Department of Computer Science and Engineering (AI&ML)

JAVA PROGRAMMING LAB MANUAL

Regulation
PR24

Class: II B.Tech II Semester

Prepared by

G DIVYA

Assistant Professor

LAB FACULTY   **HOD**   **PRINCIPAL**

VISION OF THE INSTITUTE

- To emerge as a global leader in imparting quality technical education emphasizing ethical values for the betterment of the society.

MISSION OF THE INSTITUTE

- To create an excellent teaching learning environment and inculcate the aptitude for research.
- To establish centers of excellence through collaborative initiatives.
- To empower the student community by developing creativity and innovation.

Proposed Vision and Mission of the Department

VISION OF THE DEPARTMENT

- To become a leading centre of excellence in Artificial Intelligence and Machine Learning by fostering innovation, research, and collaboration in diverse areas of computer science. We aim to address global challenges and emerging societal needs through advanced education, cutting-edge technologies, and impactful solutions in AI and ML.

MISSION OF THE DEPARTMENT

- ➢ To equip students with the knowledge and skills to solve complex, real-world problems in multidisciplinary fields using AI and ML technologies.
- ➢ To foster strong domain expertise and research capabilities, enabling students to pursue challenging careers and advanced education in AI and ML.
- ➢ To provide students with a strong sense of ethics, professionalism, and a desire for lifelong learning, enabling them to make significant contributions to both the field and society.

College code: 6F

PALLAVI ENGINEERING COLLEGE
(UGC AUTONOMOUS)
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Certified by ISO 9001 : 2015 | ISO 14001 : 2015 | ISO 50001 : 2018

Kuntloor(V), Adbullapurmet(M), Near Hayathanagar, R.R. Dist. Hyd - 501505, (T.S.) India

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

The Computer Science and Engineering – Data Science graduate will:

PEO	Statements
PEO1	Graduates will be prepared for a successful career in Computer Science discipline and related industry to meet the needs of the nation and leading industries and also to excel in postgraduate programs.
PEO2	Graduates will continue to learn and apply the acquired knowledge to solve Engineering problems and appreciation of the arts, humanities and social sciences.
PEO3	Graduates will have good and broad scientific and engineering knowledgebase so as to comprehend, analyze, design and create novel products and solutions for real-time applications.
PEO4	Graduates will understand professional and ethical responsibility, develop leadership, utilize membership opportunities, and develop effective communication skills, teamwork skills, multidisciplinary approach and life-long learning required for a successful professional career.

PROGRAM SPECIFIC OUTCOMES (PSOs)

The Computer Science and Engineering – Data Science graduate will be able to:

PSOs	Statements
PSO1	Expertise in different aspects and appropriate models of Data Science and use large data sets to cater for the growing demand for data scientists and engineers in industry.
PSO2	Apply the principles and techniques of database design, administration, and implementation to enhance data collection capabilities and decision-support systems.

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Program outcomes:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design / Development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and Team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest.

DEPARTMENT OF CSE (AI&ML)

Sub. Code   :   **Year / Sem : II-II**

Sub. Name   :JAVA PROGRAMMING LAB   **Batch: 2023-2027**

Course Objectives:

The learning objectives of this course are to

S.No	Objectives
1	To understand OOP principles.
2	To understand the Exception Handling mechanism.
3	To understand Java collection framework.
4	To understand multithreaded programming.
5	To understand swing controls in Java.

Course Outcomes:

Upon completion of the course, the students will be able to

Cos	Course Outcomes (CO)
CO.1	Able to write the programs for solving real world problems using Java OOP principles.
CO.2	Able to write programs using Exceptional Handling approach.
CO.3	Able to write multithreaded applications.
CO.4	Able to write GUI programs using swing controls in Java.
CO.5	Able to develop applets for web applications.

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PAM407PC: JAVA PROGRAMMING LAB

B.Tech. II Year II Sem.   **L   T   P   C**

Course Objectives:
- To understand OOP principles.
- To understand the Exception Handling mechanism.
- To understand Java collection framework.
- To understand multithreaded programming.
- To understand swing controls in Java.

