

A Laboratory Manual

for

**Advanced Java  
Programming**

(22517)

Semester-V

(CO/CW/CM/IF)



**Maharashtra State  
Board of Technical Education, Mumbai**  
(Autonomous) (ISO:9001:2015) (ISO/IEC 27001:2013)



**MAHARASHTRA STATE  
BOARD OF TECHNICAL EDUCATION**

**Certificate**

This is to certify that Mr. / Ms. Pawar, Nutikesh Lalchand.....  
Roll No. ....46....., of Fifth Semester of Diploma in  
.....Computer Engineering..... of Institute,  
.....Lokneta Gopinathji Munde Institute of Engg., Nashik  
(Code: ...1477....) has completed the term work satisfactorily in course  
**Advanced Java Programming (22517)** for the academic year 2020... to  
2021... as prescribed in the curriculum.

Place: Nashik.....

Enrollment No.: 1914170180

Date: .....

Exam. Seat No: 259163.

Subject Teacher

Head of the Department

Principal



**Practical No. 1: Write a program to demonstrate the use of AWT components.**

**I. Practical Significance:**

Text Field, Text Area, Button, Checkbox, Radio Buttons(Check Box Group) are the AWT components. Used to design the GUI in java. A component is object having representation that can be displayed on the screen to interact with the user.

**II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

**III. Competency and Practical skills**

To develop standalone applications

The practical is expected to develop the following skills.

1. Able to design form using required AWT components
2. Able to understand the different Components available in AWT

**IV. Relevant Course Outcome(s)**

Develop programs using GUI Framework AWT.

**V. Practical Outcome (PrOs)**

Write a program to demonstrate the use of AWT components.

**VI. Relevant Affective domain related Outcome(s)**

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

**VII. Minimum Theoretical Background**

AWT is a java programming language class library. Components are visible objects that can interact with the user. Containers (Frame, Panel, Applet) are used to hold components using in a specific layout.

Using applet window, design following AWT components using add() method of components class. Following are some AWT components

1. Label: Creates a label that displays a string.
2. TextField Creates and accepts a single-line text from user.
3. TextArea Creates and accepts multiple line text from user.

4. Button creates a push button.
5. Checkbox Creates a check box which is used to select multiple options.
6. CheckboxGroup creates a group of checkbox to act as radio button.

**To Create TextArea**

```
TextArea ta=new TextArea(String str,int nooflines)
```

**To create RadioButton(CheckBoxGroup):**

```
CheckBox cb1, cb2;
CheckBoxGroup cbg;
Cb1=new CheckBox("Male",cbg,true);
Cb2=new CheckBox("Female",cbg,false);
```

**VIII. Resources required**

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	Computer System	Computer (i3-i5 preferable RAM > 2GB)		
2	Operating System	Windows/Linux	As per Batch Size	For All Experiments
3	Development Software	JDK 1.5 Onwards		

**IX. Resources used (Additional)**

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	Computer System	i3 PROCESSOR 4 GB RAM		
2	Operating System	Windows	1	
3	Development Software	Jdk- 1.8.1		

- X. Program Code:** Teacher must assign a separate program statement to group of 3-4 students.
1. Design an applet/application to demonstrate the use of Radio Button and Checkbox.
  2. Design an applet/application to create form using Text Field, Text Area, Button and Label.

**XI. Result (Output of Code):**

We create and run the program

1 Design an applet/application to demonstrate the use of Radio Button and Checkbox.

→ Applet to demonstrate use of radio button and checkbox.

```
import java.awt.*;  
Public Class CheckBoxGroup Example
```

```
{
```

```
CheckBoxGroupExample ()
```

```
Frame F = new Frame ("CheckBoxGroup Example");
```

```
CheckBoxGroup Cbg = new CheckBoxGroup ();
```

```
CheckBox CheckBox1 = new CheckBox ("+", "+", Cbg, false);
```

```
CheckBox 1. setBounds (100, 100, 50, 50),
```

```
CheckBox 2. CheckBox 2 = new CheckBox ("Java", Cbg, true);
```

```
CheckBox 2. setBounds (100, 100, 50, 50),
```

```
F.add (checkbox 1);
```

```
F.add (checkbox 2);
```

```
F.setSize (400, 400);
```

```
F.setLayout (null);
```

```
F.setVisible (true);
```

```
}
```

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

```
{
```

```
new CheckBoxGroup Example ();
```

```
}
```

Output :-

CheckBoxGroup Example - □ X

C++

Java

② Design an applet/application to create form using Text Field, Text Area, Button and Label.

→ Applet to Create form using Text fields, Text area, Button and label.

```
import java.awt.*;
Class use - checkBoxGrr
{
```

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

```
Frame Fr = New Frame ("This program user text
Fields, text area, button")
Ex. setLayout (New flowlayout ());
Fr.setSize (300, 300);
Fr.setVisible (true);
```

```
Label L1 = new Label ("Enter your name here");
Textfield input 1 = new textfield (1);
L1. set Bounds (50, 150, 150, 20);
Label L2 = new Label ("Enter your address here");
TextArea Input 2 = new TextArea ()
L2. setBounds (50, 150, 150, 20);
Button B1 = new Button ("OK");
B1. SetBounds (50, 200, 50, 50);
Button B2 = new Button ("Cancel");
B2. SetBounds (50, 200, 50, 50);
Fr.add (L1);
Fr.add (Input 1);
Fr.add (L2);
Fr.add (Input 2);
Fr.add (B1);
Fr.add (B2);
}
Output =
```

<input type="checkbox"/>	<input type="radio"/>	<input checked="" type="checkbox"/>
Enter your name here <input type="text"/>		
Enter your address here <input type="text"/>		
<input type="button" value="OK"/>	<input type="button" value="Cancel"/>	

## XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. State the difference between CheckBox and RadioButton
2. Write the use of setEnabled() method.
3. Draw the life cycle of an Applet.

(Space for answer)

→ 1	CheckBox	RadioButton
1	checkbox allow one or many options to be selected	Radio button allow only one option to be selected out of several available option
2	Radio button have only 2 stage :- True, False	Check box have 3 states checked, unchecked, Indeterminate
→ 2	Use of SetEnable () Method:	Use the SetEnable () Method on the client to dynamically switch buttons ability to respond to end user interaction. The textfield are editable by default. The Code setEnabled (False). disables this Textfield.
→ 3	Life Cycle of Applet:-	<pre> graph TD     A((Applet is initialized)) --&gt; B((Applet is started))     B --&gt; C((Applet is stopped))     C --&gt; D((Applet is destroyed))     </pre> <p>Applet Life cycle</p>

Applet :- Applet is a special type program thus can be embedded in the webpage to generate the dynamic content.

XIII. Exercise:

1. Develop a program using Label to display message "Welcome to Java"
2. Develop a program to select multiple languages known to user. (e.g Marathi, Hindi, English, Sanskrit).
3. Write a program to create three Buttons with Caption OK, RESET and CANCEL.

(Space for answer)

```
→ 1 import java.awt.*;  
Class HelloWorld  
{  
    public static void main (String args)  
    {  
        Frame Fr = new Frame ("Hello World");  
        Fr.setLayout (new FlowLayout ());  
        Fr.setSize (300,300);  
        Fr.setVisible (true);  
        Label L1 = new Label ("Welcome to Java");  
        L1.setBounds (50,150,150,150,20)  
        Fr.add (L1);  
    }  
}
```

Output

Hello World - □ x

Welcome to Java

```
2] import java.awt.*  
class checkbox  
{  
    public static void main (String args [])  
    {  
        Frame Fr = new Frame ("Multiple Languages");  
        Fr.setLayout (new FlowLayout ());  
        Fr.setSize (300,300);  
        Fr.setVisible (true);  
        Label L1 = new Label ("Select Languages");  
        L1.setBounds (50,150,150,20);  
        checkbox b1 = new checkbox ("Marathi");  
        checkbox b2 = new checkbox ("English");  
        checkbox b3 = new checkbox ("Hindi");  
        checkbox b4 = new checkbox ("Sanskrit");  
  
        Fr.add (L1);  
        Fr.add (b1);  
        Fr.add (b2);  
        Fr.add (b3);  
        Fr.add (b4);  
    }  
}
```

Output :-      Multiple Languages -

Select Language
<input type="checkbox"/> Marathi
<input type="checkbox"/> Hindi
<input type="checkbox"/> English
<input type="checkbox"/> Sanskrit

→ 3) import java.awt.\*;  
class use label  
{  
public static void main (String args [])  
{  
Frame Fr = new Frame ("Buttons");  
Fr.setSize (400, 200);  
Fr.setLayout (new FlowLayout ());  
Fr.setVisible (true);  
Button B1 = new Button ("OK");  
Button B2 = new Button ("Cancel");  
Button B3 = new Button ("Reset");  
Fr.add (B1);  
Fr.add (B2);  
Fr.add (B3);  
3  
3

Output:

Buttons			-	X
OK	Cancel	Reset		

XIV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com>
2. <https://www.tutorialspoint.com/java>
3. The complete reference Java 2 by Herbert Schildt

XV. Assessment Scheme

Performance Indicators		Weightage
Process related (35 Marks)		70%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

List of Students / Team Members

1. Rutikesh L. Pawar
2. Aditya S. Salunkhe
3. ....

Marks Obtained			Dated signature of Teacher
Process Related (35)	Product Related (15)	Total (50)	

### Practical No. 2: Write a program to design a form using the components List and Choice.

#### I. Practical Significance:

The List and Choice components lets the user choose one option from list of available options. A Choice is displayed in a compact form that requires you to pull it down to see the list of available choices. Only one item may be selected from a Choice. A List may be displayed in such a way that several List items are visible. A List supports the selection of one or more List items.

#### II. Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

#### III. Competency and Practical skills

To develop standalone applications and web Application

The practical is expected to develop the following skills:

1. Able to develop an applet/application using Choice and List components.

#### IV. Relevant Course Outcome(s)

Develop programs using GUI Framework (AWT and Swing).

#### V. Practical Outcome (POs)

Write a program to design a form using the components List and Choice.

#### VI. Relevant Affective domain related Outcome(s)

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

#### VII. Minimum Theoretical Background

List: Creates a list from which the user can choose list items.

##### Constructors:

List () // allows only one item to be selected

List (int numRows) // no of entries will always be visible

List (int numRows, Boolean multiple Select) // if it is true then user select multiple items. If it is false then only one item may be selected

**Choice**

The Choice class is used to create a pop-up list of items from which the user may choose. When the user clicks on it, the whole list of choices pops up and new selection can be made. Choice defines the default constructor, which creates an empty list. To add a selection to the list, call add () .

**VIII. Resources required (Additional) –**

Nil

**IX. Resources used (Additional)**

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	Computer System	Processor - i3 RAM - 4 GB	1	—
2	Operating system	Windows 10	1	—

**X. Program Code:** Teacher must assign a separate program statement to group of 3-4 students.

1. Write Java Program to show following output.

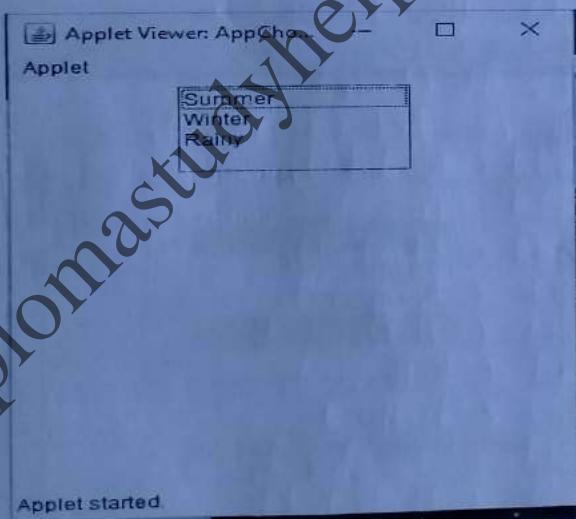


Figure 1

```
import java.awt.*;  
class useList {  
    public static void main (String args [])
```

```
9  
int i;  
Frame Fr = new Frame();  
Fr.setSize(350, 300);  
Fr.setLayout(new FlowLayout());  
Fr.setVisible(true);  
List season = new List(4, false);  
season.add("Summer");  
season.add("Winter");  
season.add("Rainy");  
Fr.add(season);  
10
```

XI. Result (Output of Code):

Programs Compiled and Run successfully

XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. Write the name of components used in following output

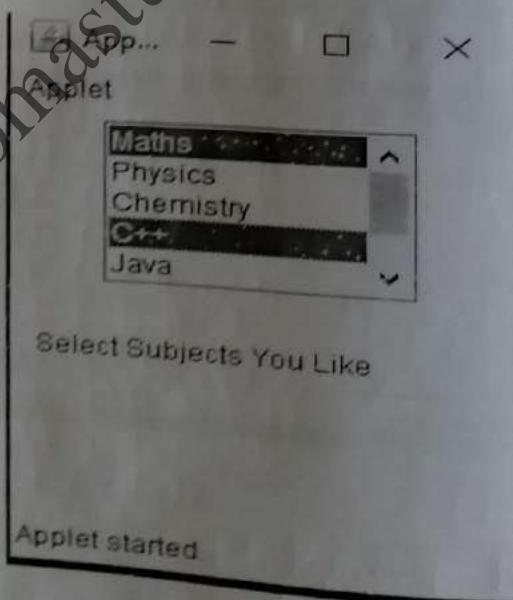


Figure 2

2. State the difference between List and Choice control
3. Write the use of getSelectedItem() and getSelectedIndex() for List.

(Space for answer)

→ 1 Components that used

- 1) list
- 2) label

→ 2

### Choice

### List

① A choice is displayed in compact form that requires you to pull it down to see the list of available choice

② Only one item may be selected from a choice

③ A list may be displayed in such a way that several list items are visible

④ Choice is the act of picking or deciding between two or more possibilities

⑤ A list is any enumeration of set items

⑥ Only one item may be selected from choice

⑦ A list supports the selection of one or more list items

→ 3 Uses of :-

getSelectedIndex () :- returns the index of the currently selected

getSelectedItem () :- gets a representation of the current choice as string

XIII. Exercise:

1. Develop an applet/ application using List components to add names of 10 cities.
2. Develop applet / application to select multiple names of news papers

(Space for answer)

→ ① import java.awt.\*;  
class UseList {  
public static void main (String args [])  
{  
int i;  
Frame Fr = new Frame ();  
Fr.setSize (350, 200);  
Fr.setVisible (true);  
List city = new List (10, false);  
city.add ("Nashik");  
city.add ("Pune");  
city.add ("Mumbai");  
city.add ("Nagpur");  
city.add ("A-Nagar");  
city.add ("Kolkata");  
city.add ("Delhi");  
city.add ("Bengaluru");  
city.add ("Hyderabad");  
city.add ("Indore");  
Fr.add (city);  
}

3

Output :-

Applet	□ □ □
Nashik	↑
Pune	
Mumbai	
Nagpur	
A. Nagar	
Kolkata	
Delhi	
Bengalur	
Indore	▼

Applet started

```

2 import java.applet.*;
import java.awt.*;
import java.awt.event.*;
public class News extends Applet
{
    public void init()
    {
        List l1 = new List(10, true);
        l1.setBounds(50, 60, 100, 120);
        l1.add("Times of India");
        l1.add("Sakal");
        l1.add("Lokmat");
    }
}

```

```
l1.add ("Hindustan Times");
l1.add ("The Economic Times");
add (l1);
setLayout (null);
}
public void paint (Graphics g)
{
    repaint ();
}
```

Output:-

Applet Viewer : News

□ ◻ ✎

Times of India
Sakal
Lokmat
Hindustan Times
The Economic Times

Applet started

IV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com>
2. <https://www.tutorialspoint.com/java>
3. The complete reference Java 2 by Herbert schildt

V. Assessment Scheme

Performance Indicators		Weightage
Process related (35 Marks)		70%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

List of Students /Team Members

1. Rutikesh...Pawar...
2. Aditya.S....Salunke
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	

**Practical No. 3: Write a program to design simple calculator with the use of Grid Layout.**

**I. Practical Significance:**

A layout manager automatically arranges your controls within a window. While it is possible to lay out Java controls by hand, too, you generally won't. It is very tedious to manually lay out a large number of components

**II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

**III. Competency and Practical skills**

To develop standalone applications

The practical is expected to develop the following skills:

1. Able to apply different layouts to Applet, Frame and Panel
2. Able to demonstrate the use of different types of Layout Manager

**IV. Relevant Course Outcome(s)**

Develop programs using GUI Framework (AWT and Swing).

**V. Practical Outcome (PrOs)**

Write a program to design simple calculator with the use of GridLayout.

**VI. Relevant Affective domain related Outcome(s)**

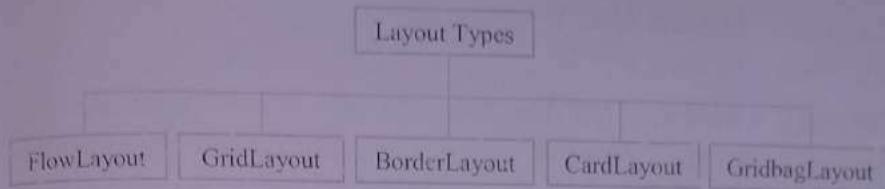
1. Follow precautionary measures.

