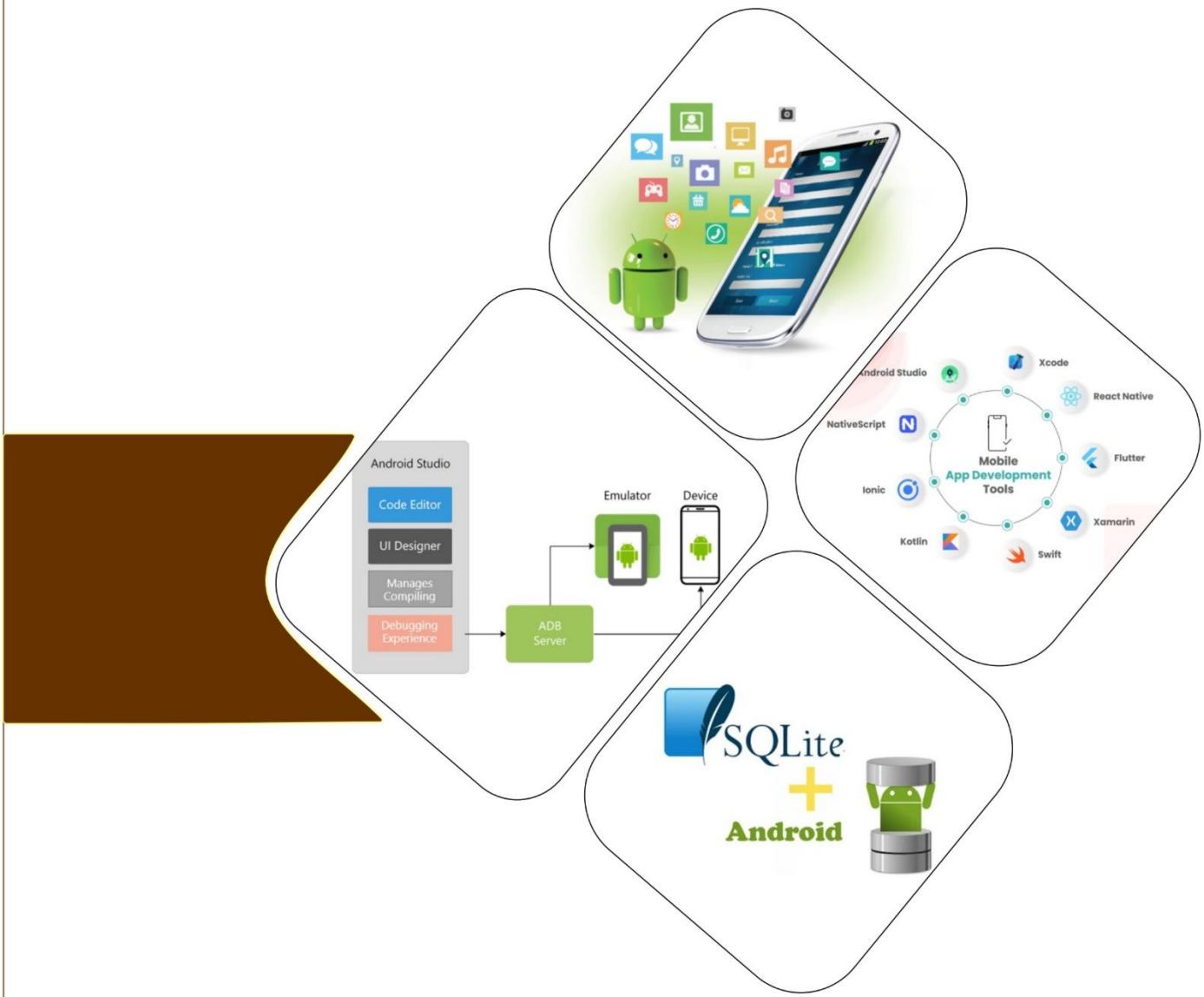
SCHEME :K

Name :_____
Roll No.:_____ Year : 20 ___ 20 __
Exam Seat No. :_____

# LABORATORY MANUAL FOR

# MOBILE APPLICATION DEVELOPEMENT (316006)




## COMPUTER ENGINEERING GROUP


MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI
(Autonomous)(ISO21001:2018)(ISO/IEC27001:2013)

## 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 challenging technological & 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 following:**

- Skill development in line with industry requirements.
- Industry readiness and improved employability of Diploma holders.
- Synergistic relationship with industry.
- Collective and Cooperative development of all stake holders.
- Technological interventions in societal development.
- Access to uniform quality technical education.

**A Laboratory Manual**
**for**

# Mobile Application Development (316006)

## Semester– (VI)

**"K-SCHEME"**

## (AI/ AN/ BD/ CM/ CO/ CW/ DS/ HA/ IF/ IH/ SE)



## Maharashtra State

## Board of Technical Education, Mumbai

**(Autonomous) (ISO-21001-2018) (ISO/IEC 27001:2013)**


Maharashtra State

Board of Technical Education, Mumbai

(Autonomous) (ISO-21001-2018) (ISO/IEC 27001:2013)

4th Floor, Government Polytechnic Building, 49, Kherwadi,

Bandra (East), Mumbai -400051.

(Printed on : _____)

# Maharashtra State
# Board of Technical Education

## Certificate

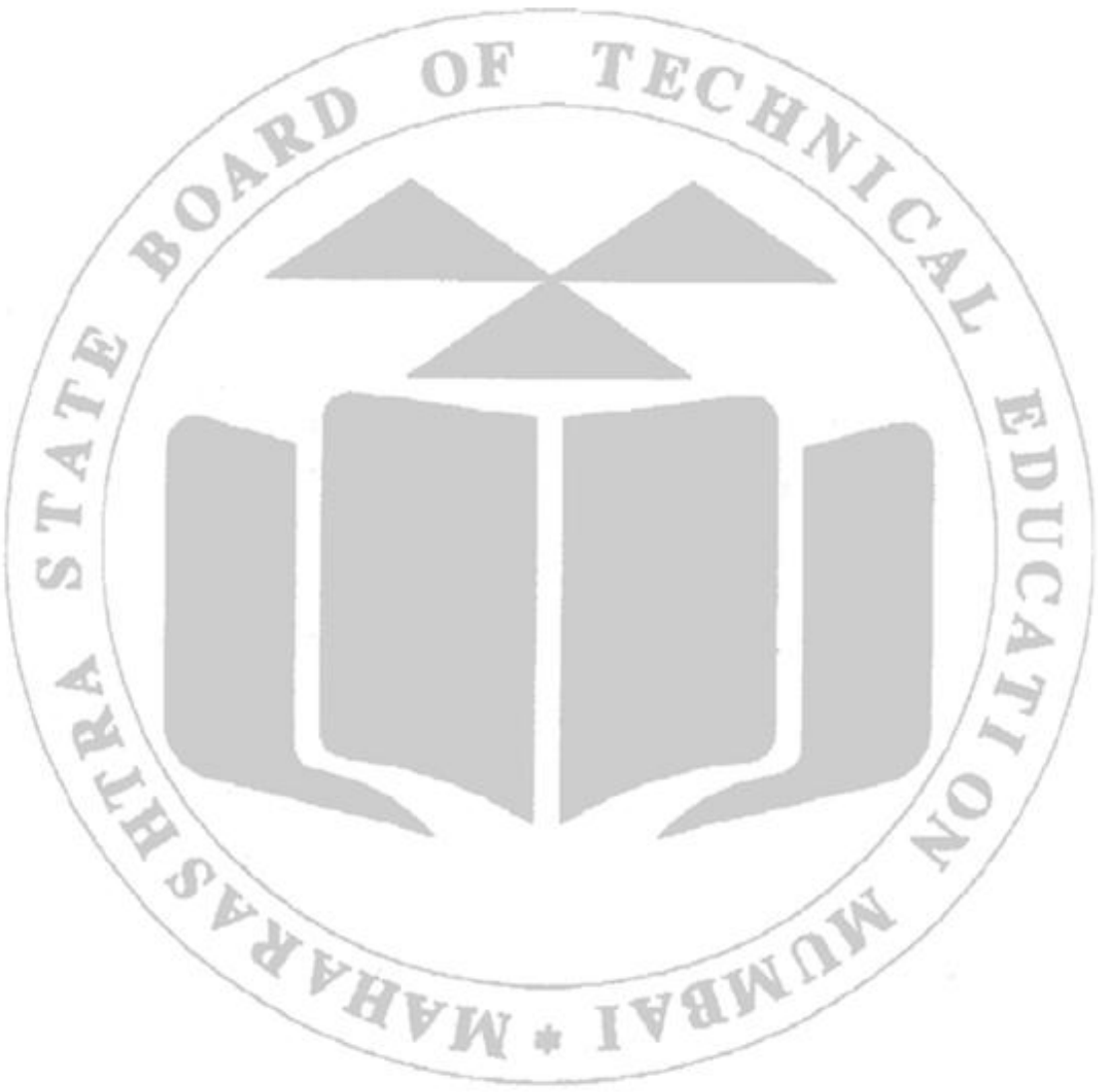
This is to certify that Mr. / Ms …….
Roll No……. of Sixth Semester of Diploma in ……. of the institute ……
(Inst. Code……...) has completed the term work satisfactorily in course **Mobile Application Development (316006)** for the academic year 20…….to 20…..... as prescribed in the curriculum.

Place ……. Enrollment No……

Date:…..... Exam Seat No. ……..

**Course Teacher** **Head of the Department** **Principal**

Seal of the Institute


MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION MUMBAI

# Preface

The objective of all engineering laboratories or field experience in the technical education system is to help students acquire the critical competencies and skills that businesses demand. In light of this, MSBTE developed the cutting-edge "K" Scheme curricula for engineering diploma programs, emphasizing outcome-based learning and the National Education Policy 2020 (NEP2020). As a result, a sizable portion of the program is dedicated to practical work. This demonstrates how crucial laboratory work is in helping teachers, instructors, and students understand that every minute of lab time must be used efficiently to create these outcomes rather than being spent on pointless tasks. Consequently, each practical has been created to operate as a "vehicle" to advance this industry in order to ensure the successful implementation of this outcome-based curriculum. It is challenging to teach practical skills using only the "chalk and duster" activity. Because of this, the "K" scheme laboratory manual creation team focused on the outcomes when designing the practical rather than following the long-standing custom of doing the practical to "verify the theory" (which may turn out to be a by-product along the way).

