgpa = temp/20;
```

```java
        return sgpa;

    }


    public void display()

    {

        System.out.println("Name: "+name);

        System.out.println("USN: "+usn);

        System.out.println("SGPA: "+sgpa());

    }

    public static void main(String[] args) {

        System.out.println("Aneesh K P");

        System.out.println("1BM22CS040");

        Student s1 = new Student();

    }

}
```

OUTPUT:

```
PS C:\Users\anees\Desktop\coding\Java> java Student
Aneesh K P
1BM22CS040
Enter your details below to calculate SGPA

Enter your USN:
1BM22CS040

Enter your name:
Aneesh
Enter your marks in order:

90
93
84
87
83
90
96
100
Name: Aneesh
USN: 1BM22CS040
SGPA: 9.55
```

PS C:\Users\anees\Desktop\coding\Java> java Student

LAB-3

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.

```java
import java.util.*;

class Book{
    String name, author;
    int price, no_of_pages;
    public void set(int i){
        Scanner s = new Scanner(System.in);
        System.out.println("Enter details of book "+(i+1)+"\n");
        System.out.println("Enter the name:\n");
        name = s.next();
        System.out.println("Enter the author's name:\n");
        author = s.next();
        System.out.println("Enter the price:\n");
        price = s.nextInt();
        System.out.println("Enter the number of pages:\n");
        no_of_pages = s.nextInt();
    }
    public String toString(int i)
    {
        return "Details of book "+(i+1)+"\n"+"Name: "+name+"\n"+"Author: "+author+"\n"+"Price: "+price+"\n"+"Number of Pages: "+no_of_pages+"\n";
    }
}
```

```java
public class Books {
    public static void main(String[] args) {
        System.out.println("Aneesh K P\n1BM22CS040");
        Scanner s = new Scanner(System.in);
        int n;
        System.out.println("Enter the number of books: \n");
        n = s.nextInt();
        Book b[] = new Book[n];
        int i = 0;
        for(i = 0; i <n; i++)
        {
            b[i] = new Book();
            b[i].set(i);
        }
        System.out.println("\n");
        for(i = 0; i<n; i++)
        {
            System.out.println(b[i].toString(i));
        }
    }
}
```

OUTPUT:

```
PS C:\Users\anees\Desktop\coding\Java> java Books
Aneesh K P
1BM22CS040
Enter the number of books:

2
Enter details of book 1

Enter the name:

Ikigai
Enter the author's name:

Gorden
Enter the price:

800
Enter the number of pages:

300
 Enter details of book 2

 Enter the name:

 Happiness
 Enter the author's name:

 Hector
 Enter the price:

 900
 Enter the number of pages:

 380


 Details of book 1
 Name: Ikigai
 Author: Gorden
 Price: 800
 Number of Pages: 300

 Details of book 2
 Name: Happiness
 Author: Hector
 Price: 900
 Number of Pages: 380
```

LAB-4

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.

```java
import java.util.*;


abstract class Shape{

    int a,b;

    abstract void printArea();

}


class Triangle extends Shape{

    Triangle(int base, int ht)

    {

        a=base;

        b= ht;


    }

    void printArea()

    {

        double area = 0.5*(a*b);

        System.out.println("The area of Triangle is: "+area);

    }

}

class Rectangle extends Shape{

    Rectangle(int len, int bdt)

    {

        a=len;

        b= bdt;
```

```java
        }
        void printArea()
        {
            double area = a*b;
            System.out.println("The area of Rectangle is: "+area);
        }
    }
    class Circle extends Shape{
        Circle(int rad)
        {
            a=rad;

        }
        void printArea()
        {
            double area = 3.14*a*a;
            System.out.println("The area of Circle is: "+area);
        }
    }
    public class GiveArea {
        public static void main(String[] args) {
            Scanner s = new Scanner(System.in);
            System.out.println("Aneesh K P \n1BM22CS040");
            System.out.println("Enter the length and breadth of a rectangle\n");
            Rectangle rec = new Rectangle(s.nextInt(), s.nextInt());
            rec.printArea();
            System.out.println("Enter the base and height of a triangle\n");
            Triangle tri = new Triangle(s.nextInt(), s.nextInt());
```

```
        tri.printArea();

        System.out.println("Enter the radius of a circle\n");

        Circle cir = new Circle(s.nextInt());

        cir.printArea();

    }


}
```

OUTPUT:

```
PS C:\Users\anees\Desktop\coding\Java> java GiveArea
Aneesh K P
 1BM22CS040
Enter the length and breadth of a rectangle