2. Follow naming conventions.

3. Follow ethical practices.

**VII. Minimum Theoretical Background**

Layout Manager is a facility that determines how components should be arranged when they are added to the container. Layout Manager is an interface that is implemented by all the classes of layout managers. There are following classes that represent the layout managers.



Understand the default layout for different containers such as Applet, Frame, Panel.  
Grid Layout is used to make a bunch of components equal in size and displays them in the requested number of rows and columns. One component is displayed in each rectangle.

The list of Constructor for GridLayout are:

1. GridLayout(): creates a grid layout with one column per component in a row.
2. GridLayout(int rows, int columns): creates a grid layout with the given rows and columns but no gaps between the components.
3. GridLayout(int rows, int columns, int hgap, int vgap): creates a grid layout with the given rows and columns along with given horizontal and vertical gaps if we give setLayout(null) the default layout is disabled.then we have to use setBounds method to layout the components.

### VIII. Resources required (Additional)-

Nil

### IX. Resources used (Additional) -

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	Computer System	Processor - P3 RAM - 4GB	1	-

### X. Program Code: Teacher must assign a separate program statement to group of 3-4 students.

1. Write java Program to Demonstrate Grid of 5\* 5
2. Write a program to display The Number on Button from 0 to 9.

→ 2 import java.awt.\*;  
import java.applet.\*;  
Public class Button Demo 10 extends Applet  
{  
Button b0,b1,b2,b3,b4,b5,b6,b7,b8,b9;  
Public void init()  
{  
b0=new Button ("0");  
b1=new Button ("1");

```
b1=new Button ("1")
b2=new Button ("2")
b3=new Button ("3")
b4=new Button ("4")
b5=new Button ("5")
b6=new Button ("6")
b7=new Button ("7")
b8=new Button ("8")
b9=new Button ("9")

add(b0);
add(b1);
add(b2);
add(b3);
add(b4);
add(b5);
add(b6);
add(b7);
add(b8);
add(b9)
```

XI. Result (Output of Code):

Program run successfully

XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. Give name of default Layout for Different container
2. List the names of BorderLayout regions.
3. Write the default horizontal and vertical gap in FlowLayout
4. Write the use of Insets in border layout.

- 1) Borderlayout() is the default layout for frame.  
FlowLayout() is the default layout for applet/panel.
- 2) Border layout arranges the components in four  
boards of windows as well as in center 5  
regions of the Borderlayout
- ① NORTH  
② SOUTH  
③ EAST  
④ WEST  
⑤ CENTER
- 3) The constructor FlowLayout(int horz; int horz;  
very) specifies horizontal and vertical distance  
by horz and very which leaves 5 pixel space  
around the component.
- 4) Every component has a set of 0 in sets. In  
sets specify the widths of the components margins  
Insets includes  
• top inset  
• left inset  
• bottom inset  
• right inset

XIII. Exercise

1. Write a program to generate following output

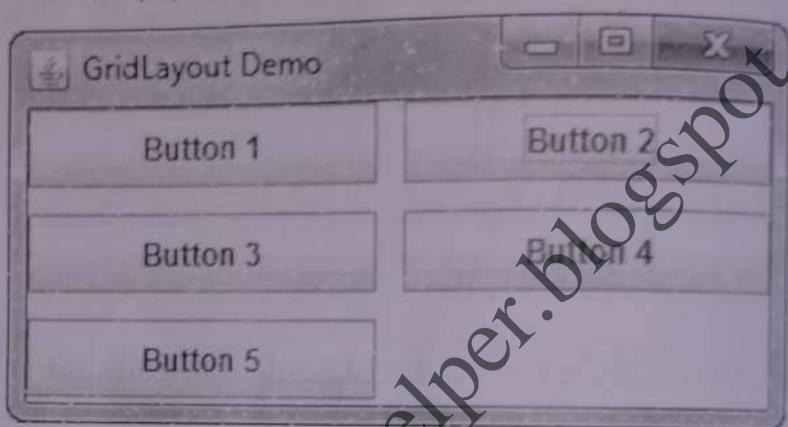


Figure 3

2. Write a program to generate following output using Border Layout

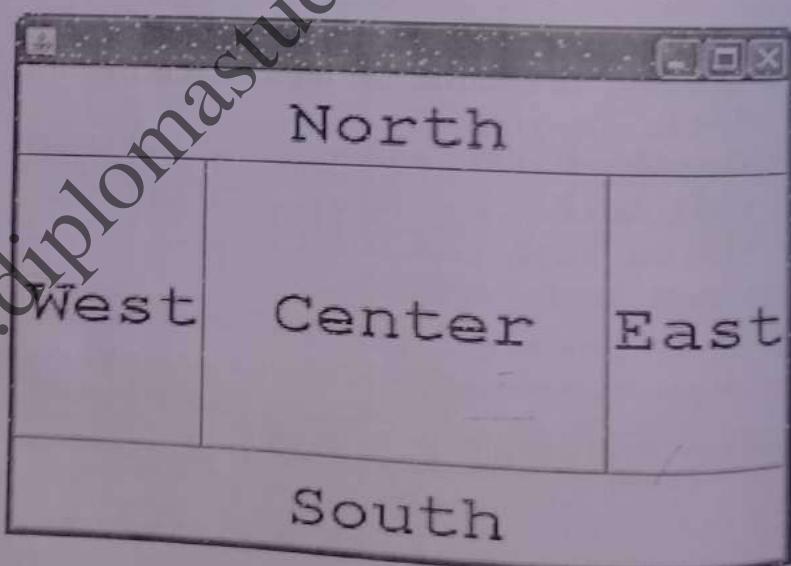


Figure 4

```
1 import java.awt  
import java.applet.*;  
Public class MyGridLayout {  
Frame F1  
MyGridLayout () {  
F = new Frame ();  
  
Button b1 = new Button ("Button 1");  
Button b2 = new Button ("Button 2");  
Button b3 = new Button ("Button 3");  
Button b4 = new Button ("Button 4");  
  
F.add (b1);  
F.add (b2);  
F.add (b3);  
F.add (b4);  
F.setLayout (new GridLayout (3,2));  
F.setVisible (true);  
}  
3  
public static void main (String args []) {  
new MyGridLayout ();  
}  
3  
Import java.awt.*;  
import java.awt.event.*;  
public class Region  
{  
Region ()  
}
```

(Space for Answer)

```
Frame F=new Frame();
Button b1=new Button("East");
Button b2=new Button("West");
Button b3=new Button("North");
Button b4=new Button("South");
Button b5=new Button("Center");
F.add(b1,BorderLayout.East);
F.add(b2,BorderLayout.West);
F.add(b3,BorderLayout.South);
F.add(b4,BorderLayout.South);
F.setSize(300,300);
F.setVisible(true);
```

3  
2  
public static void main(String [] args)

3 new Region()

3

XIV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com>
2. <https://www.tutorialspoint.com/java>
3. The complete reference Java 2 by Herbert Schildt

XV. Assessment Scheme

Performance Indicators		Weightage
Process related (35 Marks)		70%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

List of Students /Team Members

1. Rutikesh Pawar
2. Aditya Salunke,
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	

**Practical No. 4: Use of CardLayout to write a program to create a two-level card deck that allows the user to select an operating system.**

**I. Practical Significance:**

The CardLayout class manages the components in such a manner that only one component is visible at a time. It treats each component as a card hence known as CardLayout.

**II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

**III. Competency and Practical skills**

To develop standalone applications

The practical is expected to develop the following skills:

1. Able to apply different layouts to Applet, Frame and Panel
2. Able to demonstrate the use of different types of Layout Manager

**IV. Relevant Course Outcome(s)**

Develop programs using GUI Framework (AWT and Swing).

**V. Practical Outcome (PrOs)**

Write a program to demonstrate the use of Border layout showing four buttons at four sides of an applet with captions “left”, “right”, “top” and “bottom”

**VI. Relevant Affective domain related Outcome(s)**

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

**VII. Minimum Theoretical Background**

**Constructors of CardLayout class**

1. **CardLayout():** creates a card layout with zero horizontal and vertical gap.
2. **CardLayout(int hgap, int vgap):** creates a card layout with the given horizontal and vertical gap.

**Commonly used methods of CardLayout class**

1. **public void next (Container parent):** is used to flip to the next card of the given container.

2. **public void previous (Container parent):** is used to flip to the previous card of the given container.
3. **public void first (Container parent):** is used to flip to the first card of the given container.
4. **public void last (Container parent):** is used to flip to the last card of the given container.
5. **public void show (Container parent, String name):** is used to flip to the specified card with the given name.

#### VIII. Resources required (Additional)–

Nil

#### IX. Resources used (Additional)

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	Computer system	Processor - i3 RAM - 4GB	1	—

- X. Program Code: Teacher must assign a separate program statement to group of 3-4 students.  
Execute the following Program and write the output.

```

import java.awt.*;
import java.awt.event.*;
import javax.swing.*;

public class CardLayoutExample extends JFrame implements ActionListener
{
    CardLayout card;
    JButton b1, b2, b3;
    Container c;
    CardLayoutExample()
    {
        c=getContentPane();
        card=new CardLayout(40,30);
        //create CardLayout object with 40 hor space and 30 ver space
        c.setLayout(card);
        b1=new JButton("Apple");
        b2=new JButton("Boy");
        b3=new JButton("Cat");
        b1.addActionListener(this);
        b2.addActionListener(this);
        b3.addActionListener(this);
        c.add("a",b1);c.add("b",b2);c.add("c",b3);
    }
}
  
```

```
public void actionPerformed(ActionEvent e)
{
    card.next(c);
}
public static void main(String[] args)
{
    CardLayoutExample cl=new CardLayoutExample();
    cl.setSize(400,400);
    cl.setVisible(true);
    cl.setDefaultCloseOperation(EXIT_ON_CLOSE);
}
```

XI. Result (Output of Code):

XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. State difference between GridLayout and GridBagConstraints.
2. Explain constructor of GridBagConstraints.

(Space for answer)

- 1) i) GridLayout :- GridLayout class puts all the components in a rectangular grid and is divided into an equal sized rectangles and each component is placed inside a rectangle.  
ii) GridBagConstraints :- The GridBagConstraints class is a flexible layout that aligns components vertically and horizontally without requiring that components be of the same size.

2) Constructor of GridLayout :-

- Public GridLayout () :- Creates a GridLayout with default of one column per component in a single row.

Ex. GridLayout gl = new GridLayout();

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• Public GridLayout (int rows, int columns); - Creates a grid layout with the given rows and columns but no gaps between the components.

XIII. Exercise

1. Write Java program to display following output.

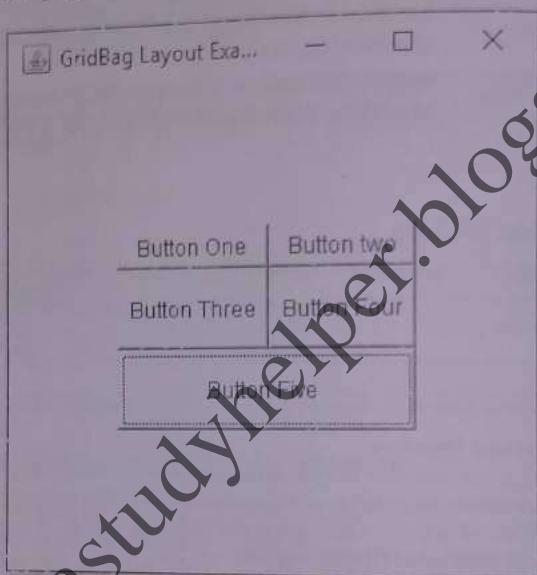


Figure 5

2. Write Java Program to display following output.

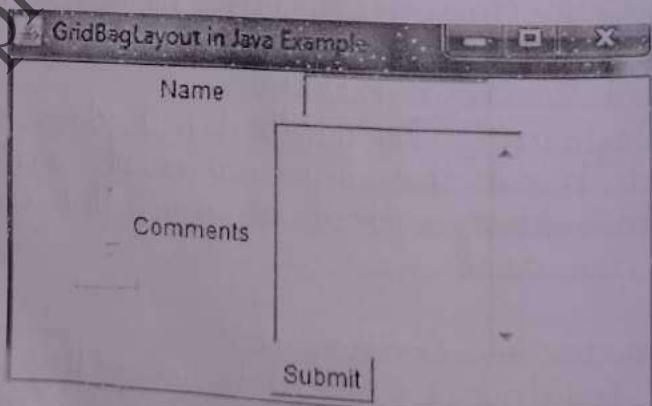


Figure 6

```
→ 1] import java.awt.Button;
      import java.awt.GridBagConstraints;
      import java.awt.GridBagLayout;
      import javax.swing.*;  
  
public class Bag extends Frame {
    public Bag () {
        GridBagConstraints g = new GridBagConstraints();
        GridBagLayout l = new GridBagLayout();
        this.setLayout(l);
        g.fill = GridBagConstraints.HORIZONTAL;
        g.gridx = 0;
        g.gridy = 0;
        this.add(new Button("Button one"), g);
        g.gridx = 1;
        g.gridy = 0;
        this.add(new Button("Button two"), g);
        g.gridx = 0;
        g.gridy = 1;
        this.add(new Button("Button three"), g);
        g.gridx = 1;
        g.gridy = 1;
        this.add(new Button("Button Four"), g);
        g.gridx = 0;
        g.gridy = 2;
        g.gridwidth = 2;
        this.add(new Button("Button Five"), g);
        setSize(300, 300);
```

```
setvisible(true);  
{
```

```
public static void main (String args []) {  
    Bag a = new Bag ();  
}
```

```
}
```

```
→ 2] import .java.awt.*;  
import .java.awt.swing.*;  
class GridLayoutExample extends Frame  
{  
    GridLayoutExample ()  
    {  
        Label lblName = new Label ("Name");  
        TextField textName = new TextField (10);  
        Label lblComments = new Label TextArea (6,15);  
        TextArea textaComments = new TextArea (6,15);  
        Button btnSubmit = new Button ("submit");  
  
        GridBagConstraints gc = new GridBagConstraints  
        {  
            int x, int y, int w, int h, int wx, int wy  
        };
```

```
        gc.gridx = x;  
        gc.gridy = y;  
        gc.gridwidth = w;  
        gc.gridheight = h;  
        gc.gridweight.x = wx;  
        add (comp,gc);  
    }
```

```
}
```

(Space for Answer)

```
Class GridBagLayout Java Example  
{  
    public static void main (String args[])  
    {  
        public static void main (String args []);  
        GridBagLayout Example Frame =  
        new GridBagLayout Example ();  
        Frame .setTitle ("GridBagLayout Java Example");  
        Frame .setSize (300, 200);  
        Frame .setVisible (true);  
    }  
}
```

**XIV. References/ Suggestions for Further Reading**

1. <https://www.javatpoint.com>
2. <https://www.tutorialspoint.com/java>
3. The complete reference Java 2 by Herbert Schildt

**XV. Assessment Scheme**

Performance Indicators		Weightage
Process related (35 Marks)		70%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

*List of Students /Team Members*

1. Rutikesh...1...Pawar.
2. Aditya...2...Salunke.
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	

**Practical No. 5: Write a program using AWT to create a menu bar where menu bar contains menu items such as File, Edit, View and create a submenu under the File menu: New and Open.**

**I. Practical Significance:**

The Menu Bar lets the user to select different menu options from the list of available menu items and perform operations on the selected menu item.

**II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

**III. Competency and Practical skills**

To develop standalone applications

The practical is expected to develop the following skills:

1. Able to develop Menu, Menu Bar and Menu Items
2. Able to write a program using Menu Bar and assign shortcuts

**IV. Relevant Course Outcome(s)**

Develop programs using GUI Framework (AWT and Swing)

**V. Practical Outcome (PrOs)**

Write a program using AWT to create a menu bar where menu bar contains menu items such as File, Edit, View and create a submenu under the File menu: New and Open.

**VI. Relevant Affective domain related Outcome(s)**

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

**VII. Minimum Theoretical Background**

A top-level window can have a menu bar associated with it. A menu bar displays a list of top-level menu choices. Each choice is associated with a drop-down menu. This concept is implemented in the AWT by the following classes: **Menu Bar**, **Menu**, and **Menu Item**

To create a menu bar, first create an instance of Menu Bar. This class only defines the default constructor. Next, create instances of Menu that will define the selections displayed on the bar.

Menu( ) // creates an empty menu.

Menu(String optionName) // name of the menu selection

Menu(String optionName, boolean removable) // If removable is true, the menu can be removed and allowed to float free. Otherwise, it will remain attached to the menu bar.