This lab manual is intended to support all parties involved, particularly the students, instructors, and teachers, in helping the students achieve the pre-established objectives. It is required of every student to read through the relevant practical process in its entirety and comprehend the bare minimum of theoretical background related to the practical at least one day in advance of the practical. As a crucial starting point for carrying out the practical, each exercise in this manual starts with establishing the competency, industry-relevant skills, course outcomes, and practical outcomes. The skills, the students will acquire from the process outlined there, together with the necessary safety measures to be followed, will subsequently be made clear to them. These will enable them to apply the knowledge and abilities to solve real-world problems in their professional lives.

Mobile Application Development using Android is designed to provide learners with a strong foundation in building modern, user-friendly, and efficient mobile applications. With Android being the most widely used mobile operating system, understanding its architecture, components, and development tools has become essential for students and professionals in the field of technology. This text introduces key concepts such as activities, layouts, intents, data storage, and API integration, while emphasizing hands-on practice through real-world examples and projects.

This practical exercise guides students in leveraging cloud resources to build, train, and deploy machine learning models. It provides hands-on experience with real-world data, ensuring a deep understanding of both theoretical concepts and practical implementation in a modern cloud-based environment.

The team responsible for developing the Practical manual would like to express its gratitude to MSBTE for taking the lead in developing and implementing the curriculum. Additionally, the team recognizes the valuable contributions made by individual course experts who have been directly or indirectly involved in the development of the "K" scheme curriculum and the laboratory manual. It is impossible to claim perfection in this laboratory manual, even though every effort has been made to verify it for errors, especially because this is the first edition. Any such mistakes and recommendations for enhancements are quite appreciated and can be brought to our attention.

**Lab Manual Development Team**

## Program Outcomes (POs) to be achieved through Practical of this Course

Following POs are expected to be achieved through the practicals of the **Mobile Application Development** course.

**PO1. Basic and Discipline specific knowledge**: Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.

**PO 2. Problem analysis:** Identify and analyze well-defined engineering problems using codified standard methods.

**PO 3. Design/ development of solutions**: Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.

**PO 4. Engineering Tools, Experimentation and Testing**: Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

**PO 5. Engineering practices for society, sustainability and environment**: Apply appropriate technology in context of society, sustainability, environment and ethical practices.

**PO 6. Project Management**: Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities in diverse and multidisciplinary fields.

**PO 7. Life-long learning**: Ability to analyze individual needs and engage in updating in the context of technological changes.

## List of Industry Relevant Skills:

The following industry relevant skills of the competency 'Mobile Application Development' are expected to be developed in you by undertaking the practical of this laboratory manual.

- **Android Platform Proficiency**
- **UI Design for Mobile Applications**
- **Application Architecture & Component Handling**
- **Data Storage & Database Integration**
- **API Consumption & Backend Connectivity**
- **App Security & Permissions Management**
- **App Deployment**

## Practical- Course Outcome (CO) matrix

CO1 - Interpret the features of android operating system.
CO2 - Use after configuring Android development environment.
CO3 - Develop android applications using UI components and layouts.
CO4 - Create database driven Android applications.
CO5 - Develop advanced Android applications that requires relevant permissions for security.

| Sr. No. | Title of the Practical | CO 1. | CO 2. | CO 3. | CO 4. | CO 5. |
|---|---|---|---|---|---|---|
| 1 | *Install Android IDE and create Android virtual device | √ | - | - | - | - |
| 2 | Develop a program to display "Hello World" on screen | - | √ | - | - | - |
| 3 | *Explore the directory structure in Android IDE | - | √ | - | - | - |
| 4 | * Develop android application using View Text and Edit Text. | - | - | √ | - | - |
| 5 | *Develop a program to implement Button, Image Button and Toggle Button | - | - | √ | - | - |
| 6 | *Develop a program to design Checkbox and Radiobutton. | - | - | √ | - | - |
| 7 | Develop a program to implement Progress Bar | - | - | √ | - | - |
| 8 | *Develop a program to create a login form using the above UI controls | - | - | √ | - | - |
| 9 | * Write program to implement Linear layout and Constraint layout to create any registration form with Custom Toast Alert | - | - | √ | - | - |
| 10 | Develop a program to implement Frame layout, Table layout and Relative layout for any e-commerce application | - | - | √ | - | - |
| 11 | *Develop a program to implement Grid View, Image View, Scroll View, List View for any management system like library management/hotel management | - | - | √ | - | - |
| 12 | Develop a simple calculator which uses grid layout and GUI concepts | - | - | √ | - | - |
| 13 | * Develop a splash screen in android | - | - | √ | - | - |
| 14 | *Design and develop any convertor application like temperature convertor /currency convertor/ volume convertor | - | - | √ | - | - |

| Sr. No. | Title of the Practical | CO 1. | CO 2. | CO 3. | CO 4. | CO 5. |
|---|---|---|---|---|---|---|
| 15 | Design and develop a simple countdown timer | - | - | √ | - | - |
| 16 | *Develop a program to implement Date Picker in application | - | - | √ | - | - |
| 17 | Develop a program to implement Time Picker in application | - | - | √ | - | - |
| 18 | Develop a program to create two simple activities for Login application | - | - | √ | - | - |
| 19 | *Develop a program to implement new Activity using explicit intent and implicit intent to open any other website | - | - | - | √ | - |
| 20 | *Develop a program to implement services like bluetooth/wifi | - | - | - | √ | - |
| 21 | *Develop a program to implement a broadcast receiver to switch between different modes like Airplane mode/Silent Mode/Loud Mode | - | - | - | √ | - |
| 22 | *Develop a registration application to insert and retrieve the data from the database | - | - | - | √ | - |
| 23 | Develop an authentication application which uses database concepts | - | - | - | √ | - |
| 24 | Develop a MyContacts application which uses database concepts | - | - | - | √ | - |
| 25 | Develop a program to use camera | - | - | - | - | √ |
| 26 | * Write a program for SMS application | - | - | - | - | √ |
| 27 | *Develop a program to send and receive email | - | - | - | - | √ |
| 28 | Write a program that uses location services and checks for permissions | - | - | - | - | √ |
| 29 | *Write a program that creates Navigation drawer using fragment concepts | - | - | - | - | √ |
| 30 | Write a program to create a simple flashlight app and check for permissions | - | - | - | - | √ |

## Guidelines to Teachers

1. There will be two sheets of blank pages after every practical for the student to report other matters (if any), which is not mentioned in the printed practical.
2. For difficult practical if required, teacher could provide the demonstration of the practical emphasizing of the skills which the student should achieve.
3. Teachers should give opportunity to students for hands-on after the demonstration.
4. Assess the skill achievement of the students and COs of each unit.
5. One or two questions ought to be added in each practical for different batches. For this teacher can maintain various practical related question banks for each course.
6. For effective implementation and attainment of practical outcomes, teacher ought to ensure that in the beginning itself of each practical, students must read through the complete write-up of that practical sheet.
7. During practical, ensure that each student gets chance and takes active part in taking observations/ readings and performing practical.
8. Teacher ought to assess the performance of students continuously according to the MSBTE guidelines.

## Instructions for Students

1. For incidental writing on the day of each practical session every student should maintain a dated log book for the whole semester, apart from this laboratory manual which s/he has to submit for assessment to the teacher in the next practical session.
2. For effective implementation and attainment of practical outcomes, in the beginning itself of each practical, students need to read through the complete write-up including the practical related questions and assessment scheme of that practical sheet.
3. Student ought to refer the reference book, lab manuals etc. Student should not hesitate to ask any difficulties they face during the conduct of practicals.

# Content Page

List of Practical and Progressive Assessment Sheet

| S. No | Laboratory Practical Titles | Page No. | Date of performance | Date of submission | FA PR marks (25) | Dated sign. of teacher | Remarks (if any) |
|---|---|---|---|---|---|---|---|
| 17 | Develop a program to implement Time Picker in application | 64 | | | | | |
| 18 | Develop a program to create two simple activities for Login application | 68 | | | | | |
| 19 | *Develop a program to implement new Activity using explicit intent and implicit intent to open any other website | 72 | | | | | |
| 20 | *Develop a program to implement services like bluetooth/wifi | 76 | | | | | |
| 21 | *Develop a program to implement a broadcast receiver to switch between different modes like Airplane mode/Silent Mode/Loud Mode | 80 | | | | | |
| 22 | *Develop a registration application to insert and retrieve the data from the database | 85 | | | | | |
| 23 | Develop an authentication application which uses database concepts | 90 | | | | | |
| 24 | Develop a MyContacts application which uses database concepts | 95 | | | | | |
| 25 | Develop a program to use camera | 99 | | | | | |
| 26 | * Write a program for SMS application | 103 | | | | | |
| 27 | *Develop a program to send and receive email | 107 | | | | | |
| 28 | Write a program that uses location services and checks for permissions | 111 | | | | | |
| 29 | *Write a program that creates Navigation drawer using fragment concepts | 115 | | | | | |
| 30 | Write a program to create a simple flashlight app and check for permissions | 119 | | | | | |
| **Total** | | | | | | | |

***Note: To be transferred to Proforma of CIAAN-2023.***

**Note: Out of above suggestive LLOs -**

- '*' Marked Practical's (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes

# Practical No. 1: *Install Android IDE and create Android virtual device.

## I Practical Significance

This practical introduces students to the Android development environment by installing Android Studio IDE and setting up an Android Virtual Device (AVD) for app testing. It helps learners understand how to configure and use emulators to simulate real Android devices without needing physical hardware.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:
Set up and configure Android Studio IDE and SDK tools.

## III Course Level Learning outcome(s)

CO1 - Interpret the features of android operating system.

## IV Laboratory Learning outcome(s)

LLO 1.1 Install any Android IDE.

## V Relevant Affective Domain Related Outcomes

Demonstrates the Role of Android IDE in Mobile Application Development.

## VI Relevant Theoretical Background

- Android Operating System: Based on the Linux kernel, designed primarily for touchscreen mobile devices.
- Android Studio IDE: The official Integrated Development Environment for Android development, built on IntelliJ IDEA.
    - Includes tools for coding (Java, Kotlin), layout design, and debugging.
- Android SDK (Software Development Kit): Provides libraries and APIs required to build Android apps.
- Android Virtual Device (AVD):
    - An emulator configuration that simulates hardware and software features of a physical Android device.
    - Used for testing and debugging applications across different Android versions and device types.
- **Procedure / Steps for Installation of Android IDE**

1.Download Android Studio:
- Visit the official Android Studio website: https://developer.android.com/studio
- Choose the version suitable for your operating system (Windows, macOS, or Linux).