23
11
The area of Rectangle is: 253.0
Enter the base and height of a triangle

34
12
The area of Triangle is: 204.0
Enter the radius of a circle

22
The area of Circle is: 1519.76
```

LAB-5

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 custname;
    int accnum;
    String acctype;
    double bal=5000;
}
class savacct extends account
{
    public savacct(String e, int f, String g)
    {
```

```java
        custname = e;

        accnum = f;

        acctype = g;

        System.out.println("Customer details : ");

        System.out.println("Customer name : "+custname);

        System.out.println("Customer acccount number : "+accnum);

        System.out.println("Customer account type : "+acctype);

    }

    Scanner s1 = new Scanner(System.in);

    public void deposit(int z)

    {

        bal = bal+z;

        System.out.println("Your Current balance is : "+bal);

    }

    public void withdrawl()

    {

        System.out.println("Enter the amount to be withdrawn : ");

        double q1 = s1.nextDouble();

        if(q1>bal)

        {

            System.out.println("Not enough amount!!");


        }

        else

        {

            System.out.println("You have withdrawn "+q1);

            bal = bal-q1;

            System.out.println("Current balance is : "+bal);

        }
```

```java
    }
    public void compinterest()
    {
        double w = bal*(1+(0.05/12)) - bal;
        System.out.println("Current interest in : "+w);
    }
    public int chq()
    {
        return 0;
    }
}
class curacct extends account
{
    public curacct(String e1, int f1, String g1)
    {
        custname = e1;
        accnum = f1;
        acctype = g1;
        System.out.println("Customer details : ");
        System.out.println("Customer name : "+custname);
        System.out.println("Customer acccount number : "+accnum);
        System.out.println("Customer account type : "+acctype);
    }
    double e;
    Scanner s2 = new Scanner(System.in);
    public void deposit(int y)
    {
        bal = bal+y;
        System.out.println("Your Current balance is : "+bal);
```

```java
        }
    public void withdrawl()
    {
        System.out.println("Enter the amount to be withdrawn : ");
        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 int chq()
    {
        return 1;
    }

}
```

```java
public class Bank
{
        public static void main(String[] args) {
    Scanner s3 = new Scanner(System.in);
    System.out.println("Aneesh K P\n1BM22CS040");
    System.out.println("Enter customer name : ");
    String a1 = s3.next();
    System.out.println("Enter customer acc num : ");
    int a2 = s3.nextInt();
    System.out.println("Enter customer type : ");
    String a3 = s3.next();
                savacct sav = new savacct(a1,a2,a3);
                sav.deposit(1000);
                sav.compinterest();
                sav.withdrawl();
    int l1 = sav.chq();
    if(l1 == 0)
    {
       System.out.println("There is no cheque facility");
    }
    else
    {
       System.out.println("Cheque facility available");
    }
    System.out.println("Enter customer name : ");
    String b1 = s3.next();
    System.out.println("Enter customer acc num : ");
    int b2 = s3.nextInt();
```

```java
        System.out.println("Enter customer  account type : ");

        String b3 = s3.next();

                curacct cur = new curacct(b1,b2,b3);

                cur.deposit(3000);

                cur.withdrawl();

                int l2 = cur.chq();

        if(l2 == 0)

        {

           System.out.println("There is no cheque facility");

        }

        else

        {

           System.out.println("Cheque facility available");

        }

            }

}
```

OUTPUT:

```
Cheque facility available
PS C:\Users\anees\Desktop\coding\Java>                         java Bank

Aneesh K P
1BM22CS040
Enter customer name :
Aneesh
Enter customer acc num :
4738
Enter customer type :
Savings
Customer details :
Customer name : Aneesh
Customer acccount number : 4738
Customer account type : Savings
Your Current balance is : 6000.0
Current interest in : 25.0
Enter the amount to be withdrawn :
200
You have withdrawn 200.0
Current balance is : 5800.0
There is no cheque facility
Enter customer name :
Anagha
Enter customer acc num :
4983
Enter customer  account type :
Current
Customer details :
Customer name : Anagha
Customer acccount number : 4983
Customer account type : Current
Your Current balance is : 8000.0
Enter the amount to be withdrawn :
500
You have withdrawn 500.0
Current balance is : 7500.0
Cheque facility available
```