**Individual menu items are of type MenuItem. It defines these constructors:**

1. MenuItem()

2. MenuItem(String itemName) // the name shown in the menu

3. MenuItem(String itemName, MenuShortcut keyAccel) // keyAccel is the menu shortcut for this item

### VIII. Resources required (Additional)-

Nil

### IX. Resources used (Additional)

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1				

### X. Program Code: Teacher must assign a separate program statement to group of 3-4 students.

1. Write a program which creates Menu of different colors and disable menu item for Black color.

→ import java.awt.\*;  
class MenuEx extends Frame  
{  
    MenuItem()

MenuBar Mr=newMenuBar();  
setMenuBar(Mr);

Menu m1=newMenu("Colours");

MenuItem mn1=newMenuItem("RED")

MenuItem mn2=newMenuItem("YELLOW")

MenuItem mn3=newMenuItem("BLACK")

Mn3.setEnabled(false);

MenuItem mn4=newMenuItem("BLUE")

MenuItem(mn1)=m1.add(mn2);

m1.add(mn2); m1.add(mn4);

Maharashtra state Board of Technical Education

```
3  
3 classMenuBarEx  
2 Public static void main (String args [])  
2 { MenuEx M = new MenuEx ();  
m.setTitle ("MenuBar"); m.setSize (500,50);  
M.setVisible (true);  
XI. Result (Output of Code): 3  
3
```

XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. Write the use of setEnabled() method
2. Write the procedure to assign shortcut key to the Menu Item
3. Write a syntax and use of addSeparator() method

(Space for answer)

→ 1] Use of setEnabled(): Textfield are editable by default.

The code setEditable (false) makes the text field uneditable. It is still selectable and the user can copy data from it, but user cannot change the textfield contents directly. The code setEnabled (false), disables this fields.

→ 2] Procedure :-

① JMenuBar = To create a menu bar

② JMenu = To create menu

③ JMenuItem = To create menu item

④ JMenuItem.setMnemonic (KeyEvent.VK\_N). A set keyboard shortcut to a menu item.

→ 3] Syntax :- addSeparator()

Use :- adds a separate in JMenu or  
JPopupMenu

### XIII. Exercise

- Find errors in following program and display output as shown below.

```
import java.awt.*;
import java.awt.event.*;
public class MenuDemo1 extends Frame
{
    MenuBar mb;
    MenuItem m1,m2,m3,m4;
    Menu mn;
    MenuShortcut ms;
    MenuDemo1()
    {
        setTitle("MenuBar Demo");
        setSize(500,500);
        setLayout(null);
        ms=new MenuShortcut(KeyEvent.VK_X);
        mn=new Menu("File");
        mb=new MenuBar();
        m1=new MenuItem("New...");
```

```
        ma.add(m1);
        mn.add(m2);
        mn.add(m3);
        mn.addSeparator();
        mn.add(m4);
        mb.add(mn);

    }

    public static void main(String[] args)
    {
        MenuDemo1 md=new MenuDemo1();
        md.setVisible(true);
    }
}
```

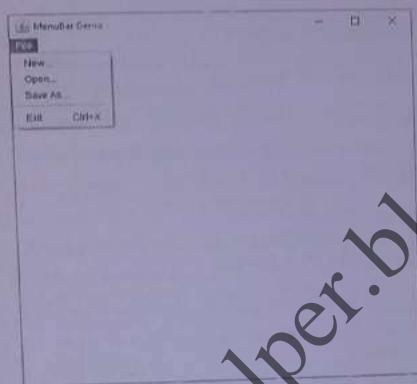


Figure 7  
(Space for Answer)

After removing exit

```
import java.awt.*;
class MenuDemo1
{
    MenuDemo1()
    {
        Frame F=new Frame("MenuBar Demo");
        MenuBar mb=new MenuBar();
        Menu menu=new Menu("File");
        MenuItem i1=new MenuItem("New... ");
        MenuItem i2=new MenuItem("Open... ");
        MenuItem i3=new MenuItem("SaveAs... ");
        MenuItem i4=new MenuItem("Exit");
        menu.add(i1); menu.add(i2);
        menu.add(i3); menu.add(i4);
    }
}
```

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Maharashtra state Board of Technical Education

```
mb.add(menu);
F.setMenuBar(mb); F.setLayout(null);
F.setSize(400,400); F.setVisible(true);
```

3 public static void main (String args [ ] )

2

new MenuDemo1();

3

XIV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com>
2. <https://www.tutorialspoint.com/java>
3. The complete reference Java 2 by Herbert Schildt

XV. Assessment Scheme

Performance Indicators		Weightage
Process related (35 Marks)		70%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

List of Students / Team Members

1. Rutuja L. Pawar
2. Aditya S. Salunkhe
- 3.

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	

**Practical No. 6: Write a program using swing to display a ScrollPane and JComboBox in an JApplet with the items – English, Marathi, Hindi, Sanskrit.**

**I. Practical Significance:**

The Swing Components are very useful to design interactive application and it provide rich look and feel to the components. Swing components are light weight and platform independent. Swing supplies additional controls such as TabbedPane, ScrollPane, Trees and Tables. JFrame and JApplets are used to design windows and web applications.

**II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

**III. Competency and Practical skills**

To develop standalone applications using swing components

The practical is expected to develop the following skills:

1. Able to Implement the JComboBox and JScrollPane
2. Able to write the program using JApplet/JFrame

**IV. Relevant Course Outcome(s)**

Develop programs using GUI Framework (AWT and Swing)

**V. Practical Outcome (PrOs)**

Write a program using swing to display a ScrollPane and JComboBox in an Japplet with the items – English, Marathi, Hindi, Sanskrit.

**VI. Relevant Affective domain related Outcome(s)**

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

**VII. Minimum Theoretical Background**

Fundamentals to swing is JApplet class which extends Applet. JApplet supports various panes such as content pane, glass pane and the root pane. When adding a component to an instance of JApplet, call add () method for the content pane of JApplet object.

JComboBox is a combination of a JTextField and a dropdown list. JComboBox extends JComponent class. It normally displays single entry however it can also display drop down list that allows the user to select option.

Constructors of JComboBox

1. JComboBox()
2. JComboBox(Vector v)

A JScrollPane is used to make a scrollable view of a component. A container that provides horizontal and/or vertical scroll bars for another component.

### VIII. Resources required (Additional)-

Nil

### X. Resources used (Additional)

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	Operating System	Windows-7	1	—

X. Program Code: Teacher must assign a separate program statement to group of 3-4 students.

1. Write a program code to generate the following output

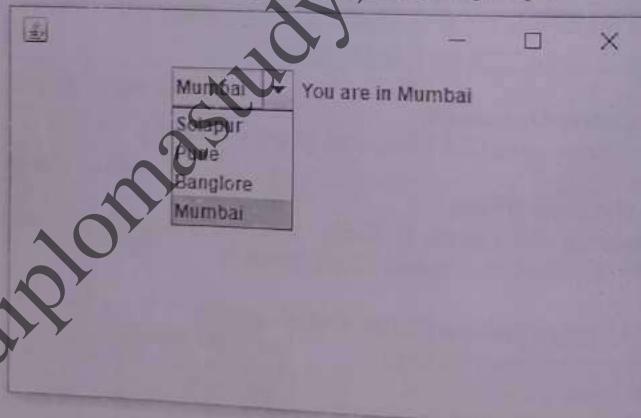


Figure 8

```
import javax.swing.JFrame;
import javax.swing.JLabel;
import javax.swing.JComboBox;
import java.awt.FlowLayout;
import java.awt.event.ItemListener;
import java.awt.event.ItemEvent;
```

```
Class Frame extends JFrame implements  
ItemListener {
```

```
Private JComboBox jb;
```

```
Private JLabel jl;
```

```
Private string [] item = {"Solapur", "Pune", "Benglore",  
"Mumbai"};
```

```
Frame()
```

```
{
```

```
setTitle ("");
```

```
setLayout (new FlowLayout());
```

```
setJComboBox (
```

```
setAction (
```

```
setSize (700, 200);
```

```
setVisible (true);
```

```
setDefaultCloseOperation (JFrame.EXIT_ON_CLOSE);
```

```
}
```

```
private void setJComboBox()
```

```
jb = new JComboBox (item);
```

```
add (jb);
```

```
jl = new JLabel ("Select a city");
```

```
add (jl);
```

```
}
```

```
Private void setAction()
{
    jb.addItemListener(this);
}

Public void itemStateChanged (ItemEvent i.e)
{
    String getItem = (String)jb.getSelecteditem();
    if (getItem.equals (item[0]))
        jl.setText ("You are in Solapur");
    else if (getItem.equals (item[1]))
        jl.setText ("You are in pune");
    else if (getItem.equals (item[2]))
        jl.setText ("You are in Bangalore");
    else if (getItem.equals (item[3]));
        jl.setText ("You are in Mumbai");
}

Public class Javascript
{
    Public static void main (String args[])
}

```

XI. Result (Output of Code): Frame frame = new Frame();

## XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. State the difference between AWT and Swing
2. State the features of Swing
3. Name the method to obtain ContentPane in swing.

→ 2] Feature of Swing - (Space for answer)

- a) Platform independent
- b) Lightweight
- c) pluggable
- d) Manageable
- e) Model View Controller
- f) Customizable

→ 3] Method to obtain contentpane in swing is get content pane();

## Swing

## AWT

- 1) Java AWT is an API to develop GUI application Java foundation classes in Java
- 2) The Components of Java AWT are heavy weighted
- 3) The execution time of AWT is More than Swing
- 4) The Components of Java AWT are platform dependant
- 1) Swing is a part of Java foundation classes and is used to create various applications.
- 2) The Components of Java swing are light weighted
- 3) The execution time of swing is less than AWT
- 4) The Components of Java swing are platform independent

## XIII. Exercise

1. Write a program to develop a frame to select the different states of India using JComboBox
2. Develop a program to demonstrate the use of ScrollPane in Swings

→ 3) Import `java.awt.*;`  
 (Space for answer)

```

public class CB2 {
    JFrame F = new JFrame();
    String S[] = {"Maharashtra", "Punjab", "Gujrat", "TamilNadu"};
    JComboBox cb = new JComboBox(S);
    cb.setBounds(50, 50, 90, 20);
    F.add(cb);
    F.setLayout(null);
    F.setSize(400, 400);
    F.setVisible(true);
}

Public static void main (String args[])
  {
    new CB2();
  }
  
```

```

import javax.swing.*;
import java.awt.*;
public class SP {
    public static void GUI() {
        Final JFrame F = new JFrame();
        F.setSize(500, 500);
        F.setVisible(true);
        F.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        F.setContentPane().setLayout(new flowLayout());
        JTextArea t = new JTextArea(20, 20);
        JScrollPane S1 = new JScrollPane(t);
        S1.setHorizontalScrollBarPolicy(JScrollPane.HORIZONTAL_SCROLLBAR_ALWAYS);
        S1.setVerticalScrollBarPolicy(JScrollPane.VERTICAL_SCROLLBAR_ALWAYS);
        F.getContentPane().add(S1);
    }
    Public static void main(String args[]) {
        Java-Swing->swing utilities.invokeLater
        (new Runnable() {
            public void run() {
                S1();
            }
        });
    }
}

```

XIV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com>
2. <https://www.tutorialspoint.com/java>
3. The complete reference Java 2 by Herbert schildt

XV. Assessment Scheme

Performance Indicators		Weightage
Process related (35 Marks)		70%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

List of Students /Team Members

1. Rutikesh...L...Pawar
2. Aditya...S...Salunkhe
3. ....

Process Related(35)	Marks Obtained		Dated signature of Teacher
	Product Related(15)	Total(50)	

**Practical No.7: Write a program to create a JTree.**

**I. Practical Significance:**

Tree is used to represent the hierarchical view of the data. The tree control shows the data in tree like structure such as root and its leaves.

**II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

**III. Competency and Practical skills**

To develop standalone applications using swing component.

The practical is expected to develop the following skills:

1. Able to implement the JTree with its methods.
2. Able to write the program using JTree.

**IV. Relevant Course Outcome(s)**

Develop programs using GUI Framework (AWT and Swing)

**V. Practical Outcome (PrOs)**

Write a program to create a JTree

**VI. Relevant Affective domain related Outcome(s)**

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

**VII. Minimum Theoretical Background**

JTree is a complex component. It has a 'root node' at the top most which is a parent for all nodes in the tree. It inherits JComponent class.

Constructors of JTree class

JTree(Hashtable ht) : The first form creates a tree in which each element of the hash table ht is a child node.

JTree(Object obj[]): Each element of the array obj is a child node.

JTree(TreeNode tn): The tree node tn is the root of the tree.

JTreeVector v) It uses the elements of vector v as child nodes.

Various Methods of JTree class:<sup>2</sup>

1. getPathForLocation(x,y) : It is used to translate a mouse click on a specific point in the tree to a tree path.

Syntax : TreePath getPathForLocation(int x,int y) where (x,y) are the coordinates at which the mouse is clicked. The return value is as TreePath object that encapsulates information about the tree node that was selected by the user.

TreeNode interface It declares methods that obtain information about a tree node.

MutableTreeNode interface : It extends TreeNode. It declares methods that can insert and remove child nodes or change the parent node.

DefaultMutableTreeNode class implements the MutableTreeNode interface.

It represents a node in a tree.

Object(MutableTreeNode Object obj) Here,obj is the object to be enclosed in this tree node. The root tree node doesn't have a parent or children. To create hierarchy of the nodes they can be used as

void add(MutableTreeNode child); added child to the current node.

### VIII. Resources required (Additional):

Nil

### IX. Resources used (Additional)

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	Computer Processors Operating Systems	RAM 4 GB	—	

X. Program Code: Teacher must assign a separate program statement to group of 3-4 students.

1. Develop a program to demonstrate the use of tree component in swing.

2. Write a program code to generate the following output

```
import javax.swing.*;
import javax.swing.tree.DefaultMutableTreeNode;
public class Tree {
    Tree() {
        JFrame F = new JFrame();
        DefaultMutableTreeNode S =  

            new DefaultMutableTreeNode("India");
        DefaultMutableTreeNode S2 =  

            new DefaultMutableTreeNode("Maharashtra");
        DefaultMutableTreeNode S3 =  

            new DefaultMutableTreeNode("Gujarat");
        S.add(S2);
        S.add(S3);
        DefaultMutableTreeNode S4 =  

            new DefaultMutableTreeNode("Mumbai");
        DefaultMutableTreeNode S5 =  

            new DefaultMutableTreeNode("Pune");
        DefaultMutableTreeNode S6 =  

            new DefaultMutableTreeNode("Nagpur");
        S2.add(S4);
        S2.add(S5);
        S2.add(S6);
        S2.add(S7);
        JTree f = new JTree(S);
        F.add(f);
        F.setSize(200, 200);
        F.setVisible(true);
    }
    public static void main(String args[]) {
        new Tree();
    }
}
```

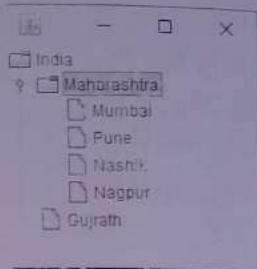


Figure 9

XI. Result (Output of Code):

XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. State the use of JTree in Swing.
2. State the use of getPathForLocation() method.
3. List different packages used to implement JTree programs.

(Space for answer)

1) Use of JTree in swing :- JTree class is used to display the tree structured data or hierarchical data. Jtree is a Complex Component, 'rootnode' at the top most which is a parent for all nodes in the tree. It inherits a complete Icomponent class.

2) Use of getPathForLocation () :-

Used to create an event when nodes have been changed, inserted or removed. Identifying the path to the parent of the modified items is per TreePath object.

Different Packages used to implement JTree Program:-

- a) Java.swing
- b) Java.swing.event

- c) javax.swing.plaf.
- d) javax.swing.plaf.basic
- e) javax.swing.plaf.meta
- f) javax.swing.plaf.multi
- g) javax.swing.plaf.synth
- h) javax.swing.text
- i) javax.swing.tree
- j) javax.swing.text.html

Q

### XIII. Exercise

Write a Jtree program to show root directory and its subFolders of your System.

(Space for answer)

```
→ import javax.swing.*;  
import javax.swing.tree.DefaultMutableTreeNode;  
  
Public class Tree {  
Tree () {  
JFrame f = new JFrame ();  
DefaultMutableTreeNode S =  
new DefaultMutableTreeNode ("Root");  
DefaultMutableTreeNode S1 =  
new DefaultMutableTreeNode ("This PC");  
DefaultMutableTreeNode S2 =  
new DefaultMutableTreeNode ("Desktop");  
S2.add (S1);  
S2.add (S2);  
DefaultMutableTreeNode S4 =  
new DefaultMutableTreeNode ("Documents");  
DefaultMutableTreeNode S5 =  
new DefaultMutableTreeNode ("Downloads");  
DefaultMutableTreeNode S6 =  
new DefaultMutableTreeNode ("Music");
```

```
DefaultMutableTreeNode S7 =  
new DefaultMutableTreeNode("Pictures");  
S2.add(S4);  
S2.add(S5);  
S2.add(S6);  
S3.add(S7);  
JTree j = new JTree(S);  
F.add(j);  
F.setSize(200, 200);  
F.setVisible(true);  
}  
public static void main(String args[]) {  
new tree();  
}
```

XIV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com>
2. <https://www.tutorialspoint.com/java>
3. The complete reference Java 2 by Herbert Schildt

XV. Assessment Scheme

Performance Indicators		Weightage
Process related(35 Marks)		70%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

List of Students /Team Members

1. Rutikesh Lalchand Pawar
2. Aditya S. Salunkhe.
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	

### Practical No. 8: Write a program to create a JTable

#### I. Practical Significance:

A table is a component that displays rows and columns of data. Students will be able to use JTable class in Java which extends JComponent. The cursor can be dragged on column boundaries to resize column.