Course Outcomes:
- Able to write the programs for solving real world problems using Java OOP principles.
- Able to write programs using Exceptional Handling approach.
- Able to write multithreaded applications.
- Able to write GUI programs using swing controls in Java.

List of Experiments:

1. Use Eclipse or Net bean platform and acquaint yourself with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try codeformatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else conditionand a for loop.

2. Write a Java program to demonstrate the OOP principles. [i.e., Encapsulation, Inheritance, Polymorphism and Abstraction]

3. Write a Java program to handle checked and unchecked exceptions. Also, demonstrate the usage of custom exceptions in real time scenario.

4. Write a Java program to demonstrate the working of different collection classes. [Use packagestructure to store multiple classes].

5. Write a program to synchronize the threads acting on the same object. [Consider the example of any reservations like railway, bus, movie ticket booking, etc.

6. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.

7. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. [Use Adapter classes].

8. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or " Go" should appear above the buttons in the selected color. Initially, there is no message shown.

9. Develop an applet in Java that displays a simple message.

10. Develop an applet in Java that receives an integer in one text field, and computes its factorialValue and returns it in another text field, when the button named "Compute" is clicked.
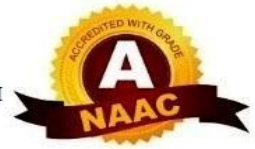
REFERENCE BOOKS:

1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition Pearson education.
2. Thinking in Java, Bruce Eckel, Pearson Education.
3. Java Programming, D. S. Malik and P. S. Nair, Cengage Learning.
4. Core Java, Volume 1, 9th edition, Cay S. Horstmann and G Cornell, Pearson.

Lab 1:

Use Eclipse or Net bean platform and acquaint yourself with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.

```java
import java.lang.*;
import java.util.*;
class Lab1
{
    public static void main(String args[]) {
        int i,count=0,n;
        Scanner sc=new Scanner(System.in);
        System.out.print("Enter Any Number : "); n=sc.nextInt();

        for(i=1;i<=n;i++) {
            if(n%i==0) {
                count++;
            }
        }

        if(count==2)
            System.out.println(n+" is prime");
        else
            System.out.println(n+" is not prime");
    }
}
```
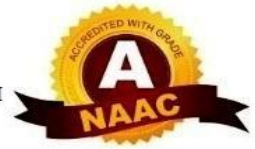
Output: Enter Any Number : 4 4 is not prime
Enter Any Number : 5 5 is prime

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Lab 2:

Write a Java program to demonstrate the OOP principles. [i.e., Encapsulation, Inheritance, Polymorphism and Abstraction]

```java
class Person {
    private String name;
    private int age;

    public Person(String name, int age) {
        this.name = name
        this.age = age;
    }

    public void setName(String name) {
        this.name = name;
    }

    public String getName() {
        return name;
    }

    public void setAge(int age) {
        this.age = age;
    }

    public
      int
    getAge()
        {
    return
      age;
    }

    public void displayInfo() {
        System.out.println("Name: "
        + name);
        System.out.println("Age: "
        + age);
    }
}

class Employee extends Person {
    private double salary;

    public Employee(String name, int age, double salary) {
        super(name, age);
        this.salary = salary;
    }

    public double getSalary() {
        return salary;
```

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```java
    }

    public void setSalary(double salary) {
        this.salary = salary;
    }

    public void displayInfo() {
        super.displayInfo();
        System.out.println("Salary:
        " + salary);
    }
}

public class Lab2 {
    public static void main(String[] args) {
```
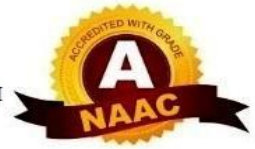
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```java
        Person person = new Person("Rahul",14);
        System.out.println("Person Info:");
        person.displayInfo();
        System.out.println("====================");
        Employee employee = new Employee("Priyanka", 24, 50000);
        System.out.println("Employee Info:");
        employee.displayInfo();
    }
}
```

Output:

