I

Name _____

Roll No. _____ Year 20____ 20____

Exam Seat No. _____

COMPUTER GROUP | SEMESTER - V | DIPLOMA IN ENGINEERING AND TECHNOLOGY

# A LABORATORY MANUAL FOR ADVANCED JAVA PROGRAMMING (22517)

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI
(Autonomous) (ISO 9001 : 2015) (ISO / IEC 27001 : 2013)

## VISION

To ensure that the Diploma level Technical Education constantly matches the latest requirements of technology and industry and includes the all-round personal development of students including social concerns and to become globally competitive, technology led organization.

## MISSION

To provide high quality technical and managerial manpower, information and consultancy services to the industry and community to enable the industry and community to face the changing technological and environmental challenges.

## QUALITY POLICY

We, at MSBTE are committed to offer the best in class academic services to the students and institutes to enhance the delight of industry and society. This will be achieved through continual improvement in management practices adopted in the process of curriculum design, development, implementation, evaluation and monitoring system along with adequate faculty development programmes.

## CORE VALUES

MSBTE believes in the followings:

- Education industry produces live products.
- Market requirements do not wait for curriculum changes.
- Question paper is the reflector of academic standards of educational organization.
- Well designed curriculum needs effective implementation too.
- Competency based curriculum is the backbone of need based program.
- Technical skills do need support of life skills.
- Best teachers are the national assets.
- Effective teaching learning process is impossible without learning resources.

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,
(Autonomous) (ISO:9001 : 2015 ) (ISO/IEC 27001 : 2013)
4th Floor, Government Polytechnic Building, 49, Kherwadi,
Bandra ( East ), Mumbai - 400051.
(Printed on May,2019)

# MAHARASHTRA STATE

# BOARD OF TECHNICAL EDUCATION

## Certificate

This is to certify that Mr. / Ms. …….…… Roll No. ……..…., of Fifth Semester of Diploma in ……..…… of Institute, ……..…….……..… (Code: ……...) has completed the term work satisfactorily in course **Advanced Java Programming (22517)** for the academic year 20…….. to 20…….. as prescribed in the curriculum.

Place: …… Enrollment No:.……

Date: …… Exam. Seat No: ……

**Subject Teacher** **Head of the Department** **Principal**

Seal of Institution

# Preface

The primary focus of any engineering laboratory/field work in the technical education system is to develop the much-needed industry relevant competencies and skills. With this in view, MSBTE embarked on this innovative 'I' Scheme curricula for engineering Diploma programmes with outcome-based education as the focus and accordingly, relatively large amount of time is allotted for the practical work. This displays the great importance of laboratory work making each teacher, instructor and student to realize that every minute of the laboratory time need to be effectively utilized to develop these outcomes, rather than doing other mundane activities. Therefore, for the successful implementation of this outcome-based curriculum, every practical has been designed to serve as a ***'vehicle'*** to develop this industry identified competency in every student. The practical skills are difficult to develop through 'chalk and duster' activity in the classroom situation. Accordingly, the 'I' scheme laboratory manual development team designed the practicals to ***focus*** on ***outcomes***, rather than the traditional age-old practice of conducting practical's to 'verify the theory' (which may become a byproduct along the way).

This laboratory manual is designed to help all stakeholders, especially the students, teachers and instructors to develop in the student the pre-determined outcomes. It is expected from each student that at least a day in advance, they have to thoroughly read the concerned practical procedure that they will do the next day and understand minimum theoretical background associated with the practical. Every practical in this manual begins by identifying the competency, industry relevant skills, course outcomes and practical outcomes which serve as a key focal point for doing the practical. Students will then become aware about the skills they will achieve through procedure shown there and necessary precautions to be taken, which will help them to apply in solving real-world problems in their professional life.

This manual also provides guidelines to teachers and instructors to effectively facilitate student-centered lab activities through each practical exercise by arranging and managing necessary resources in order that the students follow the procedures and precautions systematically ensuring the achievement of outcomes in the students.

Advanced Java Programming is used as mainstream programming language in application development. This course aims to design and develop Java based applications. Using Advanced Java programming, students will be able to develop web applications, GUI, applications as well as network-based applications. Students will be able to write the programs like applet, Servlets, connections to Databases using JDBC and socket programming.

Although all care has been taken to check for mistakes in this laboratory manual, yet it is impossible to claim perfection especially as this is the first edition. Any such errors and suggestions for improvement can be brought to our notice and are highly welcome.