#### II. Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

#### III. Competency and Practical skills

To develop standalone applications using swing components

The practical is expected to develop the following skills:

1. Able to implement the JTable with respective rows and columns.
2. Able to write the program using JTable and perform various operations on it.

#### IV. Relevant Course Outcome(s)

Develop programs using GUI Framework (AWT and Swing)

#### V. Practical Outcome (PrOs)

Write a program to create a JTable on applet window/Frame

#### VI. Relevant Affective domain related Outcome(s)

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

#### VII. Minimum Theoretical Background

Tables are implemented by the JTable class, which extends JComponent.  
Constructors of JTable:

1. JTable(): Creates a table with empty cells
2. JTable(Object data[], Object colHeads[])

Here, data is a two-dimensional array of the information to be presented, and colHeads is a one-dimensional array with the column headings.

Here are the steps for using a table in an applet:

1. Create a JTable object.

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2. Create a JScrollPane object. (The arguments to the constructor specify the table and the policies for vertical and horizontal scroll bars.)
3. Add the table to the scroll pane.
4. Add the scroll pane to the content pane of the applet.

VIII. Resources required (Additional)-

Nil

IX. Resources used (Additional)

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (if any)
1	Operating System	Windows-7	1	

- X. Program Code: Teacher must assign a separate program statement to group of 3-4 students.
1. Develop a program to demonstrate the use of JTable.
  2. Write a program code to generate the following output

ID	NAME	SALARY
101	Amit	670000
102	Jai	780000
103	Sachin	700000

Figure 10

```
→ 2  
import java.awt.*;  
import javax.swing.*;  
public class TableExample extends JFrame  
{  
    public static void main(String args[]){  
        new TableExample();  
    }  
    TableExample(){  
        F=new JFrame("JTable Example");  
        F.setSize(300,300);  
        F.setLayout(null);  
        F.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);  
        F.setVisible(true);  
        String data[][]={{"101","Amit","670000"},  
                        {"102","Jai","780000"},  
                        {"103","Sachin","700000"}};  
        String column[]={"ID","NAME","SALARY"};  
        JTable jt=new JTable(data,column);  
        jt.setBounds(10,10,280,280);  
        F.add(jt);  
    }  
}
```

```
jt.setBounds(30,40,200,300);
JS.scrollpane sp=new JScrollPane(jt);
F.add(sp);
F.setSize(300,400);
F.setVisible(true);
```

3  
Public static void main (String args [] )  
new Table Example ()

3

XI. Result (Output of Code):

XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. Name the superclass of JTable component.
2. How rows are inserted in table.
3. How to add JTable to JPanel ?

(Space for answer)

→ 1] Class component packages java.awt is superclass that declares the common features of GUI components in package Java.

→ 2) To Create the table with this model JTable  
table = new JTable(new DefaultTableModel(new  
Object[ ] { "Column 1" , "Column 2" } ));

To add row;  
DefaultTableModel = (DefaultTableModel) table

③ To add JTable in JPanel :-

```
JPanel panel = new JPanel();  
this.setContentPane(panel);  
panel.setLayout(null);  
String data [ ] [ ] = { { "1" , "ABC" },  
{ "2" , "DEF" },  
{ "3" , "GHI" }  
String col [ ] = { "Sno" , "Name" };  
JTable table = new JTable(data , col);  
table.setBounds(100 , 100 , 100 , 80);  
panel.add(table);  
setVisible(true);  
setSize(300 , 300);
```

### XIII. Exercise

1. Write a Java program to create a table of Name of Student, Percentage and Grade of 10 students using JTable.

(Space for answer)

```
→ Import java.awt.*;  
public class TableExample2  
{  
    JFrame F;
```

TableExample()

F = new JFrame();

String data [][] = {

{ "Darshan", "80.60", "A+" },

{ "Rushil", "90.40", "A+" },

{ "Abhi", "91.00", "A+" },

{ "Ninad", "84.80", "A+" },

{ "Rithik", "85.50", "A+" },

{ "Sagar", "88.50", "A+" },

{ "Rutikesh", "84.60", "A+" },

{ "Smriti", "85.80", "A+" },

{ "Bhavraj", "88.90", "A+" },

{ "Ritah", "90.80", "A+" }

String column [] = { "Name", "Percentage",

"GRADE" };

JTable jt = new JTable(data, column);

jt.setRowheight(30, 40, 200, 300);

JScrollPane sp = new JScrollPane(Jt);

f.add(sp);

f.setSize(300, 400);

f.setVisible(true);

public static void main (String args []) {

new TableExample();

3

XIV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com>
2. <https://www.tutorialspoint.com/java>
3. The complete reference Java 2 by Herbert Schildt

XV. Assessment Scheme

Performance Indicators		Weightage
Process related(35 Marks)		70%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

List of Students Team Members

1. Rukesh...L...Pandar...
2. Ananya...S...Salunke,
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	

### Practical No. 9: Write a program to launch a JProgressBar

#### I. Practical Significance:

The JProgressBar class is used to display the progress of the task. Students will be able to use JProgressBar to see the progress of the any task.

#### II. Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

#### III. Competency and Practical skills

To develop standalone applications using swing components

The practical is expected to develop the following skills:

1. Able to implement the JProgressBar with its orientation.
2. Able to write the program using JProgressBar.

#### IV. Relevant Course Outcome(s)

Develop programs using GUI Framework (AWT and Swing)

#### V. Practical Outcome (POs)

Write a program to launch a JProgressBar

#### VI. Relevant Affective domain related Outcome(s)

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

#### VII. Minimum Theoretical Background

The JProgressBar class is used to display the progress of the task. We usually see the progress bar while installation of some software is going on. It inherits JComponent class.

#### Commonly used Constructors:

JProgressBar(): It is used to create a horizontal progress bar without progress string.

JProgressBar(int min, int max): It is used to create a horizontal progress bar with the specified minimum and maximum value.

JProgressBar(int orient) : It is used to create a progress bar with the specified orientation, it can be either Vertical or Horizontal by using SwingConstants.VERTICAL and SwingConstants.HORIZONTAL constants.

`JProgressBar(int orient, int min, int max)` : It is used to create a progress bar with the specified orientation, minimum and maximum value.

**Commonly Used Methods:**

`Void addChangeListener(ChangeListener)` : Used to add changeListener to progress bar.

`int getMaximum()` : Get the Maximum value of progress bar.

`int getMinimum()` : Get the Minimum value of progress bar.

`void setStringPainted(boolean b)` : It is used to determine whether string should be displayed.

`void setString(String s)` : It is used to set value to the progress string.

`void setOrientation(int orientation)` : It is used to set the orientation, it may be either vertical or horizontal by using SwingConstants.VERTICAL and SwingConstants.HORIZONTAL constants.

`void setValue(int value)` : It is used to set the current value on the progress bar.

**VIII. Resources required (Additional)-**

Nil

**IX. Resources used (Additional)**

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	Computer System	i3 Processor 4 GB RAM	1	-

**X. Program Code:** Teacher must assign a separate program statement to group of 3-4 students.

1. Write a program code to generate the following output

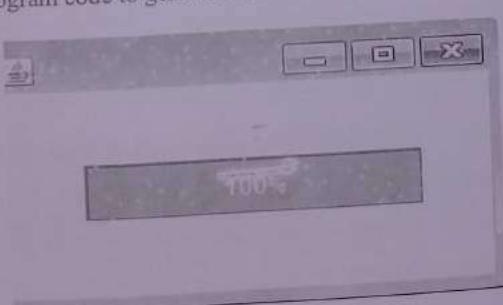


Figure 11

XI. Result (Output of Code):

XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. Name different Orientation of Progress Bar.
2. Explain the Purpose of setValue().
3. What is the use of minimum and maximum value of progressbar.

(Space for answer)

→ ① Swing constant ts VERTICAL  
② swing constants HORIZONTAL

→ ② Setvalue():-

It is used to set the current value on the progress bar

```

import java.awt.*;
import java.awt.swing.*;
public class Example extends JFrame
{
    static JProgressBar JFframepb;
    static JPanel P;
    public static void main (String args[])
    {
        JFrame F = new JFrame();
        P = new JPanel();
        pb = new JprogressBox();
        pb.setvalue(0);
        pb.setstring printed("0%");
        p.add(pb);
        t.add (P);
        t.setSize (800,300);
        F.setVisible (true);
        till ();
    }
    public static void till()
    {
        int i=0;
        try
        {
            while (i<=100)
            {
                pb.setvalue(i+100);
                Thread.sleep(2000);
                i+=10;
            }
        } catch (Exception e)
        {
        }
    }
}

```

XIII. Exercise

1. Develop a program to demonstrate the use of JProgressBar.
2. Write a Program using JProgressBar to show the progress of Progressbar when user clicks on JButton.

(Space for answer)

```
1 import java.awt.*;
import java.swing.*;
public class JButtonProgressBar extends JFrame
{
    static JProgressBar pb;
    static JPanel P;
    public static void main(String args[])
    {
        P = new JPanel();
        pb = new JProgressBar();
        pb.setValue(0);
        pb.setStringPainted(true);
        P.add(pb);
        JButton b = new JButton(P);
        add(b);
        setSize(300,300);
        setLayout(new FlowLayout(FlowLayout.RIGHT));
        setSize(300,300);
        setVisible(true);
    }
}
```

XIV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com>
2. <https://www.tutorialspoint.com/java>
3. The complete reference Java 2 by Herbert Schildt.

XV. Assessment Scheme

Performance Indicators		Weightage
Process related (35 Marks)		70%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

List of Students / Team Members

1. Rutikesh L. Patil
2. Aditya S. Saini
3. ....

Process Related(35)	Marks Obtained		Dated signature of Teacher
	Product Related(15)	Total(50)	

**Practical No. 10: Write a program to demonstrate status of key on Applet window such as KeyPressed, KeyReleased, KeyUp, KeyDown.**

**Practical Significance:**

A KeyEvent is generated when keyboard input occurs. When key is pressed, released or typed, key event is generated. Students will be able to understand the method to register an object and handle various key of Keyboards.

**Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

**II. Competency and Practical skills**

Using this Practical, students will be able to generate different events .Also, they are able to implement various methods for appropriate listener class and write and execute programs accordingly.

**IV. Relevant Course Outcome(s)**

- Handle Events of AWT and Swing Components.
- Develop programs to handle events in Java Programming.

**V. Practical Outcome (POs)**

Write a program to demonstrate status of key on Applet window such as KeyPressed, Key Released, Key Up, and Key Down

**VI. Relevant Affective domain related Outcome(s)**

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

**VL Minimum Theoretical Background**

When keyboard input is occurred, a KeyEvent is generated. There are mainly three types of key events that are recognized by integer constants as follows:

**KEY\_PRESSED, KEY\_RELEASED, KEY\_TYPED**

When key is pressed or released, first two events are generated. When character is pressed the last event occurs. All Keys do not generate character. E.g. Shift Key

InputEvent is super class of KeyEvent.

The class which processes the KeyEvent should implement KeyListener interface.

The object of that class must be registered with a component. The object can be registered using the addKeyListener () method.

Methods of KeyListener interface:

void keyPressed(KeyEvent e) : Invoked when a key is pressed

void keyReleased(KeyEvent e) : Invoked when a key has been released

void keyTyped(KeyEvent e) : Invoked when a key has been typed

### VIII. Resources required (Additional)–

Nil

### IX. Resources used (Additional)

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	Development Software	J.d.k 1.8.2	1	—

### X. Program Code: Teacher must assign a separate program statement to group of 3-4 students.

1. Write a program to generate KeyEvent when a key is pressed and display "Key Pressed" message.
2. Develop a program which will implement special keys such as function keys and arrow keys.

→ 1

```

import java.awt.*;
import java.awt.event.*;
import java.applet.*;
<applet code="keyEvents Demo.class" width=500
height=500></applet>*
Public class keyEvents Demo extends Applet implements
String msg="";
Point x=20,y=20;
Public void init()
{
    add key Listener(this);
    requestFocus();
}
public void keypressed(KeyEvent e)
{
    showStatus("keypressed");
}

```

Maharashtra state Board of Technical Education

```
Public void keyTyped (KeyEvent e)
{
    msg += ke.getKeyChar ();
    repaint ();
}

Public void paint (Graphics g)
{
    g.drawString (msg, x, y);
}
```

XI. Result (Output of Code):

.....  
.....  
.....

XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. Name any four Event Listener interfaces.
2. State the situation when all three events of KeyListener interface are generated?

(Space for answer)

- 1) ① ActionListener  
② ItemListener  
③ AdjustmentListener  
④ TextListener
- 2) ① Public abstract void keyPressed (KeyEvent e);  
Invoked when a key has been pressed.  
② Public abstract void keyReleased (KeyEvent e);  
Invoked when a key has been released.  
③ Public abstract void keyTyped (KeyEvent e);  
Invoked when a key has been typed.

### XIII. Exercise

1. Elaborate the terms Event, Source and Listener.
2. List various methods of ActionListener interface.
3. Develop a program to accept two numbers and display product of two numbers when user pressed "Multiply" button.

(Space for answer)

→ 1) Event :- Changing the state of an object is known as Event i.e. Event describes the change to state of source.

Source :- A source is an object that generates an event. This occurs when the internal state of that object changes in some way. Source may generate more than one type of event.

Listener :- The event generated by the GUI components are handled by a special group of interface known as "Listener".

A Listener is an object that is notified when an event occurs (receives event notification).

- 2) a) adjustment value changed (Adjustment Event or)  
b) addActionListener ()  
c) action performed.

**XIV. References/ Suggestions for Further Reading**

1. <https://www.javatpoint.com>
2. <https://www.tutorialspoint.com/java>
3. The complete reference Java 2 by Herbert schildt

**XV. Assessment Scheme**

Performance Indicators		Weightage
Process related (35 Marks)		70%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

*List of Students /Team Members*

1. Rutikesh...L.Jadkar
2. Aditya...S.Salunke
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	

**Practical No. 11: Write a program to demonstrate various mouse events using MouseListener and MouseMotion listener interface.**

**I. Practical Significance:**

The MouseListener and MouseMotionListener interface are used to implement different types of events that are created when the mouse is clicked, dragged, dropped, released, entered and exited in a component. These two interfaces let the user to handle the events and perform some action in event.

**II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team members in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

**III. Competency and Practical skills:**

Develop web and stand-alone applications using advanced concepts of Java. The practical is expected to develop the following skills:

1. Able to implement the events of MouseListener
2. Able to implement the events of MouseMotionListener.

**IV. Relevant Course Outcome(s)**

Develop Programs to handle events in java programming.

**V. Practical Outcome (POs)**

Write a program to demonstrate various mouse events using MouseListener and MouseMotionListener interface

**VI. Relevant Affective domain related Outcome(s)**

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

**VII. Minimum Theoretical Background**

The java's MouseListener interface allows the user to handle the events when the user performs some events using mouse. The events are MouseClicked, MousePressed, MouseEntered, MouseExited, and MouseReleased.

The list of available methods are:

1. void mouseClicked(MouseEvent me)

2. void mouseEntered(MouseEvent me)
3. void mouseExited(MouseEvent me)
4. void mousePressed(MouseEvent me)
5. void mouseReleased(MouseEvent me)

In the similar way we can handle the events when mouse is moved or dragged. The MouseMotion Interface defines the following methods.

1. void mouseDragged(MouseEvent me)
2. void mouseMoved(MouseEvent me)

VIII. Resources required (Additional)–

NIL

IX. Resources used (Additional)

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	Operating System	Windows 7	1	

X. Program Code: Teacher must assign a separate program statement to group of 3-4 students.

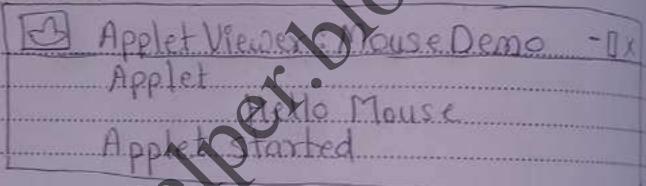
1. Debug the following Program code and write the output.