2.Run the Installer:
- Open the downloaded setup file (.exe for Windows).
- Follow the installation wizard instructions.

3.Select Components:
- Choose to install Android Studio, Android SDK, and Android Virtual Device (AVD) when prompted.

4.Choose Installation Location:
- Specify the folder where Android Studio and SDK components will be installed.

5.Complete Installation:
- Click Finish once the setup process completes.
- Android Studio will launch automatically after installation.

6.Set Up Android SDK:
- On first launch, Android Studio will download and install the necessary SDK components and system images.

7.Configure Android Virtual Device (AVD):
- Go to Tools → Device Manager → Create Device.
- Select a device model (e.g., Pixel 5) and a system image (e.g., Android 13).
- Click Finish to create the virtual device.

8.Verify Installation:
- Open a sample project and run it on the created AVD to ensure everything is working properly.

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Download and install Android Studio on your system.
2. Configure the Android SDK during installation.
3. Creating Android Virtual Device (AVD)
   i)Open **AVD Manager** and create a new virtual device with a chosen Android version.
   ii) Run the emulator and verify it is functioning properly.
   iii)Change the device orientation in the emulator and note the effect on the screen.
4. Running Sample Projects
   i) Create a new Android project in Android Studio.
   ii)Run the sample project on your AVD and note the output.
   iii)Modify the Hello World text in the project and re-run it on the emulator.

**(Space for Answer)**

……

……

……

……

……

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.udemy.com/topic/android-development

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 2: Develop a Program to display "Hello World" on screen.

## I Practical Significance

This practical introduces students to the mobile development environment and basic UI rendering. It helps students to understand how to create a project, write minimal code, and run an app on a mobile device or emulator.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:
Familiarity with platform-specific syntax Java for Android.

## III Course Level Learning outcome(s)

CO2 - Use after configuring Android development environment.

## IV Laboratory Learning outcome(s)

LLO 2.1 Use IDE to write and execute Java program for Android application.

## V Relevant Affective Domain Related Outcomes

Demonstrates the Role of Android IDE in Mobile Application Development.

## VI Relevant Theoretical Background

In Android development using Java, every application is composed of components defined in Java classes and XML layouts. The simplest app—**"Hello World"**—demonstrates how to:

- Set up an Android project
- Define a user interface using XML
- Use Java to control the app's behavior

**Key Concepts**

- **Activity**: The entry point for user interaction. In Java, it's a class that extends AppCompatActivity.
- **onCreate() Method**: Called when the activity is first created. It sets up the UI and initializes components.
- **setContentView()**: Links the Java code to the XML layout file.
- **TextView**: A UI widget used to display text on the screen.
- The MainActivity.java file defines the behavior of the app.
- The activity_main.xml file defines the layout and UI elements.
- When the app runs, onCreate() is triggered, and setContentView() loads the layout.
- The TextView displays "Hello World" on the screen.

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Write a Program to display "Welcome in Mobile Application Development World" on screen.
2. Write a Program to display "I am interested to develop different Mobile Applications" on screen.

**(Space for Answer)**

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://developer.android.com/get-started/overview

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| | Performance Indicators | Weightage |
|---|---|---|
| | **Process related (15 Marks)** | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| | **Product related (10 Marks)** | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 3: *Explore the directory structure in Android IDE

## I Practical Significance

This practical helps the students to understand the internal organization of Android projects also builds foundational knowledge for navigating, modifying, and debugging mobile apps.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:
Builds confidence in using professional development tools like Android Studio.

## III Course Level Learning outcome(s)

CO2 - Use after configuring Android development environment.

## IV Laboratory Learning outcome(s)

LLO 3.1 Change the attributes in the directory structure.

## V Relevant Affective Domain Related Outcomes

Demonstrates the Role of Android IDE in Mobile Application Development.

## VI Relevant Theoretical Background

- **Android Project Architecture**: Understanding of src, res, manifests, and Gradle scripts.
- **Resource Management**: Use of drawable, layout, values, and mipmap folders.
- **Build System**: Role of Gradle in compiling and packaging Android apps.
- **Manifest File**: Central configuration file for app components and permissions.

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Identify Key Folders.

2. Locate and Modify Layout.
3. Explore AndroidManifest.xml.
4. Understand Gradle Files- Open both build.gradle files (Project and Module level):
    - Identify where dependencies are declared.
    - Add a comment explaining the difference between the two files.
5. Create a new activity named Activity.java

**(Space for Answer)**

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.tutorialspoint.com/android/android_studio.htm
2. https://www.geeksforgeeks.org/android/android-studio-tutorial/

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 4: * Develop android application using View Text and Edit Text.

## I Practical Significance

This practical introduces basic UI components in Android: TextView for displaying text and EditText for user input.It helps students to understand layout design and interaction between UI elements and Java.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:
Familiarity with Android Studio and component linking.

## III Course Level Learning outcome(s)

CO3 - Develop android applications using UI components and layouts.

## IV Laboratory Learning outcome(s)

LLO 4.1 Develop a program to implement Auto complete Text View and Edit Text.

## V Relevant Affective Domain Related Outcomes

Demonstrates the Role of Android IDE in Mobile Application Development.

## VI Relevant Theoretical Background

- TextView: Used to display static or dynamic text.
- EditText: Used to accept user input.
- findViewById(): Links XML components to Java code.
- Event Handling: Responding to user actions like button clicks.

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Write code to display user input from EditText into TextView
2. Modify the app to show a greeting like “Hello, [user name]!” using input from EditText
3. Change the font size and color of the TextView using XML.

**(Space for Answer)**

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.tutorialspoint.com/android/android_studio.htm
2. https://www.geeksforgeeks.org/android/android-studio-tutorial/
3. https://developer.android.com/develop/ui/views/layout/declaring-layout

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| | Performance Indicators | Weightage |
|---|---|---|
| | **Process related (15 Marks)** | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| | **Product related (10 Marks)** | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 5: *Develop a program to implement Button, Image Button and Toggle Button

## I Practical Significance

This practical introduces interactive UI components in Android Also it helps students understand event handling and user interaction.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:
Ability to handle click events and toggle states in Android apps.

## III Course Level Learning outcome(s)

CO3 - Develop android applications using UI components and layouts.

## IV Laboratory Learning outcome(s)

LLO 5.1 Use different types of buttons in Android application.

## V Relevant Affective Domain Related Outcomes

Demonstrates the Role of Android IDE in Mobile Application Development.

## VI Relevant Theoretical Background

- Button: Standard clickable UI element.
- ImageButton: Button with an image instead of text.
- ToggleButton: Button with ON/OFF states.
- Event Handling: Using setOnClickListener() to respond to user actions.

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

***Note: Below given are few sample questions for reference. Teachers must design ` more such questions to ensure the achievement of identified CO.***

1. Write code to display a message when a button is clicked.
2. Create a layout with all three buttons: Button, ImageButton and ToggleButton.
3. Change TextView Based on Toggle.
4. ImageButton Interaction i)Add an ImageButton using an image from the drawable folder.ii)On click, display a Toast message: “Image Button Pressed”.

**(Space for Answer)**

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.tutorialspoint.com/android/android_studio.htm
2. https://www.geeksforgeeks.org/android/android-studio-tutorial/
3. https://developer.android.com/develop/ui/views/layout/declaring-layout

## XII Assessment Scheme

***regarding process and product related marks. Faculty must fill only the table at bottom.***

| | Performance Indicators | Weightage |
|---|---|---|
| | **Process related (15 Marks)** | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| | **Product related (10 Marks)** | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 6: *Develop a program to design Checkbox and Radiobutton.

## I Practical Significance

This practical enables students to understand and implement selection-based UI components.This Builds foundational skills in handling user input and decision making logic.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:
Ability to use CheckBox and RadioButton effectively in Android applications.

## III Course Level Learning outcome(s)

CO3 - Develop android applications using UI components and layouts.

## IV Laboratory Learning outcome(s)

LLO 6.1 Write a program to demonstrate the use of Checkbox and Radiobutton.

## V Relevant Affective Domain Related Outcomes

Inspires students to think from the user's perspective when designing forms, surveys, and preference screens.

## VI Relevant Theoretical Background

- CheckBox: Allows multiple selections; each box operates independently.
- RadioButton: Allows single selection within a group (RadioGroup).
- Event Handling: Using setOnClickListener() to respond to user actions.
- User Input Processing: Retrieving and displaying selected values.

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Write and Execute code to display selected hobbies using CheckBox.
2. Write and Execute code to count how many CheckBoxes are selected and display the count.
3. Write and Execute code to clear all CheckBox and RadioButton selections on button click.
4. Write code to change the text color of a RadioButton when selected.

**(Space for Answer)**

……

……

……

## XI References / Suggestions for further Reading

1. https://www.tutorialspoint.com/android/android_studio.htm
2. https://www.geeksforgeeks.org/android/android-studio-tutorial/
3. https://developer.android.com/guide/topics/ui/controls

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 7: Develop a program to implement Progress Bar

## I Practical Significance

This practical helps in displaying real-time task progress, enhances user engagement and app usability and demonstrates understanding of UI components and threading in Android.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:

Ability in integrating progress indicators in real-world apps (e.g., file transfer, loading screens).

## III Course Level Learning outcome(s)

CO3 - Develop android applications using UI components and layouts.

## IV Laboratory Learning outcome(s)

LLO 7.1 Implement progress Bar in android application.

## V Relevant Affective Domain Related Outcomes

Develops patience and attention to detail while managing UI states.

## VI Relevant Theoretical Background

- UI Components: Understanding ProgressBar widget and its attributes (style, max, progress, etc.).
- Threading: Basics of background processing using Handler, Thread, or AsyncTask.
- Event Handling: Updating UI from background threads safely.
- XML Layouts: Declaring and styling progress bars in activity_main.xml

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

**X Practical related Questions**

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

1. Design an Android app that displays a horizontal progress bar updating every second until it reaches 100%.
2. Implement a circular indeterminate progress bar that appears during data loading.
3. Create a file download simulation using a progress bar and Handler.
4. Modify the progress bar dynamically based on user input (e.g., slider or button click).
5. Use AsyncTask to perform a background task and update the progress bar accordingly.

**(Space for Answer)**

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.tutorialspoint.com/android/android_studio.htm
2. https://www.geeksforgeeks.org/android/android-studio-tutorial/
3. https://developer.android.com/reference/android/widget/ProgressBar

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 8: *Develop a program to create a login form using the above UI controls.

## I Practical Significance

This practical develops understanding of UI layout and input handling also design basic user authentication interfaces and reinforces understanding of input controls and event handling in Android.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:
Write efficient and secure input validation logic.