## Programme Outcomes (POs) to be achieved through Practical's of this Course:

Following programme outcomes are expected to be achieved significantly out of the ten programme outcomes and Information Technology programme specific outcomes through the practical's of the course on **Advanced Java Programming.**

**PO 1. Basic knowledge**: Apply knowledge of basic mathematics, science and basic engineering to solve the problems related to application of computers and communication services in storing, manipulating and transmitting data, often in the context of a business or other enterprise.

**PO 2. Discipline knowledge**: Apply Computer Engineering knowledge to solve broad-based Computer Engineering related problems.

**PO 3. Experiments and practice**: Plan to perform experiments, practices and to use the results to solve Computer Engineering related problems.

**PO 4. Engineering tools**: Apply appropriate Computer Engineering related techniques/ tools with an understanding of the limitations.

**PO 5. The engineer and society**: Assess societal, health, safety and legal issues and the consequent responsibilities relevant to practice in the field of Computer Engineering.

**PO 6. Environment and sustainability**: Apply Computer related engineering solutions for sustainable development practices in environmental contexts.

**PO 7. Ethics**: Apply ethical principles for commitment to professional ethics, responsibilities and norms of practice in the field of Information Technology.

**PO 8. Individual and team work**: Function effectively as a leader and team member in diverse/ multidisciplinary teams.

**PO 9. Communication**: Communicate effectively in oral and written form.

**PO 10. Life-long learning**: Engage in independent and life-long learning along with the technological changes in the IT and allied industry.

# Practical - Course Outcome Matrix

**Course Outcome:**

a. Develop program using GUI framework (AWT and Swing)
b. Handle events of AWT and Swing Components.
c. Develop programs to handle events in Java Programming.
d. Develop Java Programs using Networking Concepts.
e. Develop programs using Database.
f. Develop programs using Servlets.

| S. No. | Title of the Practical | CO a. | CO b. | CO c. | CO d. | CO e. | CO f |
|---|---|---|---|---|---|---|---|
| * 1 | Write a program to demonstrate the use of AWT components like Label, Textfield, TextArea, Button, Checkbox, RadioButton etc. | √ | - | - | - | - | - |
| * 2 | Write a program to design a form using the components List and Choice. | √ | - | - | - | - | - |
| * 3 | Write a program to design simple calculator with the use of GridLayout | √ | - | - | - | - | - |
| * 4 | Write a program to create a two-level card deck that allows the user to select component of Panel using CardLayout | √ | - | - | - | - | - |
| * 5 | Write a program using AWT to create a menubar where menubar contains menu items such as File, Edit, View and create a submenu under the File menu: New and Open. | √ | - | - | - | - | - |
| * 6 | Write a program using swing to display a ScrollPane and JcomboBox in an Japplet with the items – English, Marathi, Hindi, Sanskrit. | √ | √ | - | - | - | - |
| * 7 | Write a program to create a Jtree. | - | √ | - | - | - | - |
| 8 | Write a program to create a JTable. | - | √ | - | - | - | - |
| 9 | Write a program to launch a JProgressBar | - | √ | - | - | - | - |
| * 10 | Write a program to demonstrate status of key on Applet window such as KeyPressed, KeyReleased, KeyUp, KeyDown | √ | √ | √ | - | - | - |
| * 11 | Write a program to demonstrate various mouse events using MouseListener and MouseMotionListener interface | √ | √ | √ | - | - | - |
| * 12 | Write a program to demonstrate the use of JTextField and JPasswordField using Listener Interface | √ | √ | √ | - | - | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 13 | Write a program to demonstrate the use of WindowAdapter class. | √ | √ | √ | - | - | - |
| * 14 | Write a program to demonstrate the use of InetAddress class and its factory methods. | - | - | - | √ | - | - |
| * 15 | Write a program to demonstrate the use of URL and URLConnection class and its methods | - | - | - | √ | - | - |
| 16 | Write a program to implement chat Server using Server Socket and Socket class. | - | - | - | √ | - | - |
| 17 | Write a program to demonstrate use of DataGram Socket and DataGram Packet | - | - | - | √ | - | - |
| * 18 | Write a program to insert and retrieve the data from database using JDBC | - | - | - | - | √ | - |
| 19 | Write a program to demonstrate the use of PreparedStatement and ResultSet interface | - | - | - | - | √ | - |
| 20 | Write a program to update and delete a record from a database table. | - | - | - | - | √ | - |
| 21 | Write a program to demonstrate the use of HttpServlet as a parameterized servlet | √ | - | - | - | - | √ |
| * 22 | Write a Servlet program to send username and password using HTML forms and authenticate the user | √ | - | - | - | - | √ |
| 23 | Write a program to create Session using HttpSession class | √ | - | - | - | - | √ |
| 24 | Write a program to implement Session tracking using Cookies. | √ | - | - | - | - | √ |

# List of Industry Relevant Skills

The following industry relevant skills of the competency "Apply advanced Java Programming Concepts" are expected to be developed in you by performing practical's of this laboratory manual.