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

/* <APPLET CODE = "MouseDemo" WIDTH=300 HEIGHT=200> </APPLET> */
public class MouseDemo extends Applet implements MouseListener
{
    Label l;
    public void init()
    {
        setLayout(null);
        l=new Label("Hello Mouse");
        l.setBounds(50,150,200,100);
        add(l);
    }
    public void mousePressed(MouseEvent e)
    {
        l.setText("Mouse Pressed no. of clicks:" + e.getClickCount() + "at
position " + e.getX() + "," + e.getY());
    }
    public void mouseReleased(MouseEvent e)
    {
        l.setText("Mouse Released; # of clicks:" + e.getClickCount());
    }
}
```

```
public void mouseEntered(MouseEvent e)
{
    l.setText("Mouse Entered");
}
public void mouseExited(MouseEvent e)
{
    l.setText("Mouse exited");
}
public void mouseClicked(MouseEvent e)
{
    l.setText("mouse clicked(# of clicks:" + e.getClickCount());
}
```

XI. Result (Output of Code):



XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must ask more such questions so as to ensure the achievement of identified CO.

1. List various methods of MouseListener and MouseMotionListener
2. Do all components generate the MouseEvent
3. Write the steps to obtain the coordinates of MouseClick
4. Write the steps to register for MouseEvents

(Space for answer)

→ A) MouseListener :-

Method :- MouseClicked (MouseEvent me)  
mouseEntered ()  
mouseExited ()  
mousePressed ()  
mouseReleased ()

B) MouseMotion Listener:-

Method :- MouseDragged (MouseEvent e)  
MouseMoved

→ 2] Yes, all component generate the mouse Event.

XIII. Exercise

1. Write a program to change the background color of Applet when user performs events using Mouse
2. Write a program to count the number of clicks performed by the user in a Frame window
3. Write a program to demonstrate the use of mouseDragged and mouseMoved method of MouseMotionListener

(Space for answer)

→ 3]

```
import java.awt.*;
import java.awt.event.*;
import java.applet.*;
/*<applet code="MouseEventDemo.class" width=80
public class MouseEventDemo extends Applet
    implements MouseListener
{
    String msg = " ";
    int mouseX = 0, mouseY = 0;
    public void init()
    {
        addMouseListener(this);
    }
    public void mouseClicked(MouseEvent e)
    {
        mouseX = 0; mouseY = 10;
        msg = "Red";
        setBackground(Color.red);
    }
    public void mouseEntered(MouseEvent e)
    {
        mouseX = 0; mouseY = 20;
        msg = "Cyan";
        setBackground(Color.cyan);
    }
    public void mouseExited(MouseEvent e)
```

2  
mouse x=0 , mouse y =10;  
msg = "White"  
SetBackground (Color white);

3

XIV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com/java-mouselistener>
2. The complete reference Java 2 by Herbert Schildt

XV. Assessment Scheme

Performance Indicators		Weightage
Process related (35 Marks)		70%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

List of Students / Team Members

1. Rutikesh L. Pawar
2. Aditya S. Salunke
- 3.

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	

**Practical No. 12: Write a program to demonstrate the use of JTextField and JPasswordField using Listener Interface.**

**I. Practical Significance:**

A password is used to authenticate the user to gain the access to website application or device. The TextField control is used to accept the input from user. An interface is used to implement the methods as per the users requirements and achieve the concept of multiple inheritance in java.

**II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

**III. Competency and Practical skills**

The practical is expected to develop the following skills:

1. Able to develop an application using JTextField
2. Able to develop an application using JPasswordField

**IV. Relevant Course Outcome(s)**

Handle events of AWT and Swing Components

**V. Practical Outcome (POs)**

Write a program to demonstrate the use of JTextField and JPasswordField using Listener Interface

**VI. Relevant Affective domain related Outcome(s)**

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

**VII. Minimum Theoretical Background**

**JPasswordField:**

The JPasswordField allows the user to enter the input text in the form of password characters. It inherits the JTextField class.

**Constructors for JPasswordField:**

JPasswordField()	Constructs a new JPasswordField, with a default document, no starting text string, and 0 column width.
JPasswordField(int columns)	Constructs a new empty JPasswordField with the specified number of columns.
JPasswordField(String text)	Constructs a new JPasswordField initialized with the specified text.
JPasswordField(String text, int columns)	Constructs a new JPasswordField initialized with the specified text and columns.

**The JTextField:** It allows the user to input the single line of text in JTextField component. Only single line of text can be entered in the JTextField component of Swing control.

Constructors defined by the JTextField class are

Constructor	Description
JTextField()	Creates a new TextField
JTextField(String text)	Creates a new TextField initialized with the specified text.
JTextField(String text, int columns)	Creates a new TextField initialized with the specified text and columns.
JTextField(int columns)	Creates a new empty TextField with the specified number of columns.

**VIII. Resources required (Additional) –**

Nil

**IX. Resources used (Additional)**

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	Computer System	Processor i3 RAM 4GB	1	-
2	Operating System	Windows 7	1	-

X. Program Code: Teacher must assign a separate program statement to group of 3-4 students.

1. Write a program using JPasswordField to set the password character as '#' instead of '\*'.

```
→ import javax.swing.*;  
Public Class Jpf extends JFrame  
{  
    Public static void main (String args[])  
{  
        JPasswordField pf = new JPasswordField("#");  
        JLabel obj = new JLabel ("password :");  
        Obj.setBounds (20,100,80,30);  
        Pf.setBounds (100,100,100,30);  
        add (Pf);  
        add (Obj);  
        setSize (300,300);  
        setLayout (null);  
        setVisible (true);  
    }  
}
```

XI. Result (Output of Code)

XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. Write the use of setEchoChar() method with suitable example.
2. Write the advantages of using JPasswordField over JTextField
3. Which component can be used to accept the multiline input from user.

(Space for answer)

→ 2) The purpose of a JPasswordField class is a text portion/part specialised for password entry. It permits the editing of a single line of text. It is can

seen by any other person because of special symbol assigned to text typed

→ 2] TextArea  
JTextArea

→ 2]

### XIII. Exercise

1. Write a program using JPasswordField and JTextField to demonstrate the use of user authentication.
2. Write a program using JTextField to perform the addition of two numbers.

Write a program using JPasswordField to accept password from user and if the length is less than 6 characters then error message should be displayed "Password length must be >6 characters"

import java.awt.\*;  
import javax.swing.\*;  
(Space for Answer)  
public class Demo extends JFrame

{

    public static void main (String args [])

    JLabel L1 = new Label ("NAME");

    L1.setBounds (50, 20, 200, 200);

    JPasswordField Pf = new JPasswordField ();

```
Pb.setBounds(200, 100, 350, 300);
JLabel L2=new JLabel("Password:");
L2.setBounds(100,100,300,200);
JTextfield Tf=new JTextField();
Tf.setBounds(150,50,250,200);
add(L1);
add(L2);
add(Pb);
add(Tf);
setsize(300,300);
setLayout(null);
setVisible(true);
```

3  
3

```
import javax.swing.*;
import java.awt.*;
public class Demo extends JFrame implements
ActionListener
{
    public static void main(String args[])
    {
        JLabel L1=new JLabel("A:");
        L1.setBounds(50,50,100,100);
        JTextField t1=new JTextField();
        t1.setBounds(50,100,100,100);
        JLabel L2=new JLabel("B:");
        L2.setBounds(50,150,100,100);
        JTextField t2=new JTextField();
        t2.setBounds(50,200,100,100);
        JTextField t3=new JTextField();
        t3.setBounds(50,250,100,100);
        JButton b=new JButton("Add");
        b.setBounds(120,200,50,50);
```

```
b.add(ActionListener.this);
add(l1); add(t1); add(l2); add(t2);
add(t3); add(b);
setSize(300,300);
```

XIV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com>
2. <https://www.tutorialspoint.com/java>
3. The complete reference Java 2 by Herbert Schildt

XV. Assessment Scheme

Performance Indicators		Weightage
Process related (35 Marks)		70%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

List of Students / Team Members

1. Rutikesh L. Pawar
2. Aditya S. Salunkhe
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	

```
setLayout(null);  
setVisible(true);
```

{

```
public void actionPerformed(ActionEvent e)  
{
```

```
    String s1 = t1.getText();
```

```
    String s2 = t2.getText();
```

```
    int a = Integer.parseInt(s1);
```

```
    int b = Integer.parseInt(s2);
```

```
    int c = 0;
```

```
    c + a + b;
```

```
    String result = "sum value of (c);
```

```
    t3.setText(result);
```

{

{

### Practical No. 13: Write a program to demonstrate the use of WindowAdapter class

#### Practical Significance:

In listener interfaces implementation it is mandatory to implement all the methods defined by the particular interface. To overcome this problem and to implement only required methods java programming supports the concept of Adapter class. It lets the user to implement only required methods.

This practical focuses on different types of Adapter classes and their practical implementation.

#### Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

#### Competency and Practical skills

The practical is expected to develop the following skills:

1. Understand the concept and different types of adapter classes in java.
2. Develop an application using Adapter Class.

#### Relevant Course Outcomes(s)

Handle events of AWT and Swing Components

#### Practical Outcome (POs)

Write a program to demonstrate the use of WindowAdapter class

#### i. Relevant Affective domain related Outcome(s)

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

#### ii. Minimum Theoretical Background

An Adapter class is class which will allow the user to simplify the method implementation. For example consider we are implementing the WindowListener interface in this case we need to define all the methods of the WindowListener interface such as listed below

1. void windowActivated(WindowEvent we)
2. void windowClosed(WindowEvent we)
3. void windowClosing(WindowEvent we)
4. void windowDeactivated(WindowEvent we)

5. void windowDeiconified(WindowEvent we)
6. void windowIconified(WindowEvent we)
7. void windowOpened(WindowEvent we)

Programmer need to give either empty implementation of the methods defined by the WindowListener. To overcome this problem and to allow the user to implement only required methods java provides a facility that is Adapter classes. Some of the Adapter classes provided by the java language are listed below.

1. ComponentAdapter
2. ContainerAdapter
3. FocusAdapter
4. KeyAdapter
5. MouseAdapter
6. MouseMotionAdapter
7. WindowAdapter

These adapter classes allows the user to implement only required methods.

#### VIII. Resources required (Additional) –

Nil

#### IX. Resources used (Additional)

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	Computer System	Processor: i5 RAM: 4 GB	1	—
2	Operator System	Windows 7	1	—

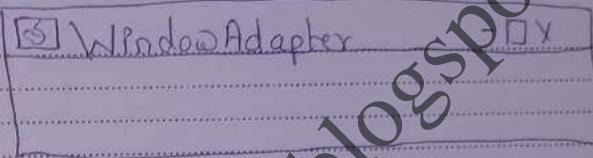
X. Program Code: Teacher must assign a separate program statement to group of 3-4 students.

Debug the following code and write the output of following code.

```
import java.awt.*;
import java.awt.event.*;
public class WindowDemo
{
    Frame f;
    WindowDemo()
    {
        f=new Frame("Window Adapter");
        f.addWindowListener(new WindowAdapter()
        {
            public void windowClosing(WindowEvent e)
            {
                f.dispose();
            }
        });
    }
}
```

```
        };
        f.setSize(400,400);
        f.setLayout(null);
        f.setVisible(false);
    }
    public static void main(String[] args)
    {
        new WindowDemo();
    }
}
```

XI. Result (Output of Code):



XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. Write the use of Adapter class
2. Write the differences between Adapter class and Listener Interface
3. Write the use of anonymous inner class.

(Space for answer)

- i) Java adapter classes provide the default implementation of Listener interfaces.  
ii) If you inherit the adapter class, you will not be forced to provide the implementation of all the methods of Listener interface. So, it saves code.

An anonymous inner class can be useful when making an instance of an object with certain "extras" such as overloading methods of a class or interface. Without having to actually subclass a class. Anonymous inner classes are useful in writing implementation.

classes for listeners interfaces interfaces in  
graphics programming.

XIII. Exercise

1. Write a program to demonstrate the use of WindowAdapter class
2. Write a program to demonstrate the use of anonymous inner class
3. Write a program using MouseMotionAdapter class to implement only one method mouseDragged().

(Space for Answer)

→ 1) Import java.awt.\*;  
import java.awt.event.\*;  
/\* <applet code = "pxx13" width = 200 height = 100>  
</applet> \*/

```
public class pixel3x extends Applet  
{  
    public void init()  
    {  
        addMouseListener(new MouseAdapter(),  
        {  
            public void mousePressed(MouseEvent me)  
            {  
                showStatus ("Mouse pressed");  
            }  
        });  
    }  
}
```

XIV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com/java-adapter-classes>
2. The complete reference Java 2 by Herbert schildt

XV. Assessment Scheme

Performance Indicators		Weightage
Process related (35 Marks)		70%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

List of Students / Day Members

1. Rutikesh L. Pawar
2. Ananya S. Salunke
- 3.

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	

**Practical No. 14:** Write a program to demonstrate the use of InetAddress class and its factory methods.

**Practical Significance:**

Java provides support for communication between two or more computers by the way of socket programming. It provides the classes for both the protocols that is UDP and TCP. Socket lets the user to create a client server communication in the network and share the data/information in it.

**Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively, verbal and written form.

**Competency and Practical skills**

To develop a program using InetAddress class

The practical is expected to develop the following skills:

1. Able to use the factory methods of InetAddress class
2. Able to write program using different constructors of the InetAddress class.

**Relevant Course Outcome(s)**

Develop java programs using networking components

**Practical Outcome (PrOs)**

Write a program to demonstrate the use of InetAddress class and its factory methods

I. **Relevant Affective domain related Outcome(s)**

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

II. **Minimum Theoretical Background**

The java's InetAddress encapsulates an IP address and used by the other networking classes such as Socket, ServerSocket, URL, DatagramSocket, DatagramPacket. It is used to represent both numerical and the domain name of the machine. InetAddress can handle both IPV4 and IPV6. The InetAddress class has no visible constructors and it uses the following factory methods.

1. static InetAddress getLocalHost() throws UnknownHostException
2. static InetAddress getByName(String hostName) throws UnknownHostException
3. static InetAddress[] getAllByName(String hostName) throws unknownHostException

VIII. Resources required (Additional) –

Nil

IX. Resources used (Additional)

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	Computer System	Processor i-3 RAM 4GB	1	
2	Operating System	Windows 7	1	

X. Program Code: Teacher must assign a separate program statement to group of 3-4 students.

1. Execute the following code and write the output

```
import java.io.*;
import java.net.*;
public class InetDemo
{
    public static void main(String[] args)
    {
        try
        {
            InetAddress ip=InetAddress.getByName("localhost");
            System.out.println("Host Name: "+ip.getHostName());
            System.out.println("IP Address: "+ip.getHostAddress());
        }
        catch(Exception e){System.out.println(e);}
    }
}
```

XI. Result (Output of Code):

Host Name : localhost  
IP Address : 127.0.0.1

XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. Write any four differences between IPV4 and IPV6
2. Write the use of getByName() and getAllByName() method.
3. Write the steps to assign IP address to your machine

(Space for answer)

IPV4

① IPV4 has 32 bits address length

② It supports Manual and DHCP address only

③ In IPV4 end-to-end connection integrity is unachievable.

④ IPV4 has header of 20-60 bytes

IPV6

① IPV6 has 128-bit address bit length

② It supports Auto and renumbering address only

③ In IPV6 end-to-end connection integrity is achievable.

④ IPV6 has header of 40 bytes fixed

② getByName () -

It returns the instance of InetAddress containing Local, Localhost IP and Name.

getAllByName () -

Determine all the IP address of a host given the host's name.

XIII. Exercise

1. Develop a program using InetAddress class to retrieve IP address of computer when hostname is entered by the user.

(Space for Answer)

```
1 import java.net.*;
import java.io.*;
import java.util.*;
public class practical_14_Exercise
{
    public static void main(String[] args)
    {
        String host;
        Scanner input = new Scanner(System.in);
        System.out.print("Enter host name : ");
        host = input.nextLine();
        try
        {
            InetAddress address = InetAddress.getByName(host);
            System.out.println("IP address :" + address.getHostName());
            System.out.println("Hostname is " + address.getHostName());
        }
        catch(UnknownHostException ex)
        {
            System.out.println("Could not find " + host);
        }
    }
}
```

XIV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com/InetAddress-class>
2. <https://www.onlyjavatech.com/inetaddress-class-in-java>
3. The complete reference Java 2 by Herbert Schildt

XV. Assessment Scheme

Performance Indicators		Weightage
Process related (35 Marks)		70%
1.	Logic formation	10%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

List of Students /Team Members

1. Rutikesh Pawar
2. Adibaj S. Salunke
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	

**Practical No. 15: Write a program to demonstrate the use of URL and URLConnection class and its methods**

**I. Practical Significance:**

The Uniform resource locator in java allows the user to access the particular file or resource which might be stored on any local or remote machine. The URL specifies the complete path by which user can access file. It contains protocol address, port number and location of the particular resource.

**II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team members in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

**III. Competency and Practical skills**

To develop a program using URL and URLConnection class

The practical is expected to develop the following skills:

1. Able to identify different types of ports and protocols
2. Able to develop an application using URL and URLConnection class.

**IV. Relevant Course Outcome(s)**

Develop java programs using networking components

**V. Practical Outcome (PrOs)**

Write a program to demonstrate the use of URL and URLConnection class and its methods

**VI. Relevant Affective domain related Outcome(s)**

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

**VII. Minimum Theoretical Background**

The URL provides easy to understand format to uniquely identify or address information on the internet. URLs are ample; every browser uses them to identify information on the Web. URL class provides a simple, concise API to access information across the Internet using URLs.

URLConnection is a class which is used to access the attributes of remote resource. Once we made a connection to the remote resource, we are ready to use URLConnection to check the properties of remote object before actually transporting it locally.

The URL and URLConnection classes are good enough for simple programs that want to connect to HTTP servers to fetch content.

**List of URL Class Methods and Constructors:**

1. public URL (String protocol, String host, int port, String file) throws MalformedURLException
2. public URL (String protocol, String host, String file) throws MalformedURLException
3. public URL(String url) throws MalformedURLException
4. public URL(URL context, String url) throws MalformedURLException

**Methods:**

1. public String getPath()
2. public String getAuthority()
3. public String getHost()
4. public String getFile()

**List of URLConnection class Methods and Constructors:**

The openConnection() method returns a java.net.URLConnection, an abstract class whose subclasses represent the various types of URL connections.

**Methods:**

1. Object getContent()
2. String getContentEncoding()
3. int getContentLength()
4. String getContentType()
5. public URL getURL()

**VIII. Resources required (Additional)-**

Nil

**IX. Resources used (Additional)**

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	Computer System	Processor i3 RAM 4GB	1	-
2	Operating System	Windows 7	1	-

**X. Program Code:** Teacher must assign a separate program statement to group of 3-4 students.

1. Execute the following code and write the output