## III Course Level Learning outcome(s)

CO3 - Develop android applications using UI components and layouts.

## IV Laboratory Learning outcome(s)

LLO 8.1 Create a login form using various UI components.

## V Relevant Affective Domain Related Outcomes

Demonstrate problem-solving ability during input validation and debugging.

## VI Relevant Theoretical Background

UI Controls Used:

- EditText → For username and password input
- Button → For login action
- ProgressBar → For loading indication
- Toast → For displaying messages
- TextView → For labels and feedback

Concepts:

- Event-driven programming using OnClickListener
- Input validation (non-empty, matching credentials)
- Using Intent for navigation after successful login

- UI Controls: EditText, RadioButton, CheckBox, Button.
- Layout Management: Use of LinearLayout, ConstraintLayout for form design.
- Event Handling: setOnClickListener() for button actions.
- Input Validation: Checking empty fields, password length, etc.
- Gender Selection: Using RadioGroup to capture single-choice input.
- Preferences: Using CheckBox to simulate "Remember Me" functionality.

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Create a login form with username and password fields, and validate non-empty input.
2. Add gender selection using radio buttons and display the selected gender on login.
3. Implement a "Remember Me" checkbox and show a toast message based on its state.
4. Design a form that disables the login button until all fields are filled.
5. Modify the form to include a progress bar that appears during login processing.

**(Space for Answer)**

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.tutorialspoint.com/android/android_studio.htm
2. https://www.geeksforgeeks.org/android/android-studio-tutorial/
3. https://developer.android.com/guide/topics/ui/controls
4. https://developer.android.com/reference/android/widget/EditText

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| **Marks obtained** | | | **Dated Sign of Teacher** |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

## Practical No. 9: * Write program to implement Linear layout and Constraint layout to create any registration form with Custom Toast Alert.

**I Practical Significance**

This practical introduces reusable and styled user feedback using custom Toasts andorganize UI elements using LinearLayout and ConstraintLayout, collect user input, and display feedback using a custom Toast message.

**II Industry/Employer Expected outcome(s)**

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:
Implement user feedback through custom alert mechanisms.

**III Course Level Learning outcome(s)**

CO3 - Develop android applications using UI components and layouts.

**IV Laboratory Learning outcome(s)**

LLO 9.1 Build android application using Linear and Constraint Layouts.

**V Relevant Affective Domain Related Outcomes**

Inspires students to think from the user's perspective when designing forms, surveys, and preference screens.

**VI Relevant Theoretical Background**

- Layouts in Android:
  LinearLayout: Aligns child views either vertically or horizontally.
  ConstraintLayout: Allows flexible positioning with constraints between views.
- UI Controls Used:
  EditText, RadioButton, Button, TextView, Toast, and ImageView.
- Custom Toast:
  customized Toast view allows you to use your own XML layout for the Toast content (e.g., adding icons, colors, or custom text styles).

**VII Resources required (Additional)**

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

**VIII Precautions to be followed**

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

**Layout and UI Design**

1. Design a registration form using LinearLayout that includes fields for Name, Email, Phone, and a Register button.
2. Recreate the same form using ConstraintLayout, ensuring proper alignment and spacing between components.
3. Add gender selection using RadioGroup and display the selected gender in the custom toast.
4. Include a CheckBox for "Terms and Conditions" and validate that it is checked before showing the toast.

**Input Validation and Feedback**

1 Implement input validation to ensure all fields are filled before allowing registration.
2 Display a custom toast with the user's name and email after successful registration.
3 Modify the toast layout to include an icon and change background color based on success or error.
4 Create a toast that appears only if the phone number is exactly 10 digits.

**(Space for Answer)**

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.tutorialspoint.com/android/android_studio.htm
2. https://www.geeksforgeeks.org/android/android-studio-tutorial/
3. https://developer.android.com/guide/topics/ui/declaring-layout
4. https://developer.android.com/training/constraint-layout

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| | Performance Indicators | Weightage |
|---|---|---|
| | **Process related (15 Marks)** | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| | **Product related (10 Marks)** | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| **Marks obtained** | | | **Dated Sign of Teacher** |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 10: Develop a program to implement Frame layout, Table layout and Relative layout for any e-commerce application.

## I Practical Significance

This practical enable designing responsive e-commerce interfaces and demonstrates arranging multiple UI components efficiently.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:
build modular UI components for real-world e-commerce.

## III Course Level Learning outcome(s)

CO3 - Develop android applications using UI components and layouts.

## IV Laboratory Learning outcome(s)

LLO 10.1 Develop android application using Frame, Table and Relative Layout.

## V Relevant Affective Domain Related Outcomes

Promotes creativity in designing visually appealing and functional interfaces.

## VI Relevant Theoretical Background

- FrameLayout: Used to stack views; ideal for overlays like discount labels on product images.
- TableLayout: Organizes data in rows and columns; useful for price breakdowns or order summaries.
- RelativeLayout: Positions views relative to each other or the parent; suitable for action buttons and compact layouts.
- Layout Attributes: layout width, layout_ height, layout_ gravity, layout _margin, layout_ alignParentStart, etc.
- UI Responsiveness: Importance of padding, alignment, and screen adaptability.

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

## X Practical related Questions

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

1. Create a product card using FrameLayout with an image and a discount label overlay.
2. Design a price summary table using TableLayout with item price, tax, shipping, and total.
3. Implement a RelativeLayout with "Add to Cart" and "Buy Now" buttons aligned on opposite ends.
4. Combine all three layouts in a single screen to simulate a product detail page.
5. Modify the RelativeLayout to include a delivery estimate aligned below the buttons.
6. Add responsiveness by wrapping the entire layout in a ScrollView and test on small screens.

**(Space for Answer)**

……

……

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.tutorialspoint.com/android/android_studio.htm
2. https://www.geeksforgeeks.org/android/android-studio-tutorial/
3. https://developer.android.com/guide/topics/ui/declaring-layout

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 11: *Develop a program to implement Grid View, Image View, Scroll View, List View for any management system management/hotel management

## I Practical Significance

These practical enables students to design dynamic and scrollable interfaces for real-world management systems also demonstrates how to display collections of data (e.g., books, rooms, customers) using visual and list-based components.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:
Implement GridView, ImageView, ScrollView, and ListView for any management system like library management or hotel management.

## III Course Level Learning outcome(s)

CO3 - Develop android applications using UI components and layouts.

## IV Laboratory Learning outcome(s)

LLO 11.1 Create Android application to implement different types of views.

## V Relevant Affective Domain Related Outcomes

Promotes confidence in handling dynamic content and user interaction.

## VI Relevant Theoretical Background

- GridView: Displays items in a two-dimensional scrollable grid; ideal for book covers, room thumbnails.
- ImageView: Used to show images such as product photos, banners, or icons.
- ScrollView: Allows vertical scrolling of content that exceeds screen height.
- ListView: Displays a scrollable list of items; useful for showing customer names, transactions, or bookings.
- Adapters: Bridge between data source and UI components (e.g., ArrayAdapter, BaseAdapter).
- View Recycling: Efficient rendering of large lists using view reuse.

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

……

## X Practical related Questions

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

1.Display a grid of book covers using GridView for a library catalog.
2. Use ImageView to show a banner image for a hotel or library welcome screen.
3. Wrap the entire layout in a ScrollView and test scrolling behavior.
4. Create a ListView showing recent borrowers or hotel guests with names and check-in dates.
5. Implement a custom adapter to show book titles and images in GridView.
6. Add click listeners to ListView items to show detailed information in a Toast.
7. Combine GridView and ListView in a single screen to simulate a dashboard.

**(Space for Answer)**

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.tutorialspoint.com/android/android_studio.htm
2. https://www.geeksforgeeks.org/android/android-studio-tutorial/
3. https://developer.android.com/reference/android/widget/GridView
4. https://developer.android.com/reference/android/widget/ScrollView
5. https://developer.android.com/reference/android/widget/ListView

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 12: Develop a simple calculator which uses grid layout and GUI concepts.

## I Practical Significance

This practical focuses on implementing a Basic Calculator App using Android GridLayout and Graphical User Interface (GUI) concepts also it helps students to design a structured user interface for mathematical operations and event handling.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:
Build calculator logic for scientific or financial applications using GridLayout

## III Course Level Learning outcome(s)

CO3 - Develop android applications using UI components and layouts.

## IV Laboratory Learning outcome(s)

LLO 12.1 Create an application to implement grid layout.

## V Relevant Affective Domain Related Outcomes

Builds confidence in creating real-world utility applications.

## VI Relevant Theoretical Background

- **GridLayout**: Organizes UI components in a grid of rows and columns; ideal for calculator keypads.
- **GUI Concepts**: Includes buttons, text views, event listeners, and layout attributes.
- **Event Handling**: Using setOnClickListener() to respond to user actions.
- **Arithmetic Logic**: Basic operations (+, –, ×, ÷) and input parsing using Double.parseDouble() or similar methods.
- **State Management**: Tracking operands, operators, and result display.

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Design a calculator UI using GridLayout with buttons for digits and basic operators.
2. Implement logic to perform addition, subtraction, multiplication, and division.
3. Add a clear button to reset the input and result.
4. Display the result dynamically in a TextView after pressing "=".
5. Modify the calculator to support decimal inputs and operations.
6. Add error handling for invalid inputs or divide-by-zero cases.

**(Space for Answer)**

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.tutorialspoint.com/android/android_studio.htm
2. https://www.geeksforgeeks.org/android/android-studio-tutorial/
3. https://developer.android.com/reference/android/widget/Button
4. https://developer.android.com/guide/topics/ui/ui-events

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 13: * Develop a splash screen in android.

## I Practical Significance

This practical introduces students to activity lifecycle and timed transitions in Android. It helps learners understand branding and user experience design through splash screens.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:
Implement splash screens that enhance app aesthetics and user engagement.

## III Course Level Learning outcome(s)

CO3 - Develop android applications using UI components and layouts.

## IV Laboratory Learning outcome(s)

LLO 13.1 Write program to develop relevant GUI for given application.

## V Relevant Affective Domain Related Outcomes

Promotes attention to user experience and first impressions.

## VI Relevant Theoretical Background

- Activity Lifecycle: Understanding onCreate(), startActivity(), and finish() methods.
- Handler and Delay: Using Handler.postDelayed() or Coroutine for timed transitions.
- Intent Navigation: Launching the main activity from the splash screen.
- UI Components: ImageView, TextView, RelativeLayout for branding and layout.
- Manifest Configuration: Setting splash activity as the launcher in AndroidManifest.xml.

