ATME COLLEGE OF ENGINEERING

13th KM Stone, Bannur Road, Mysore - 560 028

A T M E

College of Engineering

DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

(ACADEMIC YEAR 2024-25)
LABORATORY MANUAL

SUBJECT: JAVA PROGRAMMING LABORATORY
SUB CODE: 22MCAL28
SEMESTER: II-2022 CBCS Scheme

Composed By	Faculty Coordinator	Approved By
Tanya R Assistant Professor MCA Dept | ATMECE	Tanya R Assistant Professor MCA Dept | ATMECE	MCA Dept | ATMECE

INSTITUTIONAL MISSION AND VISION

Objectives

- To provide quality education and groom top-notch professionals, entrepreneurs and leaders for different fields of engineering, technology and management.
- To open a Training-R & D-Design-Consultancy cell in each department, gradually introduce doctoral and postdoctoral programs, encourage basic & applied research in areas ofsocial relevance, and develop the institute as a center of excellence.
- To develop academic, professional and financial alliances with the industry as well as the academia at national and transnational levels
- To develop academic, professional and financial alliances with the industry as well as the academia at national and transnational levels.
- To cultivate strong community relationships and involve the students and the staff in Local community service.
- To constantly enhance the value of the educational inputs with the participation of students, faculty, parents and industry.

Vision

- Development of academically excellent, culturally vibrant, socially responsible and globally competent human resources.

Mission

- To keep pace with advancements in knowledge and make the students competitive and capable at the global level.
- To create an environment for the studentsto acquire the right physical, intellectual, emotional and moral foundations and shine as torch bearers of tomorrow’s society.
- To strive to attain ever-higher benchmarks of educational excellence.

PROGRAM OUTCOMES

PO:01 Engineering knowledge:

Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.

PO:02 Problem analyses:

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

PO:03 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.

PO:04 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.

PO:05 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.

PO:06 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 and business practices.

PO:07 Environment and sustainability:

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

PO:08 Ethics:

Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.

PO:09 Individual and team work:

Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO: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.

PO:11 Project management and finance:

Demonstrate knowledge and understanding of the engineering, business 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.

PO: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 context of technological change.

Java Programming Laboratory

Course Code	**22MCAL28**	CIE Marks	50
Teaching Hours/Week (L:P: SDA)	0:3:0	SEE Marks	50
Credits	2	Exam Hours	03

Course objectives:

- Using java programming to develop programs for solving real-world problems
- Reinforce the understanding of basic object-oriented programming concepts.

Sl.NO	Experiments
1	Write a Java program to print the following triangle of numbers 1 1 2 1 2 3 1 2 3 4 1 2 3 4 5
2	Write a Java program to list the factorial of the numbers 1 to 10. To calculate the factorial value, use while loop. (Hint Fact of 4 = 4*3*2*1)
3	Write a Java program • To find the area and circumference of the circle by accepting the radius from the user. • To accept a number and find whether the number is Prime or not
4	Write a Java program to demonstrate a division by zero exception
5	Write a Java program to implement Inner class and demonstrate its Access protection.
6	Write a Java program to demonstrate Constructor Overloading and Method Overloading.
7	Write a JAVA program to demonstrate Inheritance. Simple Program on Java for the implementation of Multiple inheritance using interfaces to calculate the area of a rectangle and triangle.
8	Write a Java applet program, which handles keyboard event.
	Demonstration Experiments (For CIE) if any
9	Write a Java Program to create a window when we press ✓ M or m the window displays Good Morning ✓ A or a the window displays Good After Noon ✓ E or e the window displays Good Evening ✓ N or n the window displays Good Night
10	Write a Java program to implement a Queue using user defined Exception Handling (also make use of throw, throws). a. Complete the following: b. Create a package named shape. c. Create some classes in the package representing some common shapes like Square, Triangle, and Circle. d. Import and compile these classes in other program.