Person Info:
Name: Rahul
Age: 14
====================
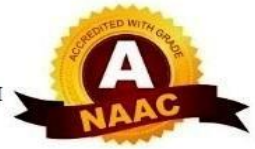Employee Info:
Name: Priyanka
Age: 24
Salary: 50000.0

Lab 3:
Write a Java program to handle checked and unchecked exceptions. Also, demonstrate the usage of custom exceptions in real time scenario.

```java
import java.io.File;
import java.io.FileReader;
import java.io.FileNotFoundException;

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

public class Lab3 {
    public static void register(String name, int age) throws InvalidAgeException {
        if (age < 18) {
            throw new InvalidAgeException("User must be at least 18 years old.");
        } else {
            System.out.println("Registration successful for user: " + name);
        }
    }

    public static void main(String[] args) {
```

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```java
    try {
       File file = new File("myfile.txt");
       FileReader fr = new FileReader(file);
    }
    catch (FileNotFoundException e) {
       System.out.println("File not found: " + e.getMessage());
    }

    try {
       int[] arr = {1, 2, 3};
        System.out.println(arr[5]);
    }
     catch (ArrayIndexOutOfBoundsException e) {
       System.out.println("Array index out of bounds: " + e.getMessage());
    }

    finally {
       System.out.println("Cleanup operations can be performed here.");
    }

    System.out.println("Demonstrating Custom Exception:");

    try {
       register("Rahul", 14);
    }
    catch (InvalidAgeException e) {
       System.out.println("Custom Exception Caught: " + e.getMessage());
    }
  }
}
```

Output:

File not found: myfile.txt (The system cannot find the file specified)
Array index out of bounds: Index 5 out of bounds for length 3
Cleanup operations can be performed here.
Demonstrating Custom Exception:
Custom Exception Caught: User must be at least 18 years old.

Lab 4:

Write a Java program on Random Access File class to perform different read and write operations.

```java
import java.io.*;
public class Lab4 {
   public static void main(String[] args) {
      try {
          RandomAccessFile file = new RandomAccessFile("data.txt", "rw");
```

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```java
        String data1 = "Hello";
        String data2 = "World";

        file.writeUTF(data1);
        file.writeUTF(data2);
        file.seek(0);

        String readData1 = file.readUTF();
        String readData2 = file.readUTF();
        System.out.println("Data read from file:");
        System.out.println(readData1);
        System.out.println(readData2);

        file.seek(file.length());
        String newData = "Java!";
        file.writeUTF(newData);
        file.seek(0);

        readData1 = file.readUTF();
        readData2 = file.readUTF();
        String readData3 = file.readUTF();

        System.out.println("Data read from file after appending:");
        System.out.println(readData1);
        System.out.println(readData2);
        System.out.println(readData3);
        file.close();
    } catch (IOException e) {
        System.out.println("An error occurred: " + e.getMessage());
        e.printStackTrace();
    }
  }
}
```
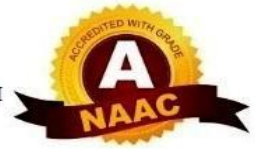
Output:

Data read from file:
Hello
World
Data read from file after appending:
Hello
World
Java!

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Lab 5:

Write a Java program to demonstrate the working of different collection classes. [Use package structure to store multiple classes].

ListExample.java

```java
import java.util.ArrayList;
public class ListExample {
    public static void main(String[] args) {
        ArrayList<String> list = new ArrayList<>();
        list.add("Apple");
        list.add("Banana");
        list.add("Orange");
        System.out.println("List Example:");
        for (String fruit : list) {
            System.out.println(fruit);
        }
    }
}
```

SetExample.java

```java
import java.util.HashSet;
public class SetExample {
    public static void main(String[] args) {
        HashSet<String> set = new HashSet<>();
        set.add("Apple");
        set.add("Banana");
        set.add("Orange");
        set.add("Apple"); // This won't be added since sets don't allow duplicates
        System.out.println("Set Example:");
        for (String fruit : set) {
            System.out.println(fruit);
        }
    }
}
```