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Create a splash screen that displays a logo and app name for 3 seconds before launching the main activity.
2. Modify the splash screen to include a fade-in animation for the logo.
3. Use Handler to delay the transition and explain its role in the activity lifecycle.
4. Set the splash activity as the launcher in the manifest and test app startup behavior.
5. Add a background image to the splash screen and ensure it scales properly.
6. Implement a splash screen that checks for user login status before navigating.

**(Space for Answer)**

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.tutorialspoint.com/android/android_studio.htm
2. https://www.geeksforgeeks.org/android/android-studio-tutorial/
3. https://developer.android.com/develop/ui/views/launch/splash-screen

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| | Performance Indicators | Weightage |
|---|---|---|
| | **Process related (15 Marks)** | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| | **Product related (10 Marks)** | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| **Marks obtained** | | | **Dated Sign of Teacher** |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 14: *Design and develop any convertor application like temperature convertor /currency convertor/ volume convertor.

## I Practical Significance

This practical focuses on creating a user-friendly converter app using AndroidUI components, event handling, and basic arithmetic logic. It helps students understand how to process user input and apply mathematical logic in mobile applications.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:
Design functional and user-friendly converter applications.

## III Course Level Learning outcome(s)

CO3 - Develop android applications using UI components and layouts.

## IV Laboratory Learning outcome(s)

LLO 14.1 Design a convertor application.

## V Relevant Affective Domain Related Outcomes

Promotes curiosity and experimentation with different conversion types and formulas.

## VI Relevant Theoretical Background

- GUI Components: EditText, Button, TextView, Spinner for input and output.
- Event Handling: Using setOnClickListener() to trigger conversions.
- Conversion Logic: Mathematical formulas for temperature (°C ↔ °F), volume (liters ↔ gallons), currency (INR ↔ USD).
- Data Types: Parsing and formatting double, float, and String.
- API Integration (for currency

**Conversion Formula (Temperature Example)**

- Celsius → Fahrenheit:

$$F = (C \times 9/5) + 32$$

- Fahrenheit → Celsius**:**

$$C = (F - 32) \times 5/9$$

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Create a temperature converter from Celsius to Fahrenheit.
2. Extend the app to convert Fahrenheit to Celsius.
3. Design a currency converter with fixed exchange rate.
4. Implement a volume converter (liters ↔ gallons).
5. Add a spinner to select conversion type and update UI accordingly.
6. Validate input and show error messages for invalid entries.

**(Space for Answer)**

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.tutorialspoint.com/android/android_studio.htm
2. https://www.geeksforgeeks.org/android/android-studio-tutorial/
3. https://developer.android.com/guide/topics/ui/controls
4. https://developer.android.com/guide/topics/ui/ui-events

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 15: Design and develop a simple countdown timer.

## I Practical Significance

This Practical introduces students to time-based UI updates and asynchronous programming in Android also It helps learners understand how to manage timed events and user feedback.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:
Implement countdown timers for use cases like quizzes, fitness apps, booking systems, or productivity tools.

## III Course Level Learning outcome(s)

CO3 - Develop android applications using UI components and layouts.

## IV Laboratory Learning outcome(s)

LLO 15.1 Implement a timer application.

## V Relevant Affective Domain Related Outcomes

Promotes awareness of user experience and timing sensitivity in mobile apps.

## VI Relevant Theoretical Background

- CountDownTimer Class: Used to schedule countdowns with interval updates.
- Event Handling: onTick() and onFinish() methods for UI updates.
- UI Components: TextView for displaying time, Button for starting/resetting.
- Threading Concepts: Understanding how timers run asynchronously without blocking the UI thread.
- Activity Lifecycle: Managing **timers across activity states (e.g., pause, resume).**

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Create a countdown timer that starts from 10 seconds and updates every second.
2. Display the remaining time in TextView and show "Time's up!" when finished.
3. Add a reset button to restart the timer from the beginning.
4. Modify the timer to accept user input for duration (e.g. from EditText).
5. Implement a timer that disables a button until countdown completes.
6. Extend the timer to trigger a sound or vibration when finished.

**(Space for Answer)**

……

……

……

## XI References / Suggestions for further Reading

1. https://www.tutorialspoint.com/android/android_studio.htm
2. https://www.geeksforgeeks.org/android/android-studio-tutorial/
3. https://developer.android.com/reference/android/os/CountDownTimer
4. https://developer.android.com/guide/topics/ui/ui-events
5. https://developer.android.com/reference/android/widget/TextView

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| | Performance Indicators | Weightage |
|---|---|---|
| | **Process related (15 Marks)** | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| | **Product related (10 Marks)** | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| **Marks obtained** | | | **Dated Sign of Teacher** |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 16: * Develop a program to implement Date Picker in application.

## I Practical Significance

The Date Picker allows users to easily select a date through a simple and interactive interface, reducing input errors and ensuring correct date formats. It enhances user experience and is useful in applications like booking, scheduling, and form submissions.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:

1. Use Date picker to display the date.

## III Course Level Learning outcome(s)

CO3 - Develop android applications using UI components and layouts.

## IV Laboratory Learning outcome(s)

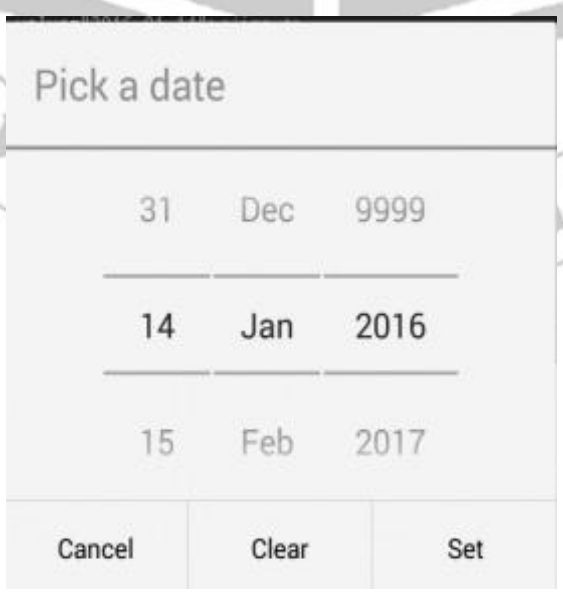
LLO 16.1 Construct a date picker in application.

## V Relevant Affective Domain Related Outcomes

1. Demonstrates responsibility and attention to detail while handling date and time data.
2. Values teamwork and collaboration during application development.
3. Exhibits patience and perseverance in testing, debugging, and refining the login activities.

## VI Relevant Theoretical Background

Android Date Picker allows you to select the date consisting of day, month and year in your custom user interface. For this functionality android provides DatePicker and DatePickerDialog components which use listeners like OnDateSetListener to capture user input. This concept is part of Android's UI Controls and Event Handling framework in mobile application development.



## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Write a program in Android to implement a Date Picker using DatePickerDialog.
2. How can you display the selected date in a TextView after user selection?
3. Modify the program to restrict the user from selecting past dates.
4. How can you set the Date Picker to show the current system date by default?
5. Write code to open the Date Picker when a button is clicked.

**(Space for Answer)**

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.geeksforgeeks.org/android/datepicker-in-android/
2. https://www.tutorialspoint.com/android/android_datepicker_control.htm

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| | Performance Indicators | Weightage |
|---|---|---|
| | **Process related (15 Marks)** | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| | **Product related (10 Marks)** | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

## Practical No. 17: Develop a program to implement Time Picker in application.

**I Practical Significance**

The Time Picker allows users to easily select a specific time through an interactive interface, ensuring accuracy and consistency. It enhances user experience and is commonly used in scheduling, reminder, and alarm applications.

**II Industry/Employer Expected outcome(s)**

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:

1. Use time picker to display the time either in 24 Hour format or 12 Hour format.

**III Course Level Learning outcome(s)**

CO3 - Develop android applications using UI components and layouts.

**IV Laboratory Learning outcome(s)**

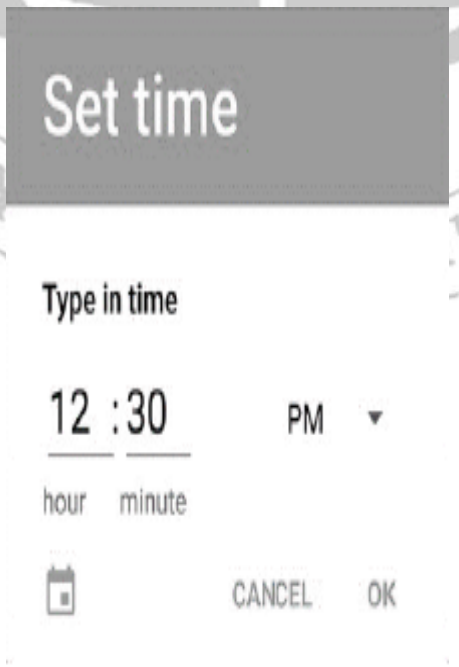
LLO 17.1 Construct a time picker in application.

**V Relevant Affective Domain Related Outcomes**

1. Demonstrates responsibility in ensuring correct time handling and formatting.
2. Values collaboration and constructive feedback during development.
3. Exhibits patience and perseverance in testing, debugging, and refining the login activities.

**VI Relevant Theoretical Background**

Android Time Picker allows you to select the time of a day in either 24 hour or AM/PM mode. The Time Picker in Android is a UI component that allows users to select time in hours and minutes. It is implemented using the TimePicker class or TimePickerDialog. The dialog uses OnTimeSetListener to capture user input and is part of Android's event-driven programming model.



## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Write a program in Android to implement a Time Picker using TimePickerDialog.
2. How can you display the selected time in a TextView after user selection?
3. Modify the program to use a 24-hour format instead of AM/PM.
4. How can you set the default time to the current system time?
5. Explain the use of OnTimeSetListener interface in Time Picker.

**(Space for Answer)**

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.geeksforgeeks.org/android/timepicker-in-android/
2. https://www.tutorialspoint.com/android/android_timepicker_control.htm

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 18: Develop a program to create two simple activities for Login application.

## I Practical Significance

This practical helps students understand how to design multi-screen Android applications. It demonstrates how to create and navigate between two activities, such as a Login screen and a Welcome screen, which is essential for real-world app development.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:

1. Create an activity to load all the UI components.

## III Course Level Learning outcome(s)

CO3 - Develop android applications using UI components and layouts.

## IV Laboratory Learning outcome(s)

LLO 18.1 Create android activities.