1. Create GUI Applications.
2. Handle events using event delegation model.
3. Write and execute programs for web based as well as window-based applications.
4. Write and execute programs for networking.
5. Write and execute programs to store the data in database to perform CRUD operations.
6. Write and execute programs for client server using Servlets.

# Brief Guidelines to Teachers

**Hints regarding strategies to be used**

1. Teacher shall explain prior concepts to the students before starting each experiment.
2. For practical's requiring tools to be used, teacher should provide the demonstration of the practical emphasizing the skills, which the student should achieve.
3. Involve students in the activities during the conduct of each experiment.
4. Teachers should give opportunity to students for hands-on after the demonstration.
5. Assess the skill achievement of the students and COs of each unit.
6. Teacher is expected to share the skills and competencies to be developed in the students.
7. Teacher should ensure that the respective skills and competencies are developed in the students after the completion of the practical exercise.
8. Teacher may provide additional knowledge and skills to the students even though that may not be covered in the manual but are expected from the students by the industries.
9. Teacher may suggest the students to refer additional related literature of the reference books/websites/seminar proceedings etc.
10. During assessment teacher is expected to ask questions to the students to tap their knowledge and skill related to that practical.

# Instructions for Students

Student shall read the points given below for understanding the theoretical concepts and practical applications.

1. Students shall listen carefully the lecture given by teacher about importance of subject, learning structure, course outcomes.
2. Students shall organize the work in the group of two or three members and make a record of all observations.
3. Students shall understand the purpose of experiment and its practical implementation.
4. Students shall write the answers of the questions during practical.
5. Student should feel free to discuss any difficulty faced during the conduct of practical.
6. Students shall develop web based and window-based applications as expected by the industries.
7. Student shall attempt to develop related hands on skills and gain confidence.
8. Students shall refer technical magazines; websites related to the scope of the subjects and update their knowledge and skills.
9. Students shall develop self-learning techniques.
10. Students should develop habit to submit the write-ups on the scheduled dates and time.

# Content Page

## List of Practical's and Progressive Assessment Sheet


| Sr. No. | Title of the practical | Page No. | Date of performance | Date of submission | Assessment Marks (50) | Dated sign. of teacher | Remarks (if any) |
|---|---|---|---|---|---|---|---|
| 1. | Write a program to demonstrate the use of AWT components like Label, Textfield, TextArea, Button, Checkbox, RadioButton etc. | 1 | | | | | |
| 2. | Write a program to design a form using the components List and Choice. | 6 | | | | | |
| 3. | Write a program to design simple calculator with the use of GridLayout | 12 | | | | | |
| 4. | Write a program to create a two-level card deck that allows the user to select component of Panel using CardLayout | 19 | | | | | |
| 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. | 25 | | | | | |
| 6. | Write a program using swing to display a ScrollPane and JcomboBox in an Japplet with the items – English, Marathi, Hindi, Sanskrit. | 31 | | | | | |
| 7. | Write a program to create a Jtree. | 37 | | | | | |
| 8. | Write a program to create a JTable. | 42 | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 9. | Write a program to launch a JProgressBar | 48 | | | | | |
| 10. | Write a program to demonstrate status of key on Applet window such as KeyPressed, KeyReleased, KeyUp, KeyDown | 53 | | | | | |
| 11. | Write a program to demonstrate various mouse events using MouseListener and MouseMotionListener interface | 58 | | | | | |
| 12. | Write a program to demonstrate the use of JTextField and JPasswordField using Listener Interface | 63 | | | | | |
| 13. | Write a program to demonstrate the use of WindowAdapter class. | 69 | | | | | |
| 14. | Write a program to demonstrate the use of InetAddress class and its factory methods. | 75 | | | | | |
| 15. | Write a program to demonstrate the use of URL and URLConnection class and its methods | 80 | | | | | |
| 16. | Write a program to implement chat Server using Server Socket and Socket class. | 85 | | | | | |
| 17. | Write a program to demonstrate use of DatagramSocket and DataGram Packet | 90 | | | | | |
| 18. | Write a program to insert and retrieve the data from database using JDBC | 95 | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 19. | Write a program to demonstrate the use of PreparedStatement and ResultSet interface. | 102 | | | | | |
| 20. | Write a program to update and delete a record from a database table. | 110 | | | | | |
| 21. | Write a program to demonstrate the use of HttpServlet as a parameterized servlet | 116 | | | | | |
| 22. | Write a Servlet program to send username and password using HTML forms and authenticate the user | 123 | | | | | |
| 23. | Write a program to create Session using HttpSession class. | 130 | | | | | |
| 24. | Write a program to implement Session tracking using Cookies. | 137 | | | | | |
| **Total Marks** | | | | | | | |

- To be transferred to Proforma of CIAAN-2017.