```
import java.net.*;
class URLDemo
{
    public static void main(String args[]) throws MalformedURLException
    {
        URL hp = new URL("https://www.javatpoint.com/javafx-tutorial");
        System.out.println("Protocol: " + hp.getProtocol());
        System.out.println("Port: " + hp.getPort());
```

```
        System.out.println("Host: " + hp.getHost());
        System.out.println("File: " + hp.getFile());
        System.out.println("Ext: " + hp.toExternalForm());
    }
}
```

XI. Result (Output of Code):

Protocol: https  
part: - 1  
Host: www.javapoint.com  
File: /JavaEx-tutorial  
Ext: https://www.javapoint.com/javalib

XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. Write the use of openConnection() method of URLConnection class.
2. Write the name of exception that can be thrown by URL class.
3. Name the package in which URL class is defined.

(Space for answer)

→ 1] The openConnection() method of URL class opens the connection to specified URL and URL connection instance that represent a connection to the remote object referred by the URL.

It should be noted that a URLConnection or instance does not establish the actual network connection on the creation.

→ 2] `InetAddress`, `URL`

`MalformedURLException`.

III. Exercise

1. Write a program using URL class to retrieve the host, protocol, port and file of URL <http://www.msbsbe.org.in>
2. Write a program using URL and URLConnection class to retrieve the date, content type, content length information of any entered URL

(Space for Answer)

```
import java.net.*;
public class URL_Demo
public static void main (String args[])
throws MalformedURLException
{
URL u = new URL ("http://www.msbsbe.org.in");
System.out.println ("Protocol: " + u.getProtocol ());
System.out.println ("Port: " + u.getPort ());
System.out.println ("File: " + u.getFile ());
System.out.println ("Host: " + u.getHost ());
System.out.println ("Ext" + u.getExtension ());
}
```

```
import java.io.*;
import java.net.*;
import java.util.Date
practical No. 15
```

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

```
PrintWriter ch;
URL handle = new URL ("http://www.phase-care);
URLConnection handle = connection = handle.openConnection();
Date date = new Date();
int length;
```

Maharashtra State Board of Technical Education  
data.info = handle.getDat();
System.out.println ("Date: " + new Date().toLocaleString());

System.out.println("context-type:" + handle-  
connection.getContextType());

Advanced Java Programming (22517) length.length - connection.getContextLength();

System.out.println("Context length:" + length);

3

3

#### XIV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com>
2. <https://www.tutorialspoint.com/java>
3. The complete reference Java 2 by Herbert schildt
4. <https://tomcat.apache.org/download-80.cgi>

#### XV. Assessment Scheme

Performance Indicators		Weightage
Process related (35 Marks)		70%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related(15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

#### List of Students /Team Members

1. Rutikesh L. Pawar
2. Aditya S. Salunke
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	

**Practical No. 16: Write a program to implement chat Server using Server Socket and Socket Class.**

**I. Practical Significance:**

Java provides the socket programming approach for communication between the client and server. A user can write the code for both client and server as well for UDP & TCP datagram packets. By using java's network communication feature we can create interactive application to communicate within a network.

**II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively, oral and written form.

**III. Competency and Practical skills**

The practical is expected to develop the following skills:

1. Able to develop an application using Socket and ServerSocket class
2. Able to create a chat application in client server environment.

**IV. Relevant Course Outcome(s)**

Develop java programs using networking components

**V. Practical Outcome (PrOs)**

Write a program to implement chat server using ServerSocket and Socket class.

**VI. Relevant Affective domain related Outcome(s)**

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices

**VII. Minimum Theoretical Background**

The ServerSocket class is used to create servers that listen for either local port or remote client programs to connect to them on published ports.

**Constructors for ServerSocket class**

1. public ServerSocket(int port) throws IOException
2. public ServerSocket(int port, int backlog) throws IOException
3. public ServerSocket(int port, int backlog, InetAddress address) throws IOException
4. public ServerSocket() throws IOException

**Methods for ServerSocket class**

1. public int getLocalPort()
2. public Socket accept() throws IOException
3. public void setSoTimeout(int timeout)
4. public void bind(SocketAddress host, int backlog)

The `java.net.Socket` class is used to communicate between client and server. The client can obtain object by creating its instance whereas the server obtains a `Socket` object from the return value of the `accept()` method.

**Constructors for Socket class:**

1. public Socket(String host, int port) throws UnknownHostException, IOException
2. public Socket(InetAddress host, int port) throws IOException
3. public Socket(String host, int port, InetAddress localAddress, int localPort) throws IOException.
4. public Socket(InetAddress host, int port, InetAddress localAddress, int localPort) throws IOException.
5. public Socket()

**Methods for Socket class:**

1. public void connect(SocketAddress host, int timeout) throws IOException
2. public InetAddress getInetAddress()
3. public int getPort()
4. public int getLocalPort()
5. public void close() throws IOException

**VIII. Resources required (Additional)**

Nil

**IX. Resources used (Ad Ginal)**

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	Computer System	Processor i-3 RAM 4GB	1	-
2	Operating System	Window 7	1	-

Program Code: Teacher must assign a separate program statement to group of 3-4 students.

- I. Write a program to check credentials of users (Client will send user id and password to server and server will authenticate the client using equals())

XI. Result (Output of Code):

.....  
.....  
.....

XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. Write the default port of used by various services such as FTP, SMTP, HTTP.
2. Write the constructor to allow the server for waiting queue
3. Write the function of Connect(), Bind()

(Space for answer)

- Q2) a) FTP uses port number 21  
b) SMTP uses or work across from 25 or  
c) HTTP uses port number 80

Bind(): To own address connect to remote address Bind() assign the address specified by to the socket referred to my the file descriptor socket.

The `connect` :- `System equal` connects the socket referred for by the file descriptor `socket` to the address specified by `address`.

### XIII. Exercise

1. Write a program using `Socket` and `ServerSocket` to create Chat Application
2. Write a program to develop prime number Server (Client will send any number to server, Server will send the response the number is prime or not)

(Space for Answer)

```
→ 1) /* Simple server Java */
import java.net.*;
public class simpleserver
{
    public static void main(String args[])
        throws IOException
    {
        ServerSocket s = new ServerSocket(1234);
        System.out.println("server standard waiting
                           for client
                           connection.");
        Socket s1 = s.accept();
        OutputStream out = s1.getOutputStream();
        DataOutputStream d = new DataOutputStream(out);
        d.write("Hello Client");
    }
}
```

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Output stream out = s1.getOutputStream();  
DataOutputStream d = new DataOutputStream(out);

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d.write\_UFE(HF there);  
d.close();  
out.close();  
S2.close();

xiv. References/ Suggestions for Further Reading

1. <https://docs.oracle.com/javase/tutorial/networking/sockets/definition.html>
2. [https://www.tutorialspoint.com/java/java\\_networking.htm](https://www.tutorialspoint.com/java/java_networking.htm)
3. The complete reference Java 2 by Herbert Schildt

xv. Assessment Scheme

Performance Indicators		Weightage
Process related (35 Marks)		
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total(50 Marks)		100%

List of Students / Team Members

1. Rutheesh L. Pawar
2. Aditya S. Salunke

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	

**Practical No. 17: Write a program to demonstrate use of  
DatagramSocket and DataGramPacket**

**I. Practical Significance:**

The User Datagram Protocol (UDP) is connectionless, and unreliable protocol by which the user can send short messages called datagrams. The java provides DatagramSocket and DatagramPacket class to implement the concept of user datagram protocol. By using these classes we can transfer the data asynchronous manner.

**II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

**III. Competency and Practical skills**

Develop web and stand-alone applications using advanced concepts of Java.

The practical is expected to develop the following skills:

1. Able to create chat application using DatagramSocket and DatagramPacket
2. Able to understand the implementation details of UDP in java.

**IV. Relevant Course Outcome(s)**

Develop Java programs using networking concepts

**V. Practical Outcome (PrOs)**

Write a program to demonstrate use of DatagramSocket and DataGram Packet

**VI. Relevant Affective domain related Outcome(s)**

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

**VII. Minimum Theoretical Background**

The Java DatagramSocket class is used to send and receive the datagrams it is connection less socket. That is there is no guarantee of message delivery. It has following constructors

1. DatagramSocket()
2. DatagramSocket(int port)
3. DatagramSocket(int port, InetAddress address)

The Java DatagramPacket is class that can be used to send the packets. If you send multiple packet, it may arrive in any order. Additionally, packet delivery is not guaranteed.

It has following constructors

1. DatagramPacket(byte[] barr, int length)
2. DatagramPacket(byte[] barr, int length, InetAddress address, int port)

VIII. Resources required (Additional)–

Nil

IX. Resources used (Additional)

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	Computer System	Processor P-3 RAM 4GB		—

X. Program Code: Teacher must assign a separate program statement to group 3-4 students.

1. Execute the following Program and write the output.

```
import java.net.*;
public class DgramRec
{
    public static void main(String[] args) throws Exception
    {
        DatagramSocket ds = new DatagramSocket(3000);
        byte[] buf = new byte[1024];
        DatagramPacket dp = new DatagramPacket(buf, 1024);
        ds.receive(dp);
        String str = new String(dp.getData(), 0, dp.getLength());
        System.out.println(str);
        ds.close();
    }
}
```

```
import java.net.*;
public class DGramSender
{
    public static void main(String[] args) throws Exception
    {
        DatagramSocket ds = new DatagramSocket();
        String str = "Java is Easy!!!!";
        InetAddress ip = InetAddress.getByName("127.0.0.1");
        DatagramPacket dp = new DatagramPacket(str.getBytes(), str.length(),
                                                ip, 3000);
        ds.send(dp);
        ds.close();
    }
}
```

}

Note: Run the two programs on separate command prompt.

XI. Result (Output of Code):

Dgram.java -  
Java Is Easy!!!!

DGramSender.java :-

XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher may design more such questions so as to ensure the achievement of identified CO

1. Write the difference between ServerSocket and DatagramPacket
2. Why UDP is unreliable protocol.
3. Write the steps to assign IP address to your machine

(Space for answer)

	ServerSocket	DatagramPacket
→1	A serversocket is for accepting incoming network connector from client. It is a connection oriented stream Protocol. eg. TCP / IP	A Datagram Packet is for sending and receiving datagram on some connectionless datagram Message protocol. eg = UDP / IP

→2 UDP does not provide error correction and is therefore an unreliable protocol. In other words delivery of packets is not guaranteed. UDP datagrams are transmitted without provision for an acknowledgment. Because there is no virtual connection between sender and receiver. UDP is also said to be connectionless.

XIII. Exercise

1. Write a program using DatagramPacket and DatagramSocket to create chat application
2. Write a program using DatagramPacket and DatagramSocket to copy the contents of one file into other
3. Write a program using DatagramPacket and DatagramSocket to transfer the file from one location to another.

(Space for Answer)

Datagram server Program

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

```
import java.net.*;
```

```
class UDPServer
```

```
{
```

```
public static DatagramSocket screenshot
```

```
public static DatagramPacket dP;
```

```
public static Buffer eventReader d.S;
```

```
public static Inet.Address to;
```

```
public static Button butt[] = new byte [1,24];
```

```
public static int port = 983, sport = 790
```

```
public static void main (String p3 threads = exc
```

```
{
```

```
ServerSocket = new DatagramSocket (sport);
```

```
d.DR = DatagramPacket (but button);
```

```
di = new BufferedReader (new InputStreamReader  
(System.in));
```

```
in = InetAddress.getLocalHost ();
```

```
System.out.println ("server is Running");
```

```
while (true);
```

```
3
```

```
serverSocket.receive (dP);
```

```
String str = new String (dp.gettext), ();
```

```
dp.getLength, () ;
```

```
'Stop to Quit');
```

```
while (true);
```

XIV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com/DatagramSocket-and-DatagramPacket>
2. The complete reference Java 2 by Herbert Schildt

XV. Assessment Scheme

Performance Indicators		Weightage
Process related (35 Marks)		35%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to subjective questions	10%
Total		100%

List of Students Team Members

1. Rakesh...L...Pawar.
2. Aditya...G...Salunke,

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	

```
String str = new String(dis.readline());
buf = str.getBytes();
if (str.equals ("STOP"))
{
    System.out.println ("Terminated....");
    sendsocket.send (new DatagramPacket (buf, str.length(),
                                         pa.sport));
    break;
}
bentsocket.send (new DatagramPacket (buf, str.length(),
                                     sport));
clientsocket.receive (dp);
String str2 = new String (dp.getData (0, (int) dp
                                     .getLength ()));
System.out.println ("Server;" + str2);
}
```

### Practical No. 18: Write a program to insert and retrieve data from database using JDBC.

#### I. Practical Significance:

ODBC isn't appropriate for direct use from the Java programming language because it uses a C interface. The JDBC API was modeled after ODBC, but, because JDBC is a Java API, it offers a natural Java interface for working with SQL. JDBC is needed to provide a "pure Java" solution for application development.

#### II. Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

#### III. Competency and Practical skills

To develop Dynamic web Application

The practical is expected to develop the following skills:

1. Able to apply the JDBC to create table , and insert data in a table.
2. Able to demonstrate the use of various JDBC driver and tier application.

#### IV. Relevant Course Outcome(s)

Develop programs using JDBC

#### V. Practical Outcome (PrOs)

Write a program to insert and retrieve data from database using JDBC

#### VI. Relevant Affective domain related Outcome(s)

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

#### VII. Minimum Theoretical Background

JDBC API enables the application to interact with the different types of databases. It is possible to publish vital information from a remote database on a webpage using the Java applet. JDBC is a low level API is used to invoke or call SQL command directly. The required SQL statements are passed as a 'string' to java methods.

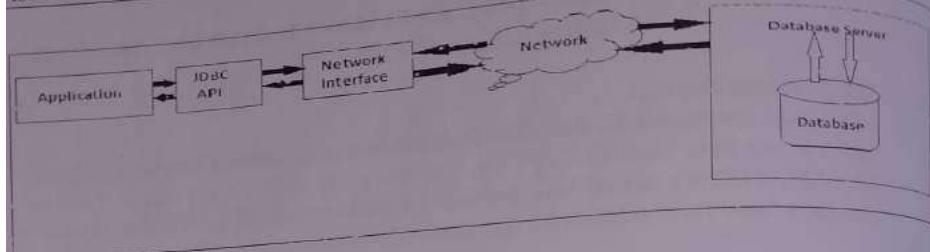


Figure 12

Some of the current JDK add more features to JDBC that is embedded SQL which makes direct mapping of relational databases to java classes. Embedded SQL enables mixing of java into a SQL statement. These statements are translated into JDBC calls using SQL processor. In this type of direct mapping, each row of the table becomes an instance of class and each column value corresponds to an attribute of that instance.

❖ **JDBC DRIVERS:-**

1. JDBC-ODBC Bridge: -
2. Native-API: - partly java Driver: -
3. JDBC-Network pure java driver:
4. Native\_protocol (100%) pure Java drivers: -

❖ **STEPS FOR USING JDBC**

There are seven steps for using JDBC to access a database.

1. Import the Package: -
2. Register Driver or If register then load driver using Class.forName()
3. Connect to Database:-
4. Create a Statement:-
5. Execute the Statement
6. Retrieve the Results

**VIII. Resources required (Additional)–**

Nil

**IX. Resources used (Additional)**

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	MS-Access	MS-Office 2010	1	
2	My-Sql Server	My-Sql Sever above 5.5	1	

**Program Code:** Teacher must assign a separate program statement to group of 3-4 students.

1. Write a Program to create a Student Table in database and insert a record in a Student table.
2. Write the output of following code
3. // Create DSN Named as MSBTE using Administrative tool from control Panel.  
// This program uses types I driver JDBC ODBC bridge.