## V Relevant Affective Domain Related Outcomes

1. Demonstrates responsibility in handling user data securely and accurately.
2. Values collaboration and accepts feedback to improve the application.
3. Exhibits patience and perseverance in testing, debugging, and refining the login activities.

## VI Relevant Theoretical Background

**Activities:** Fundamental building blocks of Android apps representing a single screen.
**Intents:** Mechanisms to navigate between activities or components.
**Layouts:** XML-based design files defining the UI.
**Event Handling:** Managing user interactions like button clicks.
**Activity Lifecycle:** Understanding onCreate(), onStart(), onResume(), etc.
**Validation:** Checking username and password correctness before granting access.
An activity class loads all the UI component using the XML file available in res/layout folder of the project. Following statement loads UI components from res/layout/activity_main.xmlfile: setContentView(R.layout.activity_main); To write our own activity the new activity must be the derived from Activity class as given below:

```
public class MainActivity extends Activity {
 @Override public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        /*Code goes here*/
        }
/** Called when the activity is about to become visible. */
 @Override protected void onStart() {
        super.onStart();
        /*Code goes here*/
        }
/** Called when the activity has become visible. */
 @Override protected void onResume() {
        super.onResume();
```

```
        /*Code goeshere*/
        }
/** Called when another activity is taking focus. */
 @Override protected void onPause() {
        super.onPause();
        /*Code goes here*/
        }
/** Called when the activity is no longer visible. */
 @Override protected void onStop() {
        super.onStop();
        /*Code goes here*/
        }
/** Called just before the activity is destroyed. */
 @Override public void onDestroy() {
        super.onDestroy();
        /*Code goes here*/
        }
}
```

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Write a program to create two activities – Login Activity and Welcome Activity.
2. How is data (like username) passed between activities using Intent?
3. Explain the role of **AndroidManifest.xml** in multiple-activity applications.

**(Space for Answer)**

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.geeksforgeeks.org/android/introduction-to-activities-in-android/
2. https://www.tutorialspoint.com/android/android_acitivities.htm

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 19: *Develop a program to implement new Activity using explicit intent and implicit intent to open any other website.

## I Practical Significance

This practical helps students understand how to use explicit and implicit intents in Android applications. Explicit intents are used to navigate between defined components within an app, while implicit intents enable the app to perform an action in another app or system component (like opening a web browser). This enhances understanding of app intercommunication and Android's component-based architecture.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:

1. Create an activity using implicit intent.
2. Create an activity and call another activity using explicit intent.

## III Course Level Learning outcome(s)

CO4 - Create database driven Android applications.

## IV Laboratory Learning outcome(s)

LLO 19.1 Implement intents in android application development.

## V Relevant Affective Domain Related Outcomes

1. Demonstrates responsibility in handling user actions and external links safely.
2. Values teamwork and constructive feedback during app development.
3. Exhibits perseverance and patience while testing intents and debugging issues.

## VI Relevant Theoretical Background

**Activity:** Represents a single screen with a user interface.
**Intent:** A messaging object used to request an action from another app component.
**Implicit Intent:** Specifies a general action to be performed (e.g., open a URL in a browser).
**Syntax:**

```
Intent intent = new Intent(Intent.ACTION_VIEW);
intent.setData(Uri.parse("https://www.google.com"));
startActivity(intent);
```

**Explicit Intent:** Specifies the exact activity or component to open (e.g., navigate from MainActivity to SecondActivity).

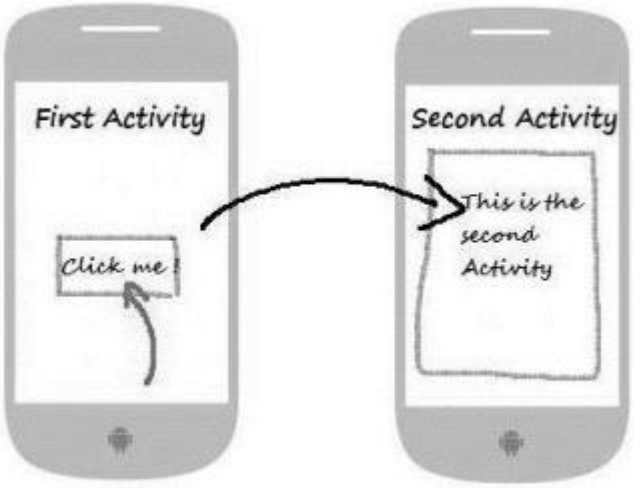
```
Intent intent = new Intent(MainActivity.this, SecondActivity.class);
intent.putExtra("username", "Vikas");
intent.putExtra("email", "vikas@example.com");
startActivity(intent);
```

**Intent Filters:** Declared in AndroidManifest.xml to define how an app responds to implicit intents.
**URI (Uniform Resource Identifier):** Used in implicit intents for web URLs, maps, etc.
Android application components can connect to other Android applications. This connection is based on a task description represented by an Intent object. Intents are asynchronous messages which allow application components to request functionality from other Android components. Intents allow you to interact with components from the same applications as well as with

components contributed by other applications. For example, an activity can start an external activity for taking a picture.

Mostly Intents are used for:

a. For Launching an Activity
b. To start a New Service
c. For Broadcasting Messages
d. To Display a list of contacts in List View




## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## *X* Practical related Questions

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

1. What code is used to open a website (e.g., "https://www.google.com") using an **implicit intent**?
2. Write code to open the device's dialer using an implicit intent.
3. Write code to pass data between two activities using explicit intent.

(Space for Answer)

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.geeksforgeeks.org/android/what-is-intent-in-android/
2. https://www.tutorialspoint.com/what-is-an-intent-in-android

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

## Practical No. 20: *Develop a program to implement services like bluetooth/wifi.

**I Practical Significance**

This practical helps students understand how to use Android system services such as Bluetooth and Wi-Fi within an application. By developing programs that can enable, disable, and check the status of these services, students gain practical exposure to device connectivity management, system permissions, and real-time interaction with hardware features of Android devices.

**II Industry/Employer Expected outcome(s)**

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:

1. Able to communicate with Bluetooth/wifi hardware.
2. Able to integrate Bluetooth/wifi in any application.

**III Course Level Learning outcome(s)**

CO4 - Create database driven Android applications.

**IV Laboratory Learning outcome(s)**

LLO 20.1 Implement android services to develop android applications.

**V Relevant Affective Domain Related Outcomes**

1. Shows interest and curiosity in exploring device connectivity features.
2. Demonstrates responsibility in managing connections and user data securely.
3. Values teamwork and collaboration during development and testing.
4. Exhibits patience, persistence, and attention to detail while debugging connectivity issues.

**VI Relevant Theoretical Background**

**Android Services:** Core components that perform long-running operations in the background.
**BluetoothAdapter Class:** Provides APIs to manage Bluetooth - turning it on/off, discovering devices, and pairing.
**WifiManager Class:** Provides methods to control Wi-Fi connectivity and obtain network status.
**Permissions:** For Bluetooth: BLUETOOTH, BLUETOOTH_ADMIN, BLUETOOTH_CONNECT (API 31+).
For Wi-Fi: ACCESS_WIFI_STATE, CHANGE_WIFI_STATE, ACCESS_NETWORK_STATE.
**Intents and Broadcast Receivers:** Used to detect changes in Bluetooth or Wi-Fi states.
**Manifest Declarations:** Necessary to declare and request runtime permissions for these services.
Android provides Bluetooth API to perform these different operations.
1. Scan for other Bluetooth devices
2. Get a list of paired devices.
3. Connect to other devices through service discovery.

Android provides Bluetooth Adapter class to communicate with Bluetooth. Create an object of this calling by calling the static method getDefaultAdapter(). Its syntax is given below.

```
private BluetoothAdapter BA;
BA = BluetoothAdapter.getDefaultAdapter();
```

In order to enable the Bluetooth of your device, call the intent with the following Bluetooth constant ACTION_REQUEST_ENABLE. Its syntax is

```
Intent turnOn = new Intent(BluetoothAdapter.ACTION_REQUEST_ENABLE);
startActivityForResult(turnOn, 0);
```

Once you enable the Bluetooth, you can get a list of paired devices by calling getBondedDevices() method. It returns a set of Bluetooth devices. Its syntax is
private Set<BluetoothDevice>pairedDevices;
pairedDevices = BA.getBondedDevices();

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Write a code snippet to turn Bluetooth ON using BluetoothAdapter.
2. How can you get a list of paired Bluetooth devices programmatically?
3. Write the permissions required in the AndroidManifest.xml to access Bluetooth.
4. How do you enable or disable Wi-Fi using the WifiManager class?
5. Write code to check the current Wi-Fi connection status.

**(Space for Answer)**

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.tutorialspoint.com/android/android_bluetooth.htm
2. https://www.tutorialspoint.com/android/android_wi_fi.htm

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 21: *Develop a program to implement a broadcast receiver to switch between different modes like Airplane mode/Silent Mode/Loud Mode.

## I Practical Significance

This practical demonstrates the use of Broadcast Receivers in Android, which allow applications to listen for and respond to system-wide broadcast messages such as mode changes, network updates,or power state changes. Students learn how to handle Airplane Mode, Silent Mode, and Loud Mode transitions programmatically and respond to these events dynamically, strengthening their understanding of Android's event-driven architecture.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:

1. Able to Create the Broadcast Receiver.
2. Able to Register Broadcast Receiver.

## III Course Level Learning outcome(s)

CO4 - Create database driven Android applications.

## IV Laboratory Learning outcome(s)

LLO 21.1 Implement the concept of broadcast receiver to develop and android application.

## V Relevant Affective Domain Related Outcomes

1. Shows interest and motivation in creating responsive and interactive applications.
2. Demonstrates responsibility in handling system settings safely and correctly.
3. Values collaboration and feedback during development and testing.
4. Exhibits patience, perseverance, and attention to detail while debugging mode switching functionality.