Course outcomes (Course Skill Set):

At the end of the course the student will be able to:

- Demonstrate the fundamental data types and constructs of Java Programming by writing executable/interpretable programs.
- Illustrate the object oriented principles with the help of java programs.
- Develop reusable and efficient applications using inheritance concepts of java.
- Learn the object oriented concepts and its implementation in Java.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 40%of maximum marks in the semester-end examination(SEE). In total of CIE and SEE student has to secure 50% maximum marks of the course.

Continuous Internal Evaluation (CIE):

CIE marks for the practical course is **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled downed to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8th week of the semester and the second test shall be conducted after the 14th week of the semester.
- In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The average of 02 tests is scaled down to **20 marks** (40% of the maximum marks).

The Sum of **scaled-down** marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

SEE marks for the practical course is 50 Marks.

SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University.

All laboratory experiments are to be included for practical examination.

(Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.

Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.

Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 10% Marks allotted to the procedure part to be made zero.

The duration of SEE is 03 hours

CONTENT LIST

8	**Program 8:** Write a Java applet program, which handles keyboard event.	**11**
9	**Program 9:** Write a Java Program to create a window when we press ➢ M or m the window displays Good Morning ➢ A or a the window displays Good After Noon ➢ E or e the window displays Good Evening ➢ N or n the window displays Good Night	**13**
10	**Program 10:** Write a Java program to implement a Queue using user defined Exception Handling (also make use of throw, throws). a. Complete the following: b. Create a package named shape. c. Create some classes in the package representing some common shapes like Square, Triangle, and Circle. d. Import and compile these classes in other program.	**15**

1. Write a Java program to print the following triangle of numbers

1

1 2

1 2 3

1 2 3 4

1 2 3 4 5

Program

```
class Program1 {
   public static void main(String[] args)
      { int n = 5;
      for (int i = 1; i <= n; i++)
         { for (int j = 1; j <= i; j++)
            System.out.print(j + " ");
         System.out.println();
      }
   }
}
```

Output

```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

2. Write a Java program to list the factorial of the numbers 1 to 10. To calculate the factorial value, use while loop. (Hint Fact of 4 = 4*3*2*1)

Program

```
class Program2 {
   public static void main(String[] args)
         { int fact = 1, i = 1;
         while( i <= 10 )
               System.out.println(i + "! = " + (fact = fact * i++));
   }
}
```

Output

```
1! = 1
2! = 2
3! = 6
4! = 24
5! = 120
6! = 720
7! = 5040
8! = 40320
9! = 362880
10! = 3628800
```

3. Write a Java program

- **To find the area and circumference of the circle by accepting the radius from the user.**
- **To accept a number and find whether the number is Prime or not**

3.1 To find the area and circumference of the circle by accepting the radius from the user.

Program

```
import java.util.Scanner;


public class Program3a {
   public static void main(String[] args)
      { Scanner sc = new Scanner(System.in);
      System.out.print("Enter Circle Radius: ");
      double radius = sc.nextDouble();
      System.out.println("Area of Circle: " + (Math.PI * radius * radius));
      System.out.println("Circumference of Circle: " + (2 * Math.PI * radius));
   }
}
```

Output

```
Enter Circle Radius: 5
Area of Circle: 78.53981633974483
Circumference of Circle: 31.41592653589793
```

3.2 To accept a number and find whether the number is Prime or not

Program

```
import java.util.Scanner;

public class Program3b {
   public static void main(String[] args)
      { System.out.print("Enter a number to check prime or not:
      "); Scanner sc = new Scanner(System.in);
      int n = sc.nextInt();
      int flag = 0, m = n/2;
      if(n!=0 && n!=1)
      {
         for (int i = 2; i <= m;
            i++){ if(n%i==0)
               flag = 1;
         }
      }
      else
         flag = 1;
      if(flag == 0)
         System.out.println(n + " is a prime number");
      else
         System.out.println(n + " is not a prime number");
   }
}
```

Output 1