MapExample.java
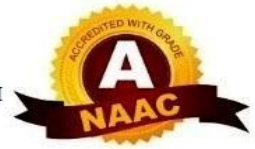
```java
import java.util.*;
public class MapExample {
    public static void main(String[] args) {
        HashMap<Integer, String> map = new HashMap<>();
        map.put(1,"Apple");
        map.put(2,"Banana");
        map.put(3,"Orange");
        System.out.println("Map Example:");
        for (Map.Entry<Integer, String> entry : map.entrySet()) {
```

```java
            System.out.println(entry.getKey()+ ":"+ entry.getValue());
        }
    }
}
```

Lab5.java

```java
public class Lab5
{
    public static void main(String[] args) {
        ListExample.main(args);
        SetExample.main(args);
        MapExample.main(args);
    }
}
```

Output:

List Example:
Apple
Banana
Orange

Set Example:
Apple
Orange
Banana

Map Example:
1:Apple
2:Banana
3:Orange

Lab 6:

Write a program to synchronize the threads acting on the same object. [Consider the example of any reservations like railway, bus, movie ticket booking, etc.]
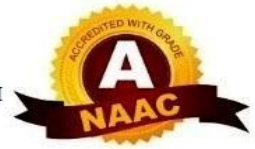
```java
class Reserve extends Thread{
    //Available berths are
    int available = 1;
    int wanted;
    //accept wanted berths at run time
    public Reserve(int i){
        wanted = i;
    }
    public void run(){
        //Display available berths
```

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```java
            System.out.println("Available berths= "+available);
            //available berths are more than wanted berths
            if(available>=wanted){
                //get the name of the person
                String name = Thread.currentThread().getName();
                //Allot the berth to him
                System.out.println(wanted +" Berth(s) reserved for "+name);
                try{
                    Thread.sleep(1500);//wait for printing the ticket
                    available = available-wanted;
                    //update the no. of available berths
                }catch (InterruptedException ie) {
                    ie.printStackTrace();
                }
            }else{
                //if available berths are less, display sorry
                System.out.println("Sorry! No berths available");
            }
        }
}
public class Lab6 {
    public static void main(String[] args) {
        //Tell that one berth is needed
        Reserve obj = new Reserve(2);
        //Attach first thread to the object
        Thread t1 = new Thread(obj);
        //Attach second thread to the same object
        Thread t2 = new Thread(obj);
        //take the thread names as persons names
        t1.setName("First Person");
        t2.setName("Second Person");
        //Send the request for berths
        t1.start();
        t2.start();
    }
}
```

Output:

```
Available berths= 1
Sorry! No berths available
Available berths= 1
Sorry! No berths available
```

Lab 7:

Write a program to perform CRUD operations on the student table in a database using JDBC. MySQL 8.0

InsertData.java

```java
import java.sql.*;

import java.util.Scanner;

public class InsertData {


  public static void main(String[] args) {
    try {

      Class.forName("com.mysql.cj.jdbc.Driver");

      Connection con = DriverManager.getConnection("jdbc:mysql://localhost:3306/jdbcdb","root","password");

      Scanner sc = new Scanner(System.in);

      System.out.println("Inserting Data into student table : ");

      System.out.println("_____");

      System.out.print("Enter student id : ");

      int sid = sc.nextInt();

      System.out.print("Enter student name : ");

      String sname = sc.next();

      String sql="insert into student values("+sid+",'"+sname+"')";

      PreparedStatement ps=con.prepareStatement(sql);

      int r=ps.executeUpdate();

      if(r>0)

      System.out.println("Data inserted successfully into student table");

      sc.close();

      con.close();

    } catch (SQLException err) {

      System.out.println("ERROR: " + err);

    } catch (Exception err) {
```

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```
        System.out.println("ERROR: " + err);

        }

    }

}
```

Output:

Inserting Data into student table :

_____

Enter student id : 2

Enter student name : ramesh

Data inserted successfully into student table

Inserting Data into student table :