## VI Relevant Theoretical Background

**Broadcast Receiver:** A component that responds to broadcast messages from other applications or the system.

**Types of Broadcasts:**

**System Broadcasts:** Sent by the Android system (e.g., Airplane mode ON/OFF).

**Custom Broadcasts:** Sent by user-defined intents within the application.

**Intent Filters:** Declared in the AndroidManifest.xml to listen for specific broadcast actions.

**AudioManager Class:** Used to switch between Silent, Vibrate, and Normal (Loud) modes.

**Airplane Mode Detection:** Handled via system broadcast Intent.ACTION_AIRPLANE_MODE_CHANGED.

**Runtime Permissions:** Required for modifying audio settings (MODIFY_AUDIO_SETTINGS).

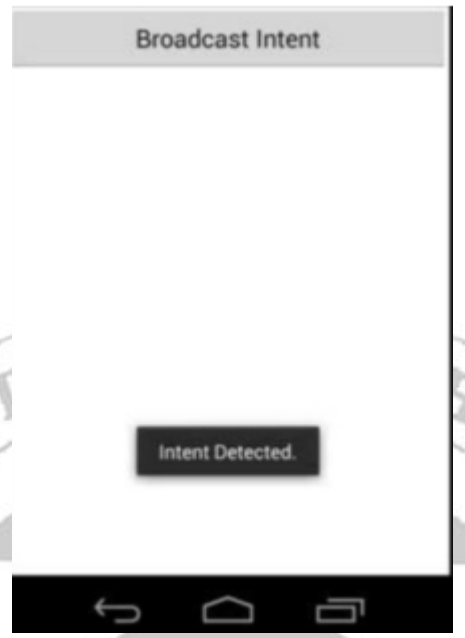
**Creating the Broadcast Receiver:**

A broadcast receiver is implemented as a subclass of Broadcast Receiver class and overriding the onReceive() method where each message is received as an Intent object parameter.

**Registering Broadcast Receiver:**

An application listens for specific broadcast intents by registering a broadcast receiver in AndroidManifest.xml file. Consider we are going to register MyReceiver for system generated

event ACTION_BOOT_COMPLETED which is fired by the system once the Android system has completed the boot process.




## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. What is the purpose of a Broadcast Receiver in Android?
2. How can you register a Broadcast Receiver dynamically in your app?
3. Write a code snippet to listen for Airplane Mode state changes.
4. How do you change the phone to Silent Mode programmatically?

**(Space for Answer)**

……

……

## XI References / Suggestions for further Reading

1. https://www.geeksforgeeks.org/android/broadcast-receiver-in-android-with-example/
2. https://www.tutorialspoint.com/android/android_broadcast_receivers.htm

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 22: *Develop a registration application to insert and retrieve the data from the database.

## I Practical Significance

This practical enable student to understand how to design, develop, and connect a front-end application with a back-end database. It helps them gain hands-on experience in database connectivity, Create, Read, Update, Delete operations, and data management. Students learn how to handle user inputs securely and efficiently.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:

1. Ability to design and develop database-driven applications.

## III Course Level Learning outcome(s)

CO4 - Create database driven Android applications.

## IV Laboratory Learning outcome(s)

LLO 22.1 Implement the database operations with android front end.

## V Relevant Affective Domain Related Outcomes

1. Shows interest and motivation in managing data efficiently through applications.
2. Demonstrates responsibility in ensuring data accuracy, integrity, and security.
3. Values teamwork and constructive feedback during development and testing.
4. Exhibits patience and persistence while debugging and handling database operations.

## VI Relevant Theoretical Background

Developing a registration application in Android that stores and retrieves data from a database involves several key **theoretical concepts** from Android development, database management, and programming. The following background knowledge is essential:

1. **Android Application Components**
   - **Activity:** Represents the user interface (UI) screen where users can enter registration details such as name, email, and password.
   - **Intent:** Used to navigate between different screens (e.g., from registration to display screen).
   - **View Components:** Includes EditText, Button, and TextView for user input and output display.
   - **Context:** Provides access to system resources and database operations within the app.
2. **Database Concepts**
   - **Database Management System (DBMS):** A system used to manage structured data efficiently.
   - **SQLite Database:** A lightweight, embedded relational database used for local data storage in Android apps. It supports SQL commands such as CREATE, INSERT, SELECT, UPDATE, and DELETE.
   - **Table Structure:** The registration table may include fields such as id, name, email, phone, and password.
3. **SQL (Structured Query Language)**
   - SQL is used to perform CRUD operations on the database.
   - Common queries include:
     - CREATE TABLE – to define the registration table.

- INSERT INTO – to store new user data.
- SELECT – to retrieve and display stored user details.
- DELETE / UPDATE – for data modification (if needed).

4. **Android Database Handling Classes**
   - **SQLiteOpenHelper:** A helper class that manages database creation and version management. It provides methods like onCreate() and onUpgrade().
   - **SQLiteDatabase:** Used to perform SQL queries (insert(), query(), update(), delete() methods).
   - **Cursor:** A data access object used to read and iterate over query results retrieved from the database.
5. **Data Validation and Exception Handling**
   - Input validation ensures correctness (e.g., valid email format, non-empty fields).
   - Exception handling (try-catch blocks) prevents crashes during runtime errors such as connection failures or invalid queries.
6. **Android Manifest and Permissions**
   - The AndroidManifest.xml file defines essential components and permissions required by the app.
   - For local databases (SQLite), no special permission is needed, but internet permission may be required if remote databases are used (e.g., Firebase).
7. **User Interface Design (XML)**
   - Layout files are written in XML defining how text fields, buttons, and labels appear.
   - Example components:
     - EditText – for user input
     - Button – to trigger insert or view operations
     - TextView or RecyclerView – to display retrieved data.
8. **Data Flow in the Application**
   - **Input Phase:** User enters data in text fields.
   - **Processing Phase:** App validates input and executes INSERT SQL command using SQLite.
   - **Output Phase:** App retrieves and displays data using SELECT query and Cursor object.

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. What are the key steps involved in establishing a database connection?
2. Write SQL queries to insert and retrieve data from a "Registration" table.
3. Modify the program to include a delete or update function.
4. What methods can be used to handle exceptions during data operations?

**(Space for Answer)**

……

……

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. How to Create and Add Data to SQLite Database in Android? - GeeksforGeeks

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 23: Develop an authentication application which uses database concepts.

## I Practical Significance

This practical focuses on developing an Android application that allows users to register, login, and authenticate using database concepts. Students will learn to handle user credentials securely, implement data validation, and integrate a database (SQLite/Firebase) with the app. This helps in understanding real-world authentication mechanisms in mobile applications.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:

1. Develop skills in input validation, exception handling, and secure password management.

## III Course Level Learning outcome(s)

CO4 - Create database driven Android applications.

## IV Laboratory Learning outcome(s)

LLO 23.1 Create an Android application for user authentication.

## V Relevant Affective Domain Related Outcomes

1. Shows interest and commitment to building secure and reliable user authentication features.
2. Demonstrates responsibility in managing sensitive user data accurately and safely.
3. Values collaboration and constructive feedback during development and testing.
4. Exhibits perseverance, patience, and attention to detail while debugging and handling database operations.

## VI Relevant Theoretical Background

Developing an authentication application in Android requires understanding both **practical Android components** and **database operations** that are directly applied during the lab work. The following points summarize the theoretical knowledge in a hands-on, practical context:

1. **Android Activities and UI Components**
   - **Activity:** Each screen of the app (e.g., Registration Screen, Login Screen) is an Activity.
   - **Views:** EditText for input (username, email, password), Button to trigger actions (Register/Login), TextView for messages.
   - **Layout Files:** XML layouts define the placement of components. ConstraintLayout or LinearLayout is commonly used.
2. **Intents**
   - **Explicit Intent:** Navigate from RegistrationActivity to LoginActivity or HomeActivity.
   - Example:
   - Intent intent = new Intent(RegistrationActivity.this, LoginActivity.class);
   - startActivity(intent);
3. **Database Concepts for Android**
   - **SQLite:** Embedded relational database for storing user credentials locally.
   - **Table Design:** Example table users with fields: id, username, email, password.
   - **CRUD Operations:**
     - **INSERT** – Add new user during registration.

- **SELECT** – Retrieve data to verify login credentials.
- **UPDATE / DELETE** – Optional, to modify or remove user data.

- **SQLiteOpenHelper:** Class to create, upgrade, and manage the database.
- **Cursor:** Object to read query results from the database.

4. **Firebase Authentication (Optional / Cloud-Based)**
   - Use Firebase to store user credentials securely in the cloud.
   - Handles registration, login, and password reset.
   - Requires internet connectivity and Firebase SDK integration.
5. **Input Validation and Security**
   - Check for empty fields, valid email format, and password strength.
   - Encrypt passwords (hashing) before storing in the database to enhance security.
   - Prevent SQL injection using parameterized queries or prepared statements.
6. **Error Handling**
   - Use try-catch blocks to handle database exceptions and runtime errors.
   - Display user-friendly messages when login fails or database errors occur.
7. **Data Flow in Application (Practical Understanding)**
   - **Step 1:** User enters registration details → Validation checks → Save to database.
   - **Step 2:** User attempts login → Retrieve credentials from database → Compare with input → Allow or deny access.
   - **Step 3:** On successful login → Navigate to HomeActivity using Intent.

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Write SQL queries to insert new user data and retrieve credentials for login verification.
2. How do you validate email and password fields in the registration screen?
3. How can you handle login failures or incorrect credentials in the app?

**(Space for Answer)**

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. How to Create and Add Data to SQLite Database in Android? - GeeksforGeeks
2. User Authentication and CRUD Operation with Firebase Realtime Database in Android - GeeksforGeeks

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| | Performance Indicators | Weightage |
|---|---|---|
| | **Process related (15 Marks)** | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| | **Product related (10 Marks)** | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 24: Develop a MyContacts application which uses database concepts.

## I Practical Significance

This practical helps students understand how mobile applications interact with databases for storing and managing data locally or online. The *MyContacts* Android app enables users to add, view, update, and delete contact information using SQLite or Firebase. Through this exercise, students learn about Android app development, database design, data persistence, and UI integration — essential skills for modern mobile developers.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:

1. Develop skills in designing intuitive user interfaces for managing contacts.

## III Course Level Learning outcome(s)

CO4 - Create database driven Android applications.

## IV Laboratory Learning outcome(s)

LLO 24.1 Develop an application which uses database.

## V Relevant Affective Domain Related Outcomes

1. Shows interest and enthusiasm in organizing and managing contact information efficiently.
2. Demonstrates responsibility in ensuring data accuracy, privacy, and security.
3. Values teamwork and feedback during development and testing.
4. Exhibits patience, persistence, and attention to detail while debugging and handling database operations.

## VI Relevant Theoretical Background

**Android Components:**

- **Activities:** Screens for adding, viewing, and updating contacts.
- **Views:** EditText for input, Button for actions, RecyclerView for displaying contact list.
- **Intents:** Explicit intents for navigation between activities.