```
Enter a number to check prime or not: 5
5 is a prime number
```

Output 2

```
Enter a number to check prime or not: 0
0 is not a prime number
```

Output 3

```
Enter a number to check prime or not: 10
10 is not a prime number
```

4. Write a Java program to demonstrate a division by zero exception

Program

```
public class Program4 {
    public static void main(String[] args)
        { try
        {
            int a = 5, b = 0;
            System.out.println("Quotient: "+ (a/b));
        }
        catch (ArithmeticException e)
        {
            System.out.println("Number cant be divided by zero ");
        }
    }
}
```

Output

```
Number cant be divided by zero
```

5. Write a Java program to implement Inner class and demonstrate its Access protection.

Program

```
class Outer {
   private int outdata = 10;

   void display() {
      Inner in = new Inner();
      System.out.println("Accessing from outer class");
      System.out.println("The value of outdata is " + outdata);
      System.out.println("The value of indata is " + in.indata);
      System.out.println();
   }

   class Inner {
      private int indata = 20;

      void inmethod() {
         System.out.println("Accessing from inner class");
         System.out.println("The sum of indata & outdata is " + (outdata + indata));
      }
   }
}

class Program5 {
   public static void main(String args[])
      { Outer out = new Outer();
      out.display();
      Outer.Inner in = out.new Inner();
      in.inmethod();
   }
}
```

Output

```
Accessing from outer class
The value of outdata is 10
The value of indata is 20

Accessing from inner class
The sum of indata & outdata is 30
```

6. Write a Java program to demonstrate Constructor Overloading and Method Overloading

Program

```
public class Program6 {
   //Constructor Overloading
   Program6()
   {
      System.out.println("Welcome");
   }

   Program6(String name)
   {
      System.out.println("Welcome "+ name);
   }
   //Method Overloading
   public void add(int a, int b)
   {
      System.out.println("Sum of "+ a +" + "+ b +" = "+ (a+b));
   }

   public void add(double a, double b)
   {
      System.out.println("Sum of "+ a +" + "+ b +" = "+ (a+b));
   }
   public static void main(String[] args)
      { Program6 p1 = new Program6();
      Program6 p2 = new Program6("Yogeesh S");
      p1.add(5, 6);
      p1.add(5.2, 6.4);
   }
}
```

Output

```
Welcome

Welcome Yogeesh S

Sum of 5 + 6 = 11

Sum of 5.2 + 6.4 = 11.600000000000001
```

7. Write a JAVA program to demonstrate Inheritance. Simple Program on Java for the implementation of Multiple inheritance using interfaces to calculate the area of a rectangle and triangle.

Program

```
interface Rectangle{
    void rectangleArea(double w,double h);
}
interface Triangle{
    void triangleArea(double b,double h);
}
class Shapes implements
    Rectangle,Triangle{ public void
    rectangleArea(double w, double h) {
        System.out.println("Rectangle Area is: "+(w*h));
    }
    public void triangleArea(double b, double h)
        { System.out.println("Triangle Area is: "+(0.5*b*h));
    }
}
class Program7 {
    public static void main(String[]
        args){ Shapes s = new Shapes();
        s.rectangleArea(5,6);
        s.triangleArea(4,3);
    }
```

Output

```
Rectangle Area is: 30.0
Triangle Area is: 6.0
```

8. Write a Java applet program, which handles keyboard event.

Program

```
import java.applet.*;
import java.awt.*;
import java.awt.event.*;