# 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 | As per Batch Size | For All Experiments |
| 2 | Operating System | Windows/Linux | | |
| 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 | | | |
| 2 | Operating System | | | |
| 3 | Development Software | | | |

## 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):

.....

.....

.....

.....

## 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**)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**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**)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

## 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. ……..
2. ……..
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 (PrOs)**

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 | | | | |
| 2 | | | | |

## 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**

.....

.....

.....

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

## 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 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)**

.....

.....

.....

.....

.....

.....

**XIII. Exercise:**

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

**(Space for answer)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

## 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. ……..
2. ……..
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 | | | | |

**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.

## 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. 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.

(Space for answer)

.....

.....

.....

## 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**

**(Space for Answer)**

## 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. ……..
2. ……..
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 | | | | |

**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 GridBagLayout.
2. Explain constructor of GridbagLayout.

(Space for answer)

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

.....

.....

## XIII. Exercise

1. Write Java program to display following output.

**Figure 5**

2. Write Java Program to display following output.

**Figure 6**

**(Space for Answer)**

.....

.....

.....

## 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. ……..
2. ……..
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.

## 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 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)

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

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**XIII. Exercise**

1. 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...");
        m2=new MenuItem("Open...");
        m3=new MenuItem("Save As...");
        m4=new MenuItem("Exit",ms);
```

```
                mn.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)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

## 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. ……..
2. ……..
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 TextField 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**

## 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 code to generate the following output

**Figure 8**

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

**(Space for answer)**

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

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**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

**(Space for answer)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

## 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. ……..
2. ……..
3. ……..

| Marks Obtained | | | Dated signature of Teacher |
|---|---|---|---|
| **Process Related(35)** | **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 components

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.

Constrtuctors 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.

JTree(Vector v):It uses the elements of vector v as child nodes.

Various Methods of JTree class :

1. getPathForLocation(): It is used to translate a mouse click on a specific point of 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.

DefaultMutableTreeNode(Object obj):Here,obj is the object to be enclosed in this tree node. The new tree node doesn't have a parent or children. To create hierarchy of tree nodes the add() 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 | | | | |

**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

**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)**

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

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**XIII. Exercise**

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

**(Space for answer)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

## 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. ……..
2. ……..
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.

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 | | | | |

**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

**Figure 10**

## 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)**

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

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**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)**

.....

.....

.....

.....

.....

.....

## 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. ……..
2. ……..
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 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 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 (PrOs)**

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 | | | | |

**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)

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

## 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)**

## 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. ……..
2. ……..
3. ……..

| Marks Obtained | | | Dated signature of Teacher |
|---|---|---|---|
| **Process Related(35)** | **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.

## I. 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.

## 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

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 (PrOs)

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

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

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

## VII. 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 | | | | |

**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.

## 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)**

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

.....

.....

.....

.....

.....

.....

.....

.....

.....

**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)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

## 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. ……..
2. ……..
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 the different types of events that are created when the mouse is clicked, dragged, dropped, released, entered and exited in a component.

These two interfaces lets the user to handle the events and perform some action in that event.

## 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 implement the events of MouseListerner
2. Able to implement the events of MouseMotionListener.

## IV. Relevant Course Outcome(s)

Develop Programs to handle events in java programming.

## V. Practical Outcome (PrOs)

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 Mouse released.

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 | | | | |

**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 design 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 MosueEvents

**(Space for answer)**

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

.....

.....

.....

**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)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

## 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. ……..
2. ……..
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 (PrOs)

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, null 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) | Construct 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 | | | | |
| 2 | | | | |

## 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 '*'

## 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)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

## 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.
3. 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"

**(Space for Answer)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

## 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. ……..
2. ……..
3. ……..

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

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

## I. 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.

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

## IV. Relevant Course Outcome(s)

Handle events of AWT and Swing Components

## V. Practical Outcome (PrOs)

Write a program to demonstrate the use of WindowAdapter class

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

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

## VII. 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 | | | | |
| 2 | | | | |

**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)

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

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**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)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

## 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 /Team Members***

1. ……..
2. ……..
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.

## I. 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.

## 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 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.

## IV. Relevant Course Outcome(s)

Develop java programs using networking components

## V. Practical Outcome (PrOs)

Write a program to demonstrate the use of InetAddress class and its factory 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 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 | | | | |
| 2 | | | | |

## 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):

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

## 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)**

## 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)**

.....

.....