_____

Enter student id : 3

Enter student name : rahul

Data inserted successfully into student table

UpdateData.java

```
import java.sql.*;

import java.util.Scanner;

public class UpdateData {

    public static void main(String[] args) {

        try {

            // to create connection with database

            Class.forName("com.mysql.cj.jdbc.Driver");

            Connection con = DriverManager.getConnection("jdbc:mysql://localhost/jdbcdb", "root", "password");

            Statement s = con.createStatement();

            Scanner sc = new Scanner(System.in);

            System.out.println("Update Data in student table : ");

            System.out.println("_____");
```

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```
        System.out.print("Enter student Rno to Update: ");

        int sid = sc.nextInt();

        System.out.print("Enter student name : ");

        String sname = sc.next();

        s.execute("update student set name='"+sname+"'where rno = "+sid);

        System.out.println("Data updated successfully");

        s.close();

        sc.close();

        con.close();

    } catch (SQLException err) {

        System.out.println("ERROR: " + err);

    } catch (Exception err) {

        System.out.println("ERROR: " + err);

    }

  }

}
```

Output:

Update Data in student table :

_____

Enter student Rno to Update: 3

Enter student name : priyanka

Data updated successfully

DeleteData.java

```
import java.sql.*;

import java.util.Scanner;

public class DeleteData {

  public static void main(String[] args) {

    try {

        Class.forName("com.mysql.cj.jdbc.Driver");
```
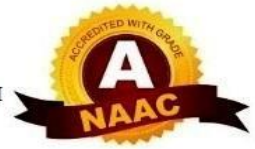
```java
        Connection con = DriverManager.getConnection("jdbc:mysql://localhost:3306/jdbcdb", "root",
"password");

        Statement s = con.createStatement();


        Scanner sc = new Scanner(System.in);

        System.out.println("Delete Data from student table : ");

        System.out.println("_____");

        System.out.print("Enter student Rno To Delete: ");

        int sid = sc.nextInt();

        // to execute delete query

        s.execute("delete from student where rno = "+sid);

        System.out.println("Data deleted successfully");

        s.close();

        sc.close();

        con.close();

    } catch (SQLException err) {

        System.out.println("ERROR: " + err);

    } catch (Exception err) {

        System.out.println("ERROR: " + err);

    }

  }

}
```

Output:

Delete Data from student table :

_____

Enter student Rno To Delete: 2

Data deleted successfully

DisplayData.java

```java
import java.sql.*;
```

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```java
public class DisplayData {

   public static void main(String[] args) {

      try {

         Class.forName("com.mysql.cj.jdbc.Driver");

         Connection con = DriverManager.getConnection("jdbc:mysql://localhost/jdbcdb", "root", "password");

         Statement s = con.createStatement();

        ResultSet rs = s.executeQuery("select * from student");

         if (rs != null) {

         System.out.println("SID \t STU_NAME ");

         System.out.println("_____");

         while (rs.next())

         {

            System.out.println(rs.getInt("rno") +" \t "+ rs.getString("name"));

            System.out.println("_____");

         }

         s.close();

         con.close();

          }

      } catch (SQLException err) {

         System.out.println("ERROR: " + err);

      } catch (Exception err) {

         System.out.println("ERROR: " + err);

      }

   }

}
```

Output:

SID   STU_NAME

_____

3   priyanka

_____

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Lab 8:

Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.

```java
import java.awt.*;
import java.awt.event.*;
import javax.swing.*;
class Lab8 implements ActionListener
{
int c,n;
String s1,s2,s3,s4,s5;
JFrame f;
JButton b1,b2,b3,b4,b5,b6,b7,b8,b9,b10,b11,b12,b13,b14,b15,b16,b17;
JPanel p;
JTextField  tf;
GridLayout g;
Lab8()
{
        f = new JFrame("My calculator");
        p = new JPanel();
        tf = new JTextField(20);

        b1 = new JButton("0");
        b2 = new JButton("1");
        b3 = new JButton("2");
        b4 = new JButton("3");
        b5 = new JButton("4");
        b6 = new JButton("5");
        b7 = new JButton("6");
        b8 = new JButton("7");
        b9 = new JButton("8");
        b10 = new JButton("9");
        b11 = new JButton("+");
        b12 = new JButton("-");
        b13 = new JButton("*");
        b14 = new JButton("/");
        b15 = new JButton("%");
        b16 = new JButton("=");
        b17 = new JButton("C");

        b1.addActionListener(this);
        b2.addActionListener(this);
        b3.addActionListener(this);
        b4.addActionListener(this);
        b5.addActionListener(this);
        b6.addActionListener(this);
```
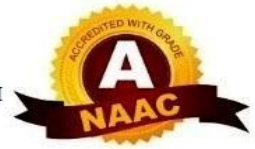
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```java
b7.addActionListener(this);
b8.addActionListener(this);
b9.addActionListener(this);
b10.addActionListener(this);
b11.addActionListener(this);
b12.addActionListener(this);
b13.addActionListener(this);
b14.addActionListener(this);
b15.addActionListener(this);
b16.addActionListener(this);
b17.addActionListener(this);

g = new GridLayout(4,4,10,20);

p.setLayout(g);

p.add(b1);p.add(b2);p.add(b3);p.add(b4);p.add(b5);p.add(b6);p.add(b7);p.add(b8);p.add(b9);
p.add(b10);p.add(b11);p.add(b12);p.add(b13);p.add(b14);p.add(b15);p.add(b16);p.add(b17);

f.add(tf);
f.add(p);
f.setSize(300,300);
f.setVisible(true);
f.setLayout(new FlowLayout());
f.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
}
public void actionPerformed(ActionEvent e)
{
        if(e.getSource()==b1)
        {
                s3 = tf.getText();
                s4 = "0";
                s5 = s3+s4;
                tf.setText(s5);
        }
        if(e.getSource()==b2)
        {
                s3 = tf.getText();
                s4 = "1";
                s5 = s3+s4;
                tf.setText(s5);
        }
        if(e.getSource()==b3)
        {
                s3 = tf.getText();
                s4 = "2";
                s5 = s3+s4;
                tf.setText(s5);
        }
```

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```
if(e.getSource()==b4)
{
        s3 = tf.getText();
        s4 = "3";
        s5 = s3+s4;
        tf.setText(s5);
}
if(e.getSource()==b5)
{
        s3 = tf.getText();
        s4 = "4";
        s5 = s3+s4;
        tf.setText(s5);
}
if(e.getSource()==b6)
{
        s3 = tf.getText();
        s4 = "5";
        s5 = s3+s4;
        tf.setText(s5);
}
if(e.getSource()==b7)
{
        s3 = tf.getText();
        s4 = "6";
        s5 = s3+s4;
        tf.setText(s5);
}
if(e.getSource()==b8)
{
        s3 = tf.getText();
        s4 = "7";
        s5 = s3+s4;
        tf.setText(s5);
}
if(e.getSource()==b9)
{
        s3 = tf.getText();
        s4 = "8";
        s5 = s3+s4;
        tf.setText(s5);
}
if(e.getSource()==b10)
{
        s3 = tf.getText();
        s4 = "9";
        s5 = s3+s4;
        tf.setText(s5);
}
```