```
import java.sql*;
class JdbcDemo
public static void main (String args[])
{
    try
    {
        DriverManager.registerDriver(new sun.jdbc.odbc.JdbcOdbcDriver());
        System.out.println(" Driver loaded");
        String url= "jdbc:odbc:MSBTE";
        Connection cn= DriverManager.getConnection(url);
        System.out.println("Connection to the database created");
        Statement st= cn.createStatement();
        String str= "select* from student";
        ResultSet rs=st.executeQuery(str);
        String text=" ";
        System.out.println("Roll Number "+Name");
        while(rs.next())
        {
            text= text+rs.getInt(1)+"\t"+rs.getString(2)+"\n";
        }
        System.out.print(text);
        St.close();
        cn.close();
    }
    catch (SQLException s)
    {
        System.out.println("sql error");
    }
}
```

→ 2) Import java.sql.\*;
Public Class - Pg 18
{
 Public static void main (String args[])
 {
 String database URL="Jdbc:ucanaccess:///D:/IDPbm9
 ,/AJP//Java.Practical Student.accdb";
 try (connection connection=Driver Manager.get connection
 (database URL))
 {
 String Sq1="INSERT INTO student (Name,city,Enrollment)
 value (1,2,2,9);"
 }
 }
}

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Prepared Statement Prepared Statement =  
Connection Prepared Statement (Sql)  
Prepared Statement.setstring (1,"Padhiyan Tejas Ramabhai")

```
Prepared Statement.setString(2, "Kopargaon");
Prepared Statement.setString(3, "1800340523");
Prepared Statement.setString(4, "98.40");
int row = preparedStatement.executeUpdate();
if (row > 0)
{
    System.out.println("A row has been inserted
                        successfully.");
}
```

3

3

```
Catch (SQLException ex)
```

2

```
ex.printStackTrace();
```

3

3

3

#### XI. (Output of Code):

#### XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. List the advantages of JDBC over ODBC?

2. Write the Use of Class.forName()?

3. Write the steps to establish DSN oriented connection and DSNLess connection.

(Space for answer)

→ 1) a) JDBC applications enjoy the platform independent of Java.

- b) JDBC does not required Software on each client system which tends itself well for Internet app.
  - c) JDBC is simpler and easier to learn than ODBC
  - d) Offers faster implementation outside the windows environment
- Q Used to load any given class (within double question as string) at runtime

### XIII. Exercise

1. Develop a program to create employee table in database having two columns "emp\_id" and "emp\_name".
2. Develop a program to display the name and roll no of students from "student table" having percentage > 70.

(Space for Answer)

→ 1] Import java.sql.\*;  
public class println {  
 public static void main (String args []) {  
 String databaseURL =  
 "jdbc:sql:connection URL";  
 try {Connection connection = DriverManager.  
 getConnection (databaseURL);  
 String Sql = "CREATE TABLE Employee (emp\_id  
 INT, emp\_name VARCHAR (20));";  
 preparedStatement = connection.prepareStatement (Sql);  
 int row = preparedStatement.executeUpdate();  
 System.out.println ("Table created successfully");  
 } catch (Exception exception) {  
 exception.printStackTrace ();  
 }  
 }  
}



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XIV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com>
2. <https://www.tutorialspoint.com/java>
3. The complete reference Java 2 by Herbert schildt
4. <ftp://ftp.icm.edu.pl/packages/javasoft-docs/jdk1.1/jdbc.pdf>

XV. Assessment Scheme

Performance Indicators		Weightage
Process related (35 Marks)		70%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

List of Students /Team Members

1. Pratikesh...L...Pawar...
2. Aditya...S...Salunke
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	

**Practical No. 19: Write a program to demonstrate the use of PreparedStatement and ResultSet interface,**

**I. Practical Significance:**

A Java JDBC PreparedStatement is a special kind of Java JDBC Statement object with some useful additional features. Remember, we need a Statement in order to execute either a query or an update. We can use a Java JDBC PreparedStatement instead of a Statement and benefit from the features of the PreparedStatement.

**II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

**III. Competency and Practical skills**

To develop Dynamic web Application

The practical is expected to develop the following skills:

1. Able to apply JDBC to insert update modify and delete the data from Database.
2. Able to demonstrate the use of PreparedStatement and ResultSet Interface.

**IV. Relevant Course Outcomes**

Develop programs using JDBC

**V. Practical Outcome (POs)**

Write a program to demonstrate the use of PreparedStatement and ResultSet interface.

**VI. Relevant Affective domain related Outcome(s)**

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

**VII. Minimum Theoretical Background**

**PreparedStatement Interface**

PreparedStatement helps us in preventing SQL injection attacks because it automatically escapes the special characters. PreparedStatement allows us to execute dynamic queries with parameter inputs. PreparedStatement provides different types of setter methods to set the input parameters for the query. PreparedStatement is faster than Statement. It becomes more visible when we reuse the PreparedStatement or use its batch processing methods for executing multiple queries. PreparedStatement helps us in writing object Oriented code with setter methods whereas with Statement we

have to use String Concatenation to create the query. If there are multiple parameters to set, writing Query using String concatenation looks very ugly and error prone. PreparedStatement returns FORWARD\_ONLY ResultSet, so we can only move in forward direction. Unlike Java Arrays or List, the indexing of PreparedStatement variables starts with 1.

One of the limitation of PreparedStatement is that we can't use it for SQL queries with IN clause because PreparedStatement doesn't allow us to bind multiple values for single placeholder (?).

Methods of Prepared Statements.

1. public void setInt(int paramInt, int value):-sets the integer value to the given parameter index.
2. public void setString(int paramInt, String value) :-sets the String value to the given parameter index.
3. public void setFloat(int paramInt, float value):- sets the float value to the given parameter index.
4. public void setDouble(int paramInt, double value):-sets the double value to the given parameter index.
5. public int executeUpdate() :-executes the query. It is used for create, drop, insert, update, delete etc.
6. public ResultSet executeQuery() :-executes the select query. It returns an instance of ResultSet.

### ResultSet Interface

The SQL statements that read data from a database query, return the data in a result set. The SELECT statement is the standard way to select rows from a database and view them in a result set. The *java.sql.ResultSet* interface represents the result set of a database query.

A ResultSet object maintains a cursor that points to the current row in the result set. The term "result set" refers to the row and column data contained in a ResultSet object.

The methods of the ResultSet interface can be broken down into three categories –

- **Navigational methods:** Used to move the cursor around.
- **Get methods:** Used to view the data in the columns of the current row being pointed by the cursor.
- **Update methods:** Used to update the data in the columns of the current row. The updates can then be updated in the underlying database as well.

is movable based on the properties of the ResultSet. These properties are designated when the corresponding Statement The cursor that generates the ResultSet is created. JDBC provides the following connection methods to create statements with desired ResultSet –

- createStatement(int RSType, int RSConcurrency);
- prepareStatement(String SQL, int RSType, int RSConcurrency);
- prepareCall(String sql, int RSType, int RSConcurrency);

The methods of the ResultSet interface can be broken down into three categories –

- **Navigational methods:** Used to move the cursor around.

- **Get methods:** Used to view the data in the columns of the current row being pointed by the cursor.
  - **Update methods:** Used to update the data in the columns of the current row. The updates can then be updated in the underlying database as well.
- JDBC provides the following connection methods to create statements with desired ResultSet –
- `createStatement(int RSType, int RSConcurrency);`
  - `prepareStatement(String SQL, int RSType, int RSConcurrency);`
  - `prepareCall(String sql, int RSType, int RSConcurrency);`

The first argument indicates the type of a ResultSet object and the second argument is one of two ResultSet constants for specifying whether a result set is read-only or updatable.

### VIII. Resources required (Additional)–

Nil

### IX. Resources used (Additional)

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	MySQL Server	5.5	1	—
2	JDK	1.6	1	—

### X. Program Code: Teacher must assign a separate program statement to group of 3-4 students.

1. Write a Program to update row of student table from MSBTE database using MySQL as database server.
2. Write the output of following JDBC code. Use MySQL server 5.5 as database server.

```

import java.sql
public class PreparedStmtEx
{
    public static void main(String args[])
    {
        try
        {
            Class.forName("com.mysql.jdbc.Driver");
            Connection con=DriverManager.getConnection("jdbc:mysql://localhost:3306/YourDBname","DBusername","DBpassword");
            //keep "" empty if not given during installation
            PreparedStatement stmt=con.prepareStatement("insert into student values(?,?,?)");
        }
    }
}
  
```

```
stmt.setInt(1,101);
//1 specifies the first parameter(1st ? symbol) in the query
stmt.setString(2,"Abhishek");
//2 specifies the second parameter(2nd ? symbol) in the query
stmt.setString(3,"Yadav");
//3 specifies the third parameter(3rd ? symbol) in the query
int i=stmt.executeUpdate();
System.out.println(i+" records inserted");
con.close();
}
catch(Exception e)
{
    System.out.println(e);
}
}
```

Output: It will give 2 errors

- ① at the 1: semicolon is missing
- ② at line 20: extra } bracket is there

After Correcting the errors output will be:

```
Command prompt - D X
C:\Java\bin>java prepared StmtEx.java
C:\Java\bin>java preparedStmtEx
1 records inserted
C:\Java\bin>
```

XI. Result (Output of Code):

The program for to demonstrate the use of prepared statement was written & executed successfully & the output was taken in the form of attached printout.

XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. Explain Advantages of Prepared Statement Interface.
2. Explain the methods of ResultSet Interface
3. Explain Types of ResultSet
4. Explain disadvantages of Prepared Statements

(Space for answer)

- 1) Advantages of Prepared Statement Interface
- ① Prepared Statement allows you to write a dynamic parameteric query.  
- By using prepared statement in Java you can write parameterized SQL queries & send different parameters by using the same SQL.
- ② Prepared Statement is faster than statement in Java.
- ③ Prepared Statement prevents SQL injection attacks in Java.

Disadvantages of prepared Statements:-

- ① Since a prepared Statement object represents only one SQL Statement at a time, we can execute only one statement by one prepared statement object.
- ② To prevent injection attacks it does not allow more than one value to a place holder.
- ③ Not all statement can be prepared.

XIII. Exercise

1. Develop JDBC program to retrieve data using ResultSet
2. Develop a program to update a record in database table  
(Space for Answer)

→ 2) Import java.sql.\*; class Connect

```
public static void main (String args[])
{
    try
    {
        Class.forName ("oracle.jdbc.driver.OracleDriver");
        Connection con = DriverManager.getConnection ("jdbc:oracle:thin:@localhost:2632:xe", "system", "system");
        String sql = "select * from student";
        PreparedStatement ps = con.prepareStatement(sql);
        ResultSet rs = ps.executeQuery();
        while (rs.next ())
        {
            System.out.println(rs.getInt(1) + rs.getString(2)
                + rs.getString(3));
        }
        con.close ();
    }
    catch (Exception e)
    {
        System.out.println(e);
    }
}
```

#### XIV. References/ Suggestions for Further Reading

Advanced Java Programming (22517)

1. <https://www.javatpoint.com>
2. <https://www.tutorialspoint.com/java>
3. The complete reference Java 2 by Herbert schildt
4. JDBC Developer's Resource by Art Taylor JDBC Developer's Resource by Art Taylor

V. Assessment Scheme

Performance Indicators		Weightage
Process related (35 Marks)		70%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

List of Students /Team Members

1. Rutikesh...L.P.Dar
2. Aditya...S.G.alunke
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	

**Practical No. 20: Write a program to update and delete a record from a database table.**

**I. Practical Significance:**

The UPDATE command is used to modify the records in the table. Upon executing this command the record values are modified based on values passed in the query. Along with WHERE clause you can update the specific records from the table. The SQL DELETE command is used to delete rows that are no longer required from the database tables. It deletes the whole row from the table. Delete command comes handy to delete temporary or obsolete data from your database.

**II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

**III. Competency and Practical skills**

To develop Dynamic web Application

The practical is expected to develop the following skills:

1. Able to Apply the JDBC to update and Delete a record
2. Able to Demonstrate the use of Update and Delete with where clause.

**IV. Relevant Course Outcome(s)**

Develop programs using JDBC

**V. Practical Outcome (PrOs)**

Write a program to update and delete a record from a database table

**VI. Relevant Affective domain related Outcome(s)**

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

**VII. Minimum Theoretical Background**

DML statements are SQL statements that manipulate data. DML stands for Data Manipulation Language. The SQL statements that are in the DML class are INSERT, UPDATE and DELETE. Some people also lump the SELECT statement in the DML classification.

The SQL UPDATE Statement

The UPDATE statement is used to modify the existing records in a table.

**UPDATE Syntax**

**UPDATE table\_name**

**SET column1 = value1, column2 = value2,**

**WHERE condition;**

SET statement is used to set new values to the particular column and the WHERE clause is used to select the rows for which the columns are needed to be updated. If we have not used the WHERE clause then

**The SQL DELETE Statement**

The DELETE statement is used to delete existing records in a table.

**DELETE Syntax**

**DELETE FROM table\_name WHERE condition;**

the columns in all the rows will be updated.

**VIII. Resources required (Additional)–**

Nil

**IX. Resources used (Additional)**

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	Mysql Database server	5.5	1	—
2	JDK	1.6	1	—

**X. Program Code:** Teacher must assign a separate program statement to group of 3-4 students.

1. Write a program to delete a record from a table.
2. Write the output of following JDBC code.

```
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.PreparedStatement;
public class UpdateQuery
{
    public static void main(String [] args)
    {
        try
        {
            Class.forName("com.mysql.jdbc.Driver");
            Connection
            con=DriverManager.getConnection("jdbc:mysql://localhost:33
06/Ddemodatabase","root","root");
        }
    }
}
```

```
PreparedStatement st = con  
    .prepareStatement("update student set roll_no=3 where  
        name='Abhishek'");  
    st.executeUpdate();  
}  
catch(Exception ex)  
{  
    System.out.println(ex);  
}  
}
```

XI. Result (Output of Code)

XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. Write ACID properties of Transaction.
2. Write the use of DDL DML and DCL
3. Write the use of Delete Cascade.
4. Write the use of Update Cascade,

(Space for answer)

- ① In the context of transaction processing, the acronym ACID refers to the four key properties of a transaction: atomicity, consistency, isolation, and durability. All changes to data are performed as if they are a single operator.
- ② DDL = Data Definition Language  
DML = Data Manipulation Language  
DCL = Data Control Language
- ③ This means that "ON update cascade" will do the same thing when ref. the parent is updated

## XIII. Exercise

1. Develop a program to update name of a student from Jack to John.
2. Develop a program to delete all record for a product whose "price is greater than 500" and Id is "P1234".

(Space for Answer)

```

→ 2) package practicals; import java.sql.*;
public class practical12Qn2 {
    public static void main (String args) {
        try {
            String url = "jdbc:mysql://localhost:3306/practical";
            String username = "root";
            String password = "System";
            String query = "select * from practical.product";
            String query2 = "delete from practical.product where
                price > 500 and pno.id = 'P1234'";
            Class.forName ("com.mysql.cj.jdbc.Driver");
            Connection cn = DriverManager.getConnection(url,
                password);
            Statement sm = cn.createStatement ();
            ResultSet rs = sm.executeQuery (query);
            String s = "";
            System.out.println ("Before Execution");
            while (rs.next ()) {
                s = "Name :" + rs.getString (1) + " Roll No : "
                    + rs.getFloat (2) + " Marks : " + rs.getString (3);
                System.out.println (s);
            }
            sm.close ();
            sm.close (); cn.close ();
        } catch (ClassNotFoundException e) {
            // Auto-generated catch block
            e.printStackTrace ();
        } catch (SQLException e) {
            e.printStackTrace ();
        }
    }
}

```



XIV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com>
2. <https://www.tutorialspoint.com/java>
3. The complete reference Java 2 by Herbert Schildt
4. <https://tomcat.apache.org/download-80.cgi>

XV. Assessment Scheme

Performance Indicators		Weightage
Process related(35 Marks)		30%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total(50 Marks)		100%

List of Students /Team Members

1. Rutikesh L. Pawar
2. Aditya S. Salunke
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	

**Practical No. 21: Write a program to demonstrate the use of Generic Servlet as a parameterized servlet**

**I. Practical Significance:**

Servlets are the Java programs that run on the Java-enabled web server or application server. They are used to handle the request obtained from the web server, process the request, produce the response, and then send response back to the web server.

**II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

**III. Competency and Practical skills**

To develop Dynamic web Application

The practical is expected to develop the following skills:

1. Able to apply the servlet for dynamic web application.
2. Able to demonstrate the use of servlet for parameter received from client.

**IV. Relevant Course Outcome(s)**

Develop programs using Servlet

**V. Practical Outcome (PrOs)**

Write a program to demonstrate the use of HttpServlet as a parameterized servlet

**VI. Relevant Affective domain related Outcome(s)**

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

**VII. Minimum Theoretical Background**

Servlets are the Java programs that run on the Java-enabled web server or application server. They are used to handle the request obtained from the web server, process the request, produce the response, and then send response back to the web server.

**The Servlet Container**

Servlet container, also known as **Servlet engine** is an integrated set of objects that provide run time environment for Java Servlet components.

In simple words, it is a system that manages Java Servlet components on top of the Web server to handle the Web client requests.

The `ServletRequest` class includes methods that allow you to read the names and

values of parameters that are included in a client request.

**Steps to Develop Servlet**

Install Apache Tomcat 8.0

To develop servlet basic steps are

1. Create and compile the servlet source code.  
D:\Sanjay\_LabManual>javac HelloMSBTE.java -classpath "C:\Program Files\Apache Software Foundation\Tomcat 8.0\lib\servlet-api.jar"
2. Copy created .class file HelloMSBTE.class in web Container i.e. C:\Program Files\Apache Software Foundation\Tomcat 8.0\webapps\examples\WEB-INF\classes
3. Start Tomcat.  
To start Tomcat, select Start Tomcat in the Start Programs menu, or run startup.bat from the C:\Program Files\Apache Software Foundation\Tomcat 8.0\bin
4. Start a Web browser and request the servlet  
<http://localhost:8080/examples/servlet/HelloMSBTE>

**VIII. Resources required (Additional)-**

Nil

**IX. Resources used (Additional)**

Sr. No.	Name of Resource	Broad Specification	Quantity	Remarks (If any)
1	Web Server Software	Apache Tomcat 8.0 with JRE.	1	
2	CD	Java	1	

X. **Program Code:** Teacher must assign a separate program statement to group of 3-4 students.

1. Write a Program to display following output in browser Window.

Figure 12

2. Write the output of following code considering below HTML is front end and servlet as back end