.....

.....

## 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 | 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. ……..
2. ……..
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 member 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 | | | | |
| 2 | | | | |

**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):

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

## 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)

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

.....

.....

**XIII. Exercise**

1. Write a program using URL class to retrieve the host, protocol, port and file of URL http://www.msbte.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)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

## 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. ……..
2. ……..
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 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 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 (Additional)

| Sr. No. | Name of Resource | Broad Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | | |

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

1. 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)**

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

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**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, Sever will send the response the number is prime or not)

**(Space for Answer)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

## 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
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. ……..
2. ……..
3. ……..

| 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 | | | | |

**X. Program Code: Teacher must assign a separate program statement to group of 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):

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

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

(Space for answer)

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

.....

.....

**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)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

## 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)** | | **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** | | **100%** |

***List of Students /Team Members***

1. ……..
2. ……..
3. ……..

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

# 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 | | |
| 2 | My-Sql Server | My-Sql Sever above 5.5 | | |

**X. 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 \t Name");
        while(rs.next())
        {
                text= text+rs.getInt(1)+"\t"+rs.getString(2)+"\n";
        }
        System.out.print(text);
        St.close();
        cn.close();
        }
        catch (SQLExccpt.ion s)
                {System.out.println("sql error");}
}
```

**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)

.....
.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**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)**

.....

.....

.....

.....

## 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. ……..
2. ……..
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 Outcome(s)**

Develop programs using JDBC

**V. Practical Outcome (PrOs)**

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**

**Prepared Statement 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 it’s 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 paramIndex, int value):-sets the integer value to the given parameter index.
2. public void setString(int paramIndex, String value) :-sets the String value to the given parameter index.
3. public void setFloat(int paramIndex, float value):- sets the float value to the given parameter index.
4. public void setDouble(int paramIndex, 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 | | |
| 2 | JDK | 1.6 | | |

**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 5.5 a 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:33
                        06/YourDBname","DBuserna  me","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);}
            }
    }
```

**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. 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)

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

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**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)**

.....

.....

## 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. JDBC Developer's Resource by Art Taylor JDBC Developer's Resource by Art Taylor

## 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. ……..
2. ……..
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 in 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 | | |
| 2 | | | | |

**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)

.....

.....

.....

**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)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

## 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. ……..
2. ……..
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/servlets/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. | | |
| 2 | | | | |

**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</td>
			<td><input type=textbox name="e" size="25" value=""></td>
			</tr>
			<tr>
			<td><B>Phone</td>
			<td><input type=textbox name="p" size="25" value=""></td>
			</tr>
		</table>
		<input type=submit value="Submit">
	</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)

## 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)

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

.....

.....

.....

.....

.....

.....

.....

**XIII. Exercise**

1. Develop servlet program to print Hello MSBTE in browser window.
2. Develop a program to receive the parameter through HTML forms and send back received parameter to browser.

**(Space for Answer)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

## 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. ……..
2. ……..
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 i.e HttpServlet class because all web servers are designed based on the protocol http.

## 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 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.

**HTTP servlets extend javax.servlet.HttpServlet** - HTTPServlet is HTTP dependent servlet. The HTTP protocol is a set of rules that allows Web browsers and servers to communicate. When Web browsers and servers support the HTTP protocol, Java-based web applications are dependent on HTTP Servlets. HttpServlet is Extended by Generic Servlet. It provides an abstract class for the developers for extend to create their own HTTP specific servlets.

**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. | | |
| 2 | | | | |

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

1. Write a Program to send the username to server and server will send the length of username to client.
2. Write the output of following code cosidering below HTML is front end and servlet as back end

**loginpage.html**

```
<html>
    <body>
            <form action="
            http://localhost:8080/examples/servlets/servlet/AthonticationServlet”
            method=”POST”>
            User Name:<input type="text" name="username"><br>
            Password:<input type="password" name="password" ><br>
            <input type="submit">
    </form>
    </body>
</html>
```

//AthonticationServlet.java

```
import java.io.IOException;
import java.io.PrintWriter;
import javax.servlet.ServletException;
import javax.servlet.http.HttpServlet;
import javax.servlet.http.HttpServletRequest;
```

```
import javax.servlet.http.HttpServletResponse;

public class AthonticationServlet 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 Successfull");
                }
                else
                {
                        out.println("Login Unsuccessfull");
                }
        }
}
```

(Space for Answer)

## 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 there 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)

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

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**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...

**(Space for Answer)**

.....

.....

.....

.....

.....

.....