//<applet code="Program8.java" width=600 height=200></applet>

public class Program8 extends Applet implements KeyListener {
   String msg = "", key;

   public void init()
      { addKeyListener(this);
   }

   public void paint(Graphics g)
      { g.drawString(msg, 150, 100);
   }

   public void keyReleased(KeyEvent ke)
      { showStatus(key + " Key Released");
   }

   public void keyPressed(KeyEvent ke)
      { int keycode = ke.getKeyCode();
      key = ke.getKeyText(keycode);
      repaint();
      showStatus(key + " Key Pressed");
   }

   public void keyTyped(KeyEvent ke)
      { char c = ke.getKeyChar();
      msg += c;
      key = String.valueOf(c);
      repaint();
   }
}
```

Output

9. Write a Java Program to create a window when we press

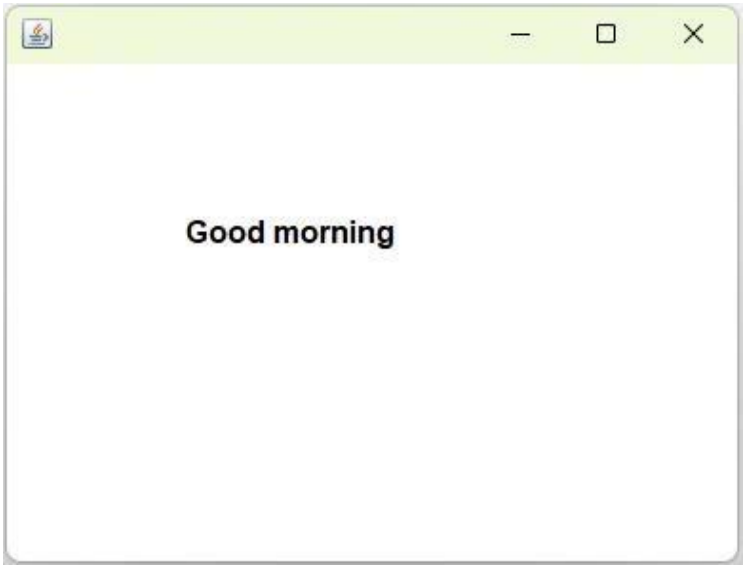
- **M or m the window displays Good Morning**
- **A or a the window displays Good After Noon**
- **E or e the window displays Good Evening**
- **N or n the window displays Good Night**

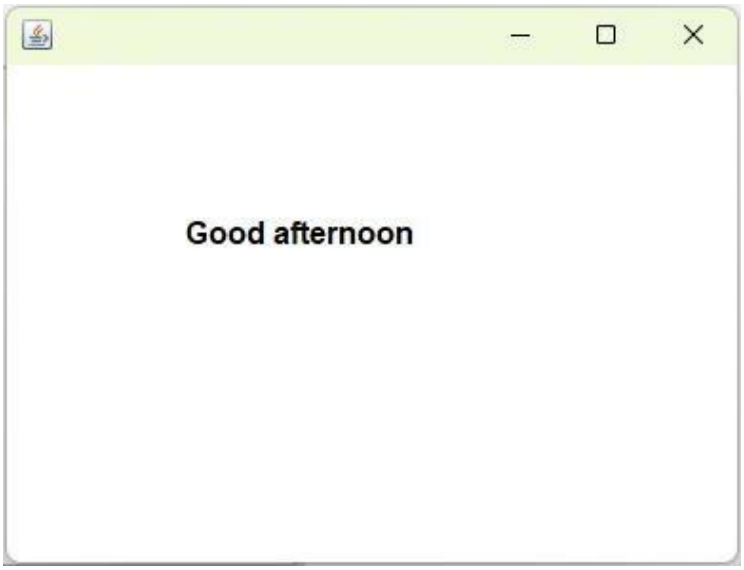
Program

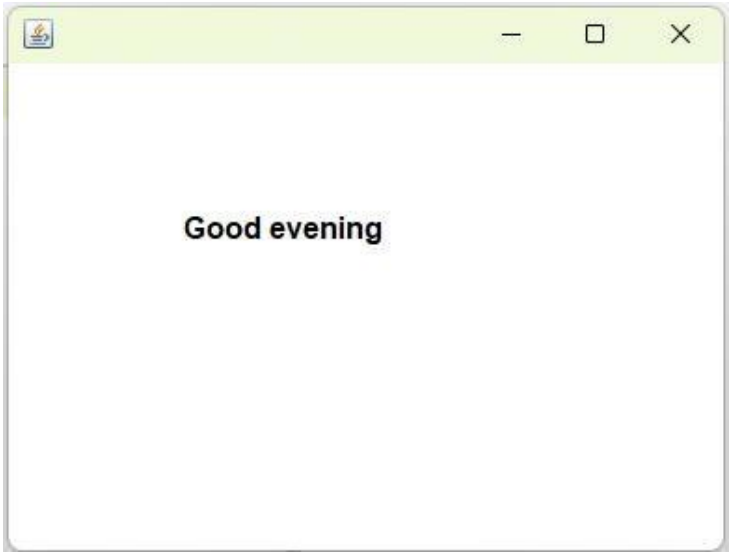
```
import java.awt.*;
import java.awt.event.*;