LAB-6

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.

```java
//CIE PACKAGE

//Student.java

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 the details :\n");
        usn=scan.nextLine();
        name=scan.nextLine();
        sem=scan.nextInt();
    }
}


//Internals.java

package CIE;

public class Internal {
    public int im[] = new int[5];
```

```java
    }



//SEE PACKAGE

//External.java

package SEE;

import CIE.Student;

public class External extends Student {

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

}


//FinalMarks.java

import java.util.*;

import SEE.*;

import CIE.*;

public class Finalmarks

{

    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.Internal s[]=new CIE.Internal[n];

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

        {

            st[i]=new SEE.External();

            s[i]=new CIE.Internal();
```

```java
        System.out.println("Enter details "+(i+1));

        st[i].accept();

        for(int j=0; j<5; j++)

        {

          System.out.println("Enter im and sm of 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]);

        }

      }

    }

} import java.util.*;

import SEE.*;

import CIE.*;

public class FinalMarks

{

    public static void main(String args[])

    {

        System.out.println("Aneesh K P\n1BM22CS040");

        int fm[]=new int[5];

        Scanner sc= new Scanner(System.in);

        System.out.println("Enter n: ");

        int n=sc.nextInt();

        SEE.Externals st[]=new SEE.Externals[n];
```

```java
CIE.Internals s[]=new CIE.Internals[n];

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

{

    st[i]=new SEE.Externals();

    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 im and sm of 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]);

    }

  }

 }

}
```

OUTPUT:

```
PS C:\Users\anees\Desktop\coding\Java\6th> java FinalMarks
Aneesh K P
1BM22CS040
Enter n:
2
Enter details 1
Enter the details :

1Bm22Cs040
Aneesh
3
Enter im and sm of sub 1
30 40
Enter im and sm of sub 2
40 50
Enter im and sm of sub 3
50 05
Enter im and sm of sub 4
30 30
Enter im and sm of sub 5
40 40
Final marks of Aneesh
Course 1 = 70
Course 2 = 90
Course 3 = 55
Course 4 = 60
Course 5 = 80
Enter details 2
Enter the details :

1Bm22Cs080
KP
3
Enter im and sm of sub 1
20 20
Enter im and sm of sub 2
40 40
Enter im and sm of sub 3
50 50
Enter im and sm of sub 4
30 30
Enter im and sm of sub 5
20 50
Final marks of KP
Course 1 = 40
Course 2 = 80
Course 3 = 100
Course 4 = 60
Course 5 = 70
```

LAB-7

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<0. In Son class, implement a
constructor that cases both father and son's age and throws an exception if son's age
is >=father's age.

```java
import java.util.Scanner;

class WrongAgeException extends Exception {
    public WrongAgeException(String message) {
        super(message);
    }
}

class father {
    int d_age;

    public father(int a) throws WrongAgeException {
        if (a < 0) {
            throw new WrongAgeException("Age is less than zero!!");
        }
        d_age = a;
    }
}

class son extends father {
    int s_age;
```

```java
    public son(int d_age, int s) throws WrongAgeException {

        super(d_age);

        if (d_age < s) {

            throw new WrongAgeException("father age can't be less than son!!");

        }

        s_age = s;


    }

}


public class father1 {

    public static void main(String[] args) {

        System.out.println("Aneesh K P\n1BM22CS040");

        int x, y;


        Scanner s = new Scanner(System.in);

        System.out.println("Enter father age");

        x = s.nextInt();

        System.out.println("Enter son age");

        y = s.nextInt();

        try {

            father s1 = new father(x);

            son s2 = new son(x, y);

        } catch (WrongAgeException e) {

            System.out.println("Exception: " + e.getMessage());

        }

    }

}
```

OUTPUT:

```
PS C:\Users\anees\Desktop\coding\Java> java father1
Aneesh K P
1BM22CS040
Enter father age
20
Enter son age
30
Exception: father age can't be less than son!!
```

LAB-8

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.

```java
class A implements Runnable
{
    public void run()
    {
        for(int i = 0;i<5;i++)
        {
            try {
            System.out.println("BMS COLLEGE OF ENGINEERING");

            Thread.sleep(10000);
        } catch(Exception e) {
            e.printStackTrace();
        }
        }
    }
}
class B implements Runnable
{
    public void run()
    {
        for(int i = 0;i<5;i++)
        {
            try {
```

```java
        System.out.println("CSE");


        Thread.sleep(2000);
    } catch(Exception e) {
        e.printStackTrace();
    }
    }
  }
}


public class Threads
{
public static void main(String[] args) {
  System.out.println("Aneesh K P\n1BM22CS040");
  A p1 = new A();
  B p2 = new B();
  Thread t1 = new Thread(p1);
  Thread t2 = new Thread(p2);
  t1.start();
  t2.start();
}
}
```
OUTPUT:

```
PS C:\Users\anees\Desktop\coding\Java> java Threads
Aneesh K P
1BM22CS040
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
```