## 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. ……..
2. ……..
3. ……..

| 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:**

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:

1. bind objects
2. 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 (PrOs)**

Write a Servlet program to Create Session using HttpSession 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 Http Servlet 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

**Commonly used methods of HttpSession interface**

1. **public String getId():**Returns a string containing the unique identifier value.
2. **public long getCreationTime():**Returns the time when this session was created, measured in milliseconds since midnight January 1, 1970 GMT.
3. **public long getLastAccessedTime():**Returns the last time the client sent a request associated with this session, as the number of milliseconds since midnight January 1, 1970 GMT.
4. **public void invalidate():**Invalidates this session then unbinds any objects bound to it.

**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. | | |
| 2 | | | | |

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

1. Write a Program to Session id and Session time in Browser Window.
2. Write the output of following code considering below HTML is front end and servlet as back end

```
<html>
	<body>
		<form action="
		http://localhost:8080/examples/servlet/SessionServlet">
			Name:<input type="text" name="userName"/><br/>
			<input type="submit" value="go"/>
		</form>
	</body>
</html>

//SessionServlet.java
import java.io.*;
import javax.servlet.*;
import javax.servlet.http.*;

public class SessionServlet extends HttpServlet
{
	public void doGet(HttpServletRequest request, HttpServletResponse response)
	{
		try
```

```
                {
                        response.setContentType("text/html");
                        PrintWriter out = response.getWriter();
                        String n=request.getParameter("userName");
                        out.print("Welcome "+n);
                        HttpSession session=request.getSession();
                        session.setAttribute("uname",n);
                        out.print("<a href='servlet2'>visit</a>");
                        out.close();
                }
                catch (Exception e) {System.out.println(e);}
        }
}
```

**(Space for Answer)**

## 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. 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)

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

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**XIII. 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

**(Space for Answer)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

## 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. ……..
2. ……..
3. ……..

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

# 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 Outcome(s)**

Develop programs using Servlet

**V. Practical Outcome (PrOs)**

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.

Hidden Form Fields
A web server can send a hidden HTML form field along with a unique session ID as follows −
<input type = "hidden" name = "sessionid" value = "12345">

URL Rewriting
You can append some extra data on the end of each URL that identifies the session, and the server can associate that session identifier with data it has stored about that session.

The HttpSession Object
Apart from the above mentioned three ways, servlet provides HttpSession Interface which provides a way to identify a user across more than one page request or visit to a Web site and to store information about that user.

**Types of Cookie**
There are 2 types of cookies in servlets.
1. Non-persistent cookie
2. Persistent cookie

**Non-persistent cookie**
It is **valid for single session** only. It is removed each time when user closes the browser.

**Persistent cookie**
It is **valid for multiple session**. It is not removed each time when user closes the browser. It is removed only if user logout or sign-out.

**javax.servlet.http.Cookie** class provides the functionality of using cookies. It provides a lot of useful methods for cookies.

**Other methods required for using Cookies**
For adding cookie or getting the value from the cookie, we need some methods provided by other interfaces. They are:
1. **public void addCookie(Cookie ck):**method of HttpServletResponse interface is used to add cookie in response object.
2. **public Cookie[] getCookies():**method of HttpServletRequest interface is used to return all the cookies from the browser.

## 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. | | |

| | | | | |
|---|---|---|---|---|
| 2 | | | | |
| 3 | | | | |

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

1. Write a Program to Create Cookie.
2. Write the output of following servlet code

**index.html**

```
<form action=" http://localhost:8080/examples/servlet /servlet1" method="post">
        Name:<input type="text" name="userName"/><br/>
        <input type="submit" value="go"/>
</form>
```

```
//FirstServlet.java
import java.io.*;
import javax.servlet.*;
import javax.servlet.http.*;

public class FirstServlet extends HttpServlet
{
        public void doPost(HttpServletRequest request, HttpServletResponse response)
        {
                try
                {
                        response.setContentType("text/html");
                        PrintWriter out = response.getWriter();
                        String n=request.getParameter("userName");
                        out.print("Welcome "+n);
                        Cookie ck=new Cookie("uname",n);//creating cookie object
                        response.addCookie(ck);//adding cookie in the response
                        //creating submit button
                        out.print("<form action='servlet2'>");
                        out.print("<input type='submit' value='go'>");
                        out.print("</form>");
                        out.close();
                }
        catch(Exception e){System.out.println(e);}
        }
}

// SecondServlet.java
import java.io.*;
import javax.servlet.*;
import javax.servlet.http.*;

public class SecondServlet extends HttpServlet
```

```
{
        public void doPost(HttpServletRequest request, HttpServletResponse response)
        {
                try
                {
                        response.setContentType("text/html");
                        PrintWriter out = response.getWriter();
                        Cookie ck[]=request.getCookies();
                        out.print("Hello "+ck[0].getValue());
                        out.close();
                }
        catch(Exception e){System.out.println(e);}
        }
}
```