public class Program9 extends Frame implements KeyListener
   { Label lbl;
   Program9()
      { addKeyListener(this)
      ; requestFocus();
      lbl = new Label();
      lbl.setBounds(100, 100, 200, 40);
      lbl.setFont(new Font("Calibri", Font.BOLD, 16));
      add(lbl);
      setSize(400, 300);
      setLayout(null);
      setVisible(true);
   }
   public void keyPressed(KeyEvent e) {
      if (e.getKeyChar() == 'M' || e.getKeyChar() == 'm')
         lbl.setText("Good morning");
      else if (e.getKeyChar() == 'A' || e.getKeyChar() == 'a')
         lbl.setText("Good afternoon");
      else if (e.getKeyChar() == 'E' || e.getKeyChar() == 'e')
         lbl.setText("Good evening");
      else if (e.getKeyChar() == 'N' || e.getKeyChar() == 'n')
         lbl.setText("Good night");
   }
   public void keyReleased(KeyEvent e) {
   }
   public void keyTyped(KeyEvent e) {
   }
   public static void main(String[] args)
      { new Program9();
   }
}
```

Output







10. Write a Java program to implement a Queue using user defined Exception Handling (also make use of throw, throws). a. Complete the following: b. Create a package named shape. c. Create some classes in the package representing some common shapes like Square, Triangle, and Circle. d. Import and compile these classes in other program.

Program (Rectangle1.java)

```
package Shape;

public class Rectangle1 {
   private double length, breadth;

   public void setRectangle(double len, double br)
      { length = len;
      breadth = br;
   }

   public void area() {
      double area = length * breadth;
      System.out.println("Area of Rectangle =" + area);
   }
}
```

Program (Square.java)

```
package Shape;

public class Square
   { private double side;

   public void setSquare(double val)
      { side = val;
   }

   public void area() {
      System.out.println("Area of Square=" + (side * side));
   }
}
```

Program(Circle1.java)

```
package Shape;

public class Circle1
   { private double rad;

   public void setCircle(double radius)
      { rad = radius;
   }

   public void area() {
      double area = (0.5) * 3.14 * rad * rad;
      System.out.println("Area of Rectangle =" + area);
   }
}
```

Program(Program10.java)

```
import Shape.Rectangle1;
import Shape.Square;
import Shape.Circle1;

public class Program10 {
   public static void main(String args[])
      { Rectangle1 rect = new
      Rectangle1(); rect.setRectangle(5.6,
      6.4); rect.area();
      Square sq = new Square();
      sq.setSquare(10.5);
      sq.area();
      Circle1 round = new Circle1();
      round.setCircle(5.6);
      round.area();
   }
}
```

Output

```
javac -d . Rectangle1.java
javac -d . Circle1.java
javac -d . Square.java
javac Program10.java
java Program10
Area of Rectangle =35.839999999999996
Area of Square=110.25
Area of Rectangle =49.2352
```