```

<html>
  <body>
    <center>
      <form name="Form1" method="post"
            action="http://localhost:8080/examples/servlet/PostParametersServlet">
        <table>
          <tr>
            <td><B>Employee</B></td>
            <td><input type="textbox" name="e" size="25" value=""></td>
          </tr>
          <tr>
            <td><B>Phone</B></td>
            <td><input type="textbox" name="p" size="25" value=""></td>
          </tr>
        </table>
        <input type="submit" value="Submit">
      </form>
    </body>
  </html>

import java.io.*;
import java.util.*;
import javax.servlet.*;

public class PostParametersServlet extends GenericServlet
{
  public void service(ServletRequest request, ServletResponse response)
    throws ServletException, IOException
  {
  }
}

```

```
PrintWriter pw = response.getWriter();
// Get enumeration of parameter names.
Enumeration e = request.getParameterNames();
// Display parameter names and values.
while(e.hasMoreElements())
{
    String pname = (String)e.nextElement();
    pw.print(pname + "=");
    String pvalue = request.getParameter(pname);
    pw.println(pvalue);
}
pw.close();
```

(Space for Answer)

→ 1) //HTML FILE

```
<html>
<head>
<title>TODO supply a title </title>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width,initial-
scale=1.0">
</head>
<body>
<form name="f1" method="POST" action="prac 21">
<input type="text" size="200" name="MSBTE">
<input type="submit" value="SUBMIT">
</html>
```

//SERVLET FILE Import java.io.\*;
Import javax.servlet.\*;import
javax.servlet.http.\*;public class prac 21
extends HttpServlet
@Override public void doPost (HttpServletRequest request,
HttpServletResponse response) throws
ServletException, IOException
{
String s = request.getParameter ("MSBTE");
response.setContentType ("text/html");
PrintWriter pw = response.getWriter();
pw.println(s); pw.close();}

XI. Result (Output of Code):

XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. List the types and uses of Servlet
2. List the advantages of Servlet over CGI?
3. Draw the servlet life cycle?
4. What is servlet container?

(Space for answer)

→ 1) Types = ① Generic Servlet  
② HTTP Servlet

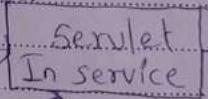
- Uses of Servlet :-

A. Servlet is Java Programming language class that is used to extend capabilities of servlet that has application accessed by means of a request - response programming model.

→ 2) a) Servlet are platform independent.  
b) Servlet are portable.  
c) Servlet gives better performance.  
d) Servlet is more secure.

→ 3) Servlet Container

init()



destroy()

Service()

HTTP:

doGet(), doPost(), doHead()

XIV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com>
2. <https://www.tutorialspoint.com/java>
3. The complete reference Java 2 by Herbert Schildt
4. <https://tomcat.apache.org/download-80.cgi>

XV. Assessment Scheme

Performance Indicators		Weightage
Process related (35 Marks)		70%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

List of Students / Team Members

1. Rutik L. Pawar
2. Aditya S. Salunke
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	
.....	.....	.....	.....

**Practical No. 22: Write a Servlet program to send username and password using HTML forms and authenticate the user.**

**I. Practical Significance:**

There is a possibility of developing 'n' types of servlets, like `httpServlet`, `ftpServlet`, `smtpServlet` etc. for all these protocol specific servlet classes. `GenericServlet` is the common super class containing common properties and logics. So, `GenericServlet` is not a separate type of servlet.

As of now Servlet API is giving only one subclass to `GenericServlet`, `HttpServlet` class because all web servers are designed based on the protocol `http`.

**II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematical sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

**III. Competency and Practical skills**

To develop Dynamic Web Application

The practical is expected to develop the following skills:

1. Able to apply the servlet program for dynamic web application.
2. Able to demonstrate the use of servlet for parameter received from client.

**IV. Relevant Course Outcome(s)**

Develop programs using Servlet.

**V. Practical Outcome (PrOs)**

Write a program to demonstrate the use of `HttpServlet` as a parameterized servlet

**VI.**

**Relevant Affective domain related Outcome(s)**

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

**VII. Minimum Theoretical Background**

Generic servlets extend `javax.servlet.GenericServlet`. It is protocol independent servlet. Generic Servlet is a base class servlet from which all other Servlets are derived. Generic Servlet supports for HTTP, FTP and SMTP protocols. It implements the `Servlet` and `ServletConfig` interface. It has only `init()` and `destroy()` method of `ServletConfig` interface in its life cycle. It also implements the `log` method of `ServletContext` interface.

```

import javax.servlet.http.HttpServletResponse;
public class AuthenticationServlet extends HttpServlet
{
    protected void doPost(HttpServletRequest request, HttpServletResponse
    response) throws ServletException, IOException
    {
        response.setContentType("text/html;charset=UTF-8");
        PrintWriter out = response.getWriter();
        String pass="abhishek12345";
        String username,password;
        username=request.getParameter("username");
        password=request.getParameter("password");
        if(username.equals(uname) && password.equals(pass))
        {
            out.println("Login Successful");
        }
        else
        {
            out.println("Login Unsuccessful");
        }
    }
}

```

(Space for Answer)

→ index1.html

```

<!DOCTYPE html>
<html>
<head>
<meta http-equiv="Content-Type" content="text/html;
charset=UTF-8">
<title>Practical No. 22</title>
<head>
<body>
<form action="NewServlet" method="GET">
Enter username <input type="text" name="username"/>
<br><br>
<input type="Submit" value="Send Data"/>
</form>
</body>
</html>

```

NewServlet.java

```

package P1;
import P2;
import java.io.*;
import java.servlet.*;

```

```
import javax.servlet.http.*;
public class NewServlet extends HttpServlet
{
    @Override
    protected void doGet(HttpServletRequest request, HttpServletResponse response) throws ServletException, IOException
    {
        PrintWriter out = response.getWriter();
        String ur = request.getParameter("User Name");
        out.println("Length of username is: " + ur.length());
        out.println("<br><br>");
    }
}
```

XI. Result (Output of Code):

XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. List the types of servlet and default port for their services.
2. List the difference between doGet() and doPost() method of servlet.
3. Explain ServletConfig and ServletContext.
4. Explain ServletInputStream Class and ServletOutputStream Class with methods.

(Space for answer)

→ 1) Types of Servlet are :-

a) Generic Servlet (javax.servlet.)

b) HTTP Servlet (javax.servlet.http.)

Default port for their service is 80.

2) ServletConfig :-

The interface `ServletConfig` allows a servlet to obtain configuration data when it is loaded. This interface is defined as:

```
public interface ServletConfig
```

Server Context =

The Interface `servletContext` enables servlet to obtain information about their environment and also the communicate with its servlet container. This interface is defined as  
Public Interface `servletContext`

XIII. Exercise

1. Develop servlet program to retrieve data from List and Radio Button using HTML Forms.
2. Develop a program to receive student subject marks through HTML forms TextField and send the response as passed or Failed in Examination..

→2

Exercise 2.html

(Space for Answer)

<html>  
<head>

```
<title> Exercise 2 </title>
</head>
<body>
<Form action="Practical 2" method="GE">
    Enter you marks <input type="text" name="Marks">
    <input type="submit" value="Submit">
</Form>
</body>
</html>
```

<form action="Practical 2" method="GE">
 Enter you Marks <input type="text" name="Marks">
 <input type="submit" value="Submit">

</form>

</body>

</html>

XIV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com>
2. <https://www.tutorialspoint.com/java>
3. The complete reference Java 2 by Herbert schildt
4. <https://tomcat.apache.org/download-80.cgi>

XV. Assessment Scheme

Performance Indicators		Weightage
Process related (35 Marks)		70%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

List of Students /Team Members

1. Rakesh...L...Pawar
2. Aditya...S...Salunke

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	

### Practical No. 23: Write a Servlet program to Create Session using HttpSession Interface.

#### I. Practical Significance:

The container creates a session id for each user. The container uses this id to identify the particular user. An object of HttpSession can be used to perform two tasks:

- bind objects
- view and manipulate information about a session, such as the session identifier, creation time, and last accessed time.

#### II. Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

#### III. Competency and Practical skills

To develop Dynamic web Application

The practical is expected to develop the following skills:

1. Able to develop a servlet program to retrieve the session ID.
2. Able to develop Servlet program to track the user session

#### IV. Relevant Course Outcome(s)

Develop programs using Servlet.

#### V. Practical Outcome (POs)

Write a Servlet program to Create Session using HttpSession class.

#### Relevant Affective domain related Outcome(s)

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

#### VII. Minimum Theoretical Background

The HttpServlet Request interface provides two methods to get the object of HttpSession:

1. **public HttpSession getSession():** Returns the current session associated with this request, or if the request does not have a session, creates one.
2. **public HttpSession getSession(boolean create):** Returns the current HttpSession associated with this request or, if there is no current session and create is true, returns a new session.

XI. Result (Output of Code):

XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified QO.

1. Explain Session ID.
2. Explain Methods of HttpSession ?
3. Explain the session management in detail .?
4. Explain Session hijacking and session poisoning in Java Servlet.

(Space for answer)

Ques	Method	HT Description
→1	Session.getAttribute(String name)	Returns the object bound with the specified name in this session, or null if no object is bound under the name.
→2	Session.getAttributeNames()	Returns an Enumeration object containing the names of all the objects bound in this session.
	Session.getId()	Returns a string containing the unique identifier assigned to the session.

void invalidate Invalidates this Session then  
then unbinds any object bound  
to it

void removeAttribute Removes specified attribute  
(String name)

#### Q1. Exercise

1. Develop servlet program to display various details about session using HttpSession methods.
2. Develop a program to display last accessed time of session. And Expire the session with specified time

SERVLET FILE Import (Space for Answer)

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

Public Class Pr\_23 extends HttpServlet.

```

public void doGet (HttpServletRequest request, HttpServletResponse response)
throws ServletException, IOException {
HttpSession session = request.getSession(true);
Date createTime = new Date(session.getCreationTime());
Date lastAccessTime = new Date(session.getLastAccessedTime());
String title = "Welcome Back to my Website";
Integer visitCount = new Integer(0);
String visitCountKey = new String("visitCount");
String userKey = new String("userKey");
String userId = new String("userId");

if (session.isNew()) {
    title = "Welcome to my website";
    session.setAttribute(userKey, userId);
} else {
    VisitCountAttribute session.getAttribute(userKey);
    session.setAttribute(visitCountKey, visitCount);
    response.setContentType("text/html");
}

PrintWriter out = response.getWriter();
String docType =
"<!DOCTYPE html public "-//IWA3C//DTD"
"html 4.0" +
"transitional//EN">\n";
out.println(docType +
"html></html>" +
```

```
'<head><title>' + title + '</title></head>'  
'<body bgcolor="#f0f0f0">\n' +  
'<tbl align="center">" + title + '</tbl>\n'  
'<table border="1" align="center">\n'+
```

XIV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com>
2. <https://www.tutorialspoint.com/java>
3. The complete reference Java 2 by Herbert schildt
4. <https://tomcat.apache.org/download-80.cgi>

XV. Assessment Scheme

Performance Indicators		Weightage
Process related (35 Marks)		70%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total (50 Marks)		100%

List of Students / Team Members

1. Rutikesh L. Pawar
2. Aditya S. Salunkhe
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	

"<tr> by colour = "#g4g4g4" >/b" +  
"<th> session info </th><th> value </th></tr>" +  
+  
"<tr>" + "<td> id </td>\n" + "<td>" + session.  
getId() + "  
<td> </td>\n" +  
"<tr>\n" +  
" <td> number of visits </td> in + "<td>  
visit + visitCount + "<td></td>\n" +  
" </tr>\n" + "<tbody></tbody>".

**Practical No. 24: Write a Servlet program to implement session tracking using Cookies.**

**I. Practical Significance:**

Session Tracking is a way to maintain state (data) of an user. It is also known as session management in servlet. Http protocol is a stateless so we need to maintain state using session tracking techniques. Each time user requests to the server, server treats the request as the new request. So we need to maintain the state of an user to recognize to particular user. HTTP is stateless that means each request is considered as the new request.

**II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the computer group related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve the computer group related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve the computer group related problems.
- **Engineering tools:** Apply relevant Computer programming / technologies and tools with an understanding of the limitations.
- **Individual and Team work:** Function effectively as a leader and team member in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

**III. Competency and Practical skills**

To develop Dynamic web Application

The practical is expected to develop the following skills:

1. Able to apply the servlet for session tracking.
2. Able to demonstrate the use of session tracking with various methods.

**IV. Relevant Course Outcomes(s)**

Develop programs using Servlet

**V. Practical Outcome(s)**

Write a Servlet program to implement session tracking using Cookies.

**VI. Relevant Affective domain related Outcome(s)**

1. Follow precautionary measures.
2. Follow naming conventions.
3. Follow ethical practices.

**VII. Minimum Theoretical Background**

**Cookies**

A webserver can assign a unique session ID as a cookie to each web client and for subsequent requests from the client they can be recognized using the received cookie.

This may not be an effective way because many time browser does not support a cookie, so I would not recommend to use this procedure to maintain the sessions.

XI. Result (Output of Code):

XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

1. Write the methods of Cookie.
2. Write the advantages of Cookie over URL rewriting.
3. Write steps to disable Cookie.

(Space for answer)

- 1) String getName()  
2) String getValue()  
3) int getMaxAge()  
4) void setName(String s)  
5) void setValue(String v)  
6) void setMaxAge(int sec)  
• Method to add cookie  
- void addCookie(Cookie c)  
• Method for retrieving cookie  
- cookie[] getCookies()
- 2) Advantage of cookie over URL rewriting are that it is supported by default by Java EE container and does not have URL breakage errors like that of URL rewriting.
- 3) i) Click on chrome menu C; ii) Click on the setting option at bottom. iii) Click on show advanced setting on Advance opt. iv) Click on the site settings. v) Click on allowed sites to same as reading cookie date.

**XIII. Exercise**

1. Develop a program to collect user information using cookie.
  2. Develop program to get the browser Information.
- (Space for Answer)

```

<html>
  <head>
    <title> Session tracking using cookies</title>
  </head>
  <body>
    <form action = "px24">
      <center> user Name : <input type = "password" name = "user password" />
      <br> <br> <input type = "submit" value = "Submit" />
    </center>
    </form>
  </body>
</html>
// SERVLET FILE important Java.io.*;
import javax.servlet.*; import
index.servlet.http.*; public class px24
extends HttpServlet
public void doGet(HttpServletRequest request, HttpServletResponse response)
  
```

```

Println("Byr your password : " + password);
//Creating two Cookies
Cookie c1 = new Cookie("User Name : " , name);
Cookie c2 = new Cookie("User Password : " , password);

//Adding the Cookies to response header
addCookie(c1); response.addCookie(c2);
PrintWriter printWriter = response.getWriter();
printWriter.println(" > view details </a> ");
PrintWriter.close();
Catch (Exception exp)

System.out.println(exp);

try {
    response.setContentType("text/html");
    PrintWriter printWriter = response.getWriter();
    //Responsible reading Cookies
    Cookie c1 = request.getCookie("User Name : " );
    System.out.println("Name: " + c1.getValue() + " & " + c1.getName());
    printWriter.println(" > view details </a> ");
    printWriter.close();
} catch (Exception exp) {
    System.out.println(exp);
}

```

```

response.setContentType("text/html");
PrintWriter pw = response.getWriter();
String password = request.getParameter("password");
pw.println("<h1>Hello " + name + "</h1>");

```

## IV. References/ Suggestions for Further Reading

1. <https://www.javatpoint.com>
2. <https://www.tutorialspoint.com/java>
3. The complete reference Java 2 by Herbert schildt
4. <https://tomcat.apache.org/download-80.cgi>

## CV. Assessment Scheme

Performance Indicators		Weightage
Process related (35 Marks)		35%
1.	Logic formation	30%
2.	Debugging ability	30%
3.	Follow ethical practices	10%
Product related (15 Marks)		30%
4.	Expected output	10%
5.	Timely Submission	10%
6.	Answer to sample questions	10%
Total(50 Marks)		100%

## List of Students/Team Members

1. Rudresh L. Pawar
2. Aditya S. Salunkhe
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(35)	Product Related(15)	Total(50)	