**(Space for Answer)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

## 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)

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

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**XIII. Exercise**

1. Develop a program to collect user information using cookie.
2. Develop program to get the browser Information.

**(Space for Answer)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

## 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. ……..
2. ……..
3. ……..

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

# List Of Laboratory Manuals Developed by MSBTE

**First Semester:**

| | | |
|---|---|---|
| 1 | Fundamentals of ICT | 22001 |
| 2 | English | 22101 |
| 3 | English Work Book | 22101 |
| 4 | Basic Science (Chemistry) | 22102 |
| 5 | Basic Science (Physics) | 22102 |

**Second Semester:**

| | | |
|---|---|---|
| 1 | Bussiness Communication Using Computers | 22009 |
| 2 | Computer Peripherals & Hardware Maintenace | 22013 |
| 3 | Web Page Design with HTML | 22014 |
| 4 | Applied Science (Chemistry) | 22202 |
| 5 | Applied Science (Physics) | 22202 |
| 6 | Applied Machines | 22203 |
| 7 | Basic Surveying | 22205 |
| 8 | Applied Science (Chemistry) | 22211 |
| 9 | Applied Science (Physics) | 22211 |
| 10 | Fundamental of Electrical Engineering | 22212 |
| 11 | Elements of Electronics | 22213 |
| 12 | Elements of Electrical Engineering | 22215 |
| 13 | Basic Electronics | 22216 |
| 14 | 'C' programming Language | 22218 |
| 15 | Basic Electronics | 22225 |
| 16 | Programming in "C" | 22226 |
| 17 | Fundamentals of Chemical Engineering | 22231 |

**Third Semester:**

| | | |
|---|---|---|
| 1 | Applied Multimedia Techniques | 22024 |
| 2 | Advanced Serveying | 22301 |
| 3 | Highway Engineering | 22302 |
| 4 | Mechanics of Structures | 22303 |
| 5 | Building Construction | 22304 |
| 6 | Concrete Technology | 22305 |
| 7 | Strength Of Materials | 22306 |
| 8 | Automobile Engines | 22308 |
| 9 | Automobile Transmission System | 22309 |
| 10 | Mechanical Operations | 22313 |
| 11 | Technology Of Inorganic Chemicals | 22314 |
| 12 | Object Oriented Programming Using C++ | 22316 |
| 13 | Data Structure Using 'C' | 22317 |
| 14 | Computer Graphics | 22318 |
| 15 | Database Management System | 22319 |
| 16 | Digital Techniques | 22320 |
| 17 | Principles Of Database | 22321 |
| 18 | Digital Techniques & Microprocessor | 22323 |
| 19 | Electrical Circuits | 22324 |
| 20 | Electrical & Electronic Measurment | 22325 |
| 21 | Fundamental Of Power Electronics | 22326 |
| 22 | Electrical Materials & Wiring Practice | 22328 |
| 23 | Applied Electronics | 22329 |
| 24 | Electrical Circuits & Networks | 22330 |
| 25 | Electronic Measurments & Instrumentation | 22333 |
| 26 | Principles Of Electronics Communication | 22334 |
| 27 | Thermal Engineering | 22337 |
| 28 | Engineering Matrology | 22342 |
| 29 | Mechanical Engineering Materials | 22343 |
| 30 | Theory Of Machines | 22344 |

**Fourth Semester:**

| | | |
|---|---|---|
| 1 | Hydraulics | 22401 |
| 2 | Geo Technical Engineering | 22404 |
| 3 | Chemical Process Instrumentation & Control | 22407 |
| 4 | Fluid Flow Operation | 22409 |
| 5 | Technology Of Organic Chemicals | 22410 |
| 6 | Java Programming | 22412 |
| 7 | GUI Application Development Using VB.net | 22034 |
| 8 | Microprocessor | 22415 |
| 9 | Database Managment | 22416 |
| 10 | Electric Motors And Transformers | 22418 |
| 11 | Industrial Measurements | 22420 |
| 12 | Digital Electronics And Microcontroller Applications | 22421 |
| 13 | Linear Integrated Circuits | 22423 |
| 14 | Microcontroller & Applications | 22426 |
| 15 | Basic Power Electronics | 22427 |
| 16 | Digital Communication Systems | 22428 |
| 17 | Mechanical Engineering Measurments | 22443 |
| 18 | Fluid Mechanics and Machinery | 22445 |
| 19 | Fundamentals Of Mechatronics | 22048 |