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```java
if(e.getSource()==b11)
{
        s1 = tf.getText();
        tf.setText("");
        c=1;
}
if(e.getSource()==b12)
{
        s1 = tf.getText();
        tf.setText("");
        c=2;
}
if(e.getSource()==b13)
{
        s1 = tf.getText();
        tf.setText("");
        c=3;
}
if(e.getSource()==b14)
{
        s1 = tf.getText();
        tf.setText("");
        c=4;
}
if(e.getSource()==b15)
{
        s1 = tf.getText();
        tf.setText("");
        c=5;
}
if(e.getSource()==b16)
{
        s2 = tf.getText();
        if(c==1)
        {
                n = Integer.parseInt(s1)+Integer.parseInt(s2);
                tf.setText(String.valueOf(n));
        }
        else if(c==2)
        {
                n = Integer.parseInt(s1)-Integer.parseInt(s2);
                tf.setText(String.valueOf(n));
        }
        else if(c==3)
        {
                n = Integer.parseInt(s1)*Integer.parseInt(s2);
                tf.setText(String.valueOf(n));
        }
        if(c==4)
```
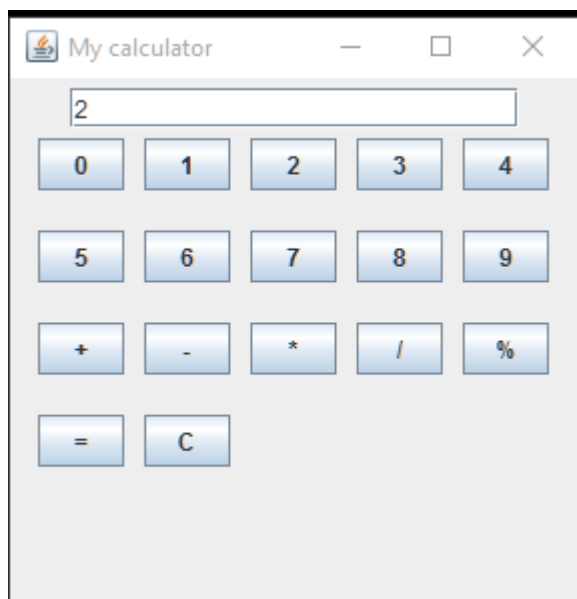
```java
                {
                        try
                        {
                                n = Integer.parseInt(s1)/Integer.parseInt(s2);
                                tf.setText(String.valueOf(n));
                        }
                        catch(Exception i)
                        {
                                tf.setText("Arithmetic Exception");
                        }
                }
                if(c==5)
                {
                        n = Integer.parseInt(s1)%Integer.parseInt(s2);
                        tf.setText(String.valueOf(n));
                }
        }
        if(e.getSource()==b17)
        {
                tf.setText("");
        }
}
public static void main(String[] abc)
{
   new Lab8();
}
}
```
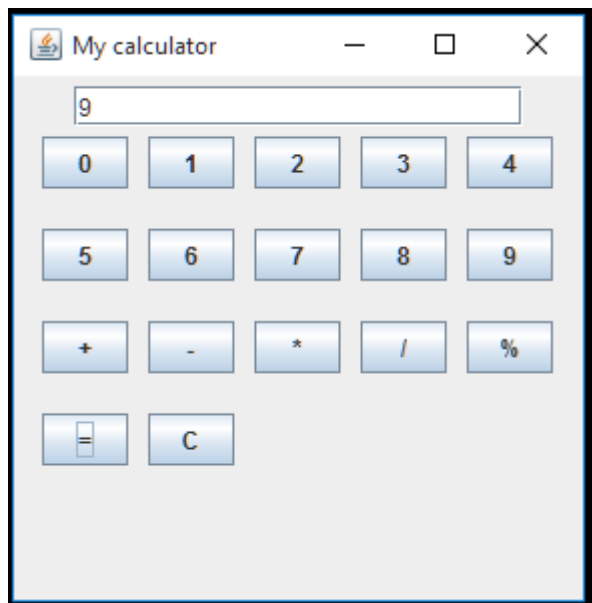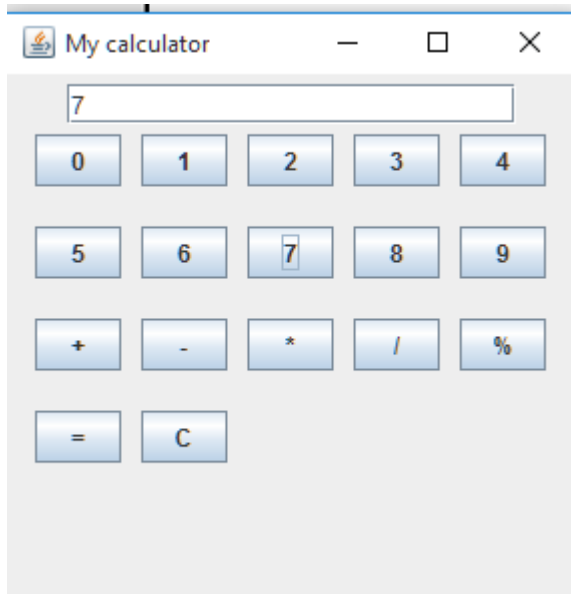
Output:

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Lab 9

Write a Java program that handles all mouse events and shows the event name at the centre of the window when a mouse event is fired. [Use Adapter classes]

import javax.swing.*;

import java.awt.*;

import javax.swing.event.*;

import java.awt.event.*;
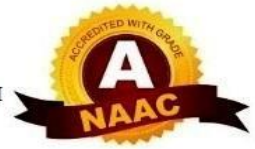
class Lab9 extends JFrame implements MouseListener
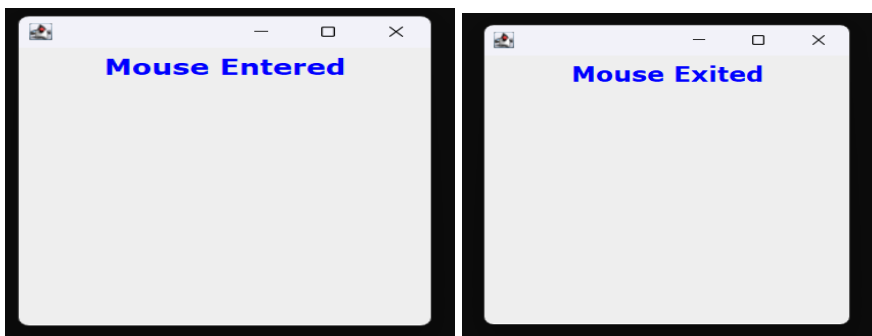
```java
{
    JLabel l1;
    public Lab9()
    {
        setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        setSize(300,300);
        setLayout(new FlowLayout(FlowLayout.CENTER));
        l1 = new JLabel();
        Font f = new Font("Verdana", Font.BOLD, 20);
        l1.setFont(f);
        l1.setForeground(Color.BLUE);
        add(l1);
        addMouseListener(this);
        setVisible(true);
    }
    public void mouseExited(MouseEvent m)
    {
        l1.setText("Mouse Exited");
    }
    public void mouseEntered(MouseEvent m)
    {
        l1.setText("Mouse Entered");
    }
    public void mouseReleased(MouseEvent m)
    {
        l1.setText("Mouse Released");
    }
    public void mousePressed(MouseEvent m)
    {
        l1.setText("Mouse Pressed");
```

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```
    }
    public void mouseClicked(MouseEvent m)
    {
        l1.setText("Mouse Clicked");
    }
    public static void main(String[] args) {
        Lab9 mep = new Lab9();
    }
}
```

Output:

10. **Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked.**

```
Develop applet to find factorial of the given number */
import java.awt.*;
import java.applet.*;
import java.awt.event.*;
/*<applet code="FactorialApplet" width=500 height=250>
</applet>*/
public class FactorialApplet extends Applet implements ActionListener {
    Label L1,L2;
    TextField T1,T2;
    Button B1;
    public void init() {
        L1=new Label("Enter any Number : ");
        add(L1);
        T1=new TextField(10);
        add(T1);
        L2=new Label("Factorial of Num : ");
```

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```java
        add(L2);
        T2=new TextField(10);
        add(T2);
        B1=new Button("Compute");
        add(B1);
        B1.addActionListener(this);
    }
    public void actionPerformed(ActionEvent e) {
        if(e.getSource()==B1)
        {
        int value=Integer.parseInt(T1.getText());
        int fact=factorial(value);
        T2.setText(String.valueOf(fact));
        }
    }
    int factorial(int n) {
        if(n==0)
            return 1;
        else
            return n*factorial(n-1);
    }
}
```

Output:

```
C:\StudyGlance\Java_Lab_Programs\W3>javac FactorialApplet.java

C:\StudyGlance\Java_Lab_Programs\W3>appletviewer FactorialAppl
```

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Applet Viewer: FactorialApplet   —   □   ✕

Applet

Enter any Number :   5   Factorial of Num :   120

Compute

Applet started.