**Fifth Semester:**

| | | |
|---|---|---|
| 1 | Design of Steel and RCC Structures | 22502 |
| 2 | Public Health Engineering | 22504 |
| 3 | Heat Transfer Operation | 22510 |
| 4 | Environmental Technology | 22511 |
| 5 | Operating Systems | 22516 |
| 6 | Advanced Java Programming | 22517 |
| 7 | Software Testing | 22518 |
| 8 | Control Systems and PLC's | 22531 |
| 9 | Embedded Systems | 22532 |
| 10 | Mobile and Wireless Communication | 22533 |
| 11 | Industrial Machines | 22523 |
| 12 | Switchgear and Protection | 22524 |
| 13 | Energy Conservation and Audit | 22525 |
| 14 | Power Engineering and Refrigeration | 22562 |
| 15 | Solid Modeling and Additive Manufacturing | 22053 |
| 16 | Guidelines & Assessment Manual for Micro Projects & Industrial Training | 22057 |

**Sixth Semester:**

| | | |
|---|---|---|
| 1 | Solid Modeling | 17063 |
| 2 | Highway Engineering | 17602 |
| 3 | Contracts & Accounts | 17603 |
| 4 | Design of R.C.C. Structures | 17604 |
| 5 | Industrial Fluid Power | 17608 |
| 6 | Design of Machine Elements | 17610 |
| 7 | Automotive Electrical and Electronic Systems | 17617 |
| 8 | Vehicle Systems Maintenance | 17618 |
| 9 | Software Testing | 17624 |
| 10 | Advanced Java Programming | 17625 |
| 11 | Mobile Computing | 17632 |
| 12 | System Programing | 17634 |
| 13 | Testing & Maintenance of Electrical Equipments | 17637 |
| 14 | Power Electronics | 17638 |
| 15 | Illumination Engineering | 17639 |
| 16 | Power System Operation & Control | 17643 |
| 17 | Environmental Technology | 17646 |
| 18 | Mass Transfer Operation | 17648 |
| 19 | Advanced Communication System | 17656 |
| 20 | Mobile Communication | 17657 |
| 21 | Embedded System | 17658 |
| 22 | Process Control System | 17663 |
| 23 | Industrial Automation | 17664 |
| 24 | Industrial Drives | 17667 |
| 25 | Video Engineering | 17668 |
| 26 | Optical Fiber & Mobile Communication | 17669 |
| 27 | Therapeutic Equipment | 17671 |
| 28 | Intensive Care Equipment | 17672 |
| 29 | Medical Imaging Equipment | 17673 |

## Pharmacy Lab Manual

**First Year:**

| | | |
|---|---|---|
| 1 | Pharmaceutics - I | 0805 |
| 2 | Pharmaceutical Chemistry - I | 0806 |
| 3 | Pharmacognosy | 0807 |
| 4 | Biochemistry and Clinical Pathology | 0808 |
| 5 | Human Anatomy and Physiology | 0809 |

**Second Year:**

| | | |
|---|---|---|
| 1 | Pharmaceutics - II | 0811 |
| 2 | Pharmaceutical Chemistry - II | 0812 |
| 3 | Pharmacology & Toxicology | 0813 |
| 4 | Hospital and Clinical Pharmacy | 0816 |

# HEAD OFFICE

Secretary,
Maharashtra State Board of Technical Education
49, Kherwadi, Bandra (East), Mumbai - 400 051
Maharashtra (INDIA)
Tel: (022)26471255 (5 -lines)
Fax: 022 - 26473980
Email: -secretary@msbte.com
**Web -www.msbte.org.in**

## REGIONAL OFFICES:

**MUMBAI**

Deputy Secretary (T),
Mumbai Sub-region,
2nd Floor, Govt. Polytechnic Building,
49, Kherwadi, Bandra (East)
Mumbai - 400 051
Phone: 022-26473253 / 54
Fax: 022-26478795
Email: rbtemumbai@msbte.com

**PUNE**

Deputy Secretary (T),
M.S. Board of Technical Education,
Regional Office,
412-E, Bahirat Patil Chowk,
Shivaji Nagar, Pune
Phone: 020-25656994 / 25660319
Fax: 020-25656994
Email: rbtepn@msbte.com

**NAGPUR**

Deputy Secretary (T),
M.S. Board of Technical Education
Regional Office,
Mangalwari Bazar, Sadar, Nagpur - 440 001
Phone: 0712-2564836 / 2562223
Fax: 0712-2560350
Email: rbteng@msbte.com

**AURANGABAD**

Deputy Secretary (T),
M.S. Board of Technical Education,
Regional Office,
Osmanpura, Aurangabad -431 001.
Phone: 0240-2334025 / 2331273
Fax: 0240-2349669
Email: rbteau@msbte.com