**Database Concepts:**

- **SQLite:** Embedded relational database for storing contact information.
- **Tables:** Example fields – id, name, phone, email, address.
- **CRUD Operations:**
  - INSERT – Add new contacts.
  - SELECT – Retrieve and display contact list.
  - UPDATE – Edit existing contact details.
  - DELETE – Remove contacts.
- **SQLiteOpenHelper:** Manage database creation and versioning.
- **Cursor:** Used to read query results.

**Data Validation and Security:**

- Validate input fields (non-empty, valid phone/email format).
- Handle exceptions during database operations to prevent crashes.

**Data Flow:**

- User inputs contact → Validated → Stored in SQLite → Displayed in contact list → Edit/Delete as required.

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. How do you create and configure a SQLite database in Android for storing contacts?
2. Write SQL queries to insert, update, delete, and retrieve contact information.
3. How can you implement a search feature to find a contact by name or phone number?
4. How do you navigate between Add Contact and View Contacts screens?

**(Space for Answer)**

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

**References / Suggestions for further Reading**

1. https://www.tutorialspoint.com/how-to-create-contacts-app-in-android-studio
2. https://www.geeksforgeeks.org/android/how-to-build-a-simple-contact-list-android-app-using-mvvm-and-room-database/

## XI Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **70%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 30% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **30%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 10% |
| 6 | Answer to sample questions | 10% |
| | Total (25 Marks) | 100% |

| Marks Obtained | | | Dated signature of Teacher |
|---|---|---|---|
| **Process Related(15)** | **Product Related(10)** | **Total (25)** | |
| | | | |

# Practical No. 25: Develop a program to use camera.

## I Practical Significance

This practical teaches students to develop an Android application that can capture images using the device camera. It demonstrates the integration of Android components, intents, and storage mechanisms. Students gain hands-on experience in working with device hardware, managing permissions, handling images, and displaying captured data in the app.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:

1. Capability to design user-friendly UI for camera-based applications.

## III Course Level Learning outcome(s)

CO5 - Develop advanced Android applications that requires relevant permissions for security.

## IV Laboratory Learning outcome(s)

LLO 25.1 Create Android application that uses camera with permissions.

## V Relevant Affective Domain Related Outcomes

1. Shows interest and curiosity in integrating device hardware features into applications.
2. Demonstrates responsibility in handling media data safely and respecting user privacy.
3. Values teamwork and constructive feedback during development and testing.
4. Exhibits patience and persistence while debugging and optimizing camera functionality.

## VI Relevant Theoretical Background

Camera can be used in your application in following ways.

1. Using existing android camera application in our application
2. Directly using Camera API provided by android in our application

You will use MediaStore.ACTION_IMAGE_CAPTURE to launch an existing camera application installed on your phone. Its syntax is given below:

Intent in = new Intent(android.provider.MediaStore.ACTION_IMAGE_CAPTURE);

We will be using the camera API to integrate the camera in our application. First you will need to initialize the camera object using the static method provided by the api called Camera. Its syntax is:

Camera object = null; object = Camera.open();

**Methods:**

1. startActivityForResult(Intent intent, int requestCode, Bundle options)
   It starts an activity, but can take extra bundle of options withit.
2. startActivityFromChild(Activity child, Intent intent, int requestCode)
   It launches the activity when your activity is child of any otheractivity.
3. startActivityFromChild(Activity child, Intent intent, int requestCode, Bundle options)
   It work same as above, but it can take extra values in the shape of bundle with it.
4. startActivityFromFragment(Fragment fragment, Intent intent, int requestCode)
   It launches activity from the fragment you are currentlyinside.
5. startActivityFromFragment(Fragment fragment, Intent intent, intrequestCode, Bundle options)

It not only launches the activity from the fragment, but can take extra values with it.

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Write a program to capture an image and display it using image view.
2. How can captured images be stored in internal and external storage?
3. Write a program to record a video using various camera methods.

**(Space for Answer)**

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.geeksforgeeks.org/android/how-to-open-camera-through-intent-and-display-captured-image-in-android/
2. https://www.tutorialspoint.com/android/android_camera.htm

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 26: *Write a program for SMS application.

## I Practical Significance

This practical enable student to develop an Android application that can send and receive SMS messages. Students learn to interact with device messaging services, handle permissions, and design user-friendly interfaces. This gives hands-on experience in mobile communication, real-time data handling, and Android app development.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:

1. Ability to develop Android applications that integrate device SMS functionality.

## III Course Level Learning outcome(s)

CO5 - Develop advanced Android applications that requires relevant permissions for security.

## IV Laboratory Learning outcome(s)

LLO 26.1 Create application to Send and Receive SMS.

## V Relevant Affective Domain Related Outcomes

1. Shows interest and enthusiasm in creating communication-based applications.
2. Demonstrates responsibility in handling user messages securely and respecting privacy.
3. Values collaboration and constructive feedback during development and testing.
4. Exhibits patience, persistence, and attention to detail while debugging and ensuring reliable message delivery.

## VI Relevant Theoretical Background

A host of third-party apps for sending and receiving SMS messages are also available in Google Play. The SMS protocol was primarily designed for user-to-user communication and is not well-suited for apps that want to transfer data. You should not use SMS to send data messages from a web server to your app on a user device. SMS is neither encrypted nor strongly authenticated on either the network or the device. Access to the SMS features of an Android device is protected by user permissions. Just as your app needs the user's permission to use phone features, so also does an app need the user's permission to directly use SMS features.

You have two choices for sending SMS messages:

• Use an implicit Intent to launch a messaging app such as Messenger, with the ACTION_SENDTOaction.

• Send the SMS message using the sendTextMessage() method or other methods of the SmsManagerclass.

To receive SMS messages, the best practice is to use the onReceive() method of the Broadcast Receiver class. The Android framework sends out system broadcasts of events such as receiving an SMS message, containing intents that are meant to be received using a Broadcast Receiver. Your app receives SMS messages by listening for the SMS_RECEIVED_ACTION broadcast.

**Methods:**

1. ArrayList divideMessage(String text):- This method divides a message text into several fragments, none bigger than the maximum SMS message size.
2. static SmsManager getDefault():- This method is used to get the default instance of the Sms Manager

3. void sendDataMessage(String destination Address, String scAddress, short destinationPort, byte[] data, PendingIntent sentIntent, PendingIntent deliveryIntent):- This method is used to send a data based SMS to a specific application port.
4. void sendTextMessage(String destinationAddress, String scAddress, String text, PendingIntent sentIntent, PendingIntent deliveryIntent):- Send a text based SMS.

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Write a program to send and receive sms.
2. How can you validate phone numbers and prevent sending empty messages?

**(Space for Answer)**

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.tutorialspoint.com/android/android_sending_sms.htm
2. https://www.geeksforgeeks.org/android/sending-a-text-message-over-the-phone-using-smsmanager-in-android/

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 27: *Develop a program to send and receive email.

## I Practical Significance

This practical helps students develop an Android application that can send and receive emails programmatically. It provides hands-on experience in integrating Android applications with email services using SMTP/IMAP protocols or APIs, handling user authentication, designing interactive UI, and managing secure communication. Students learn real-world mobile communication practices.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:

1. Ability to integrate email functionality in Android applications.

## III Course Level Learning outcome(s)

CO5 - Develop advanced Android applications that requires relevant permissions for security.

## IV Laboratory Learning outcome(s)

LLO 27.1 Implement an email application.

## V Relevant Affective Domain Related Outcomes

1. Shows interest and motivation in building communication and productivity applications.
2. Demonstrates responsibility in managing user data securely and maintaining privacy.
3. Values collaboration and constructive feedback during development and testing.
4. Exhibits patience, persistence, and attention to detail while debugging and ensuring reliable email functionality.

## VI Relevant Theoretical Background

**Intent Object - Action to send Email:**

You will use ACTION_SEND action to launch an email client installed on your Android device. Following is simple syntax to create an intent with ACTION_SEND action.

```
Intent emailIntent = new Intent(Intent.ACTION_SEND);
```

**Intent Object – Data Type to send Email:**

To send an email you need to specify mailto: as URI using setData() method and data type will be to text/plain using setType() method as follows:

```
emailIntent.setData(Uri.parse("mailto:"));
emailIntent.setType("text/plain");
```

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Write a program to send email.

(Space for Answer)

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

**References / Suggestions for further Reading**

1. https://www.tutorialspoint.com/android/android_sending_email.htm
2. https://www.geeksforgeeks.org/android/how-to-send-email-in-android-app-without-using-intent/

## XI Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 28: Write a program that uses location services and checks for permissions.

## I Practical Significance

This practical teaches students how to develop an Android application that accesses device location using GPS or network services. Students learn to handle runtime permissions, retrieve location coordinates, and integrate location-based functionalities in real-world mobile apps such as maps, navigation, or location tracking.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:

1. Ability to develop Android applications that use GPS and network location services.

## III Course Level Learning outcome(s)

CO5 - Develop advanced Android applications that requires relevant permissions for security.

## IV Laboratory Learning outcome(s)

LLO 28.1 Develop GPS application.

## V Relevant Affective Domain Related Outcomes

1. Shows interest and curiosity in integrating device features responsibly.
2. Demonstrates responsibility in handling sensitive location data securely and ethically.
3. Values collaboration and feedback during development and testing.
4. Exhibits patience, perseverance, and attention to detail while managing permissions and debugging location-based functionality.

## VI Relevant Theoretical Background

Add the map fragment into xml layout file. Its syntax is given below –

```
<fragment
android:id="@+id/map"  android:name="com.google.android.gms.maps.MapFragment"
android:layout_width="match_parent"
android:layout_height="match_parent"/>
```

Add some permissions along with the Google Map API key in the AndroidManifest.XML file. Its syntax is given below:

```
<!-- Permissions-->
< uses-permission android:name =
"android.permission.ACCESS_NETWORK_STATE" />
< uses-permission android:name = "android.permission.INTERNET"/>
< uses-permission android:name =
"com.google.android.providers.gsf.permission..READ_GSERVICES"/>
< uses-permission android:name = "android.permission.WRITE_EXTERNAL_STO RAGE" />
```

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Write a program to locate user's current location.

**(Space for Answer)**

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.geeksforgeeks.org/android/how-to-get-user-location-in-android/
2. https://developer.android.com/develop/sensors-and-location/location/permissions

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 29: *Write a program that creates Navigation drawer using fragment concepts.

## I Practical Significance

This practical enable student to develop an Android application that incorporates a Navigation Drawer to switch between multiple screens using Fragments. Students learn modern Android UI design patterns, modular app development, and efficient navigation techniques. This helps in creating scalable and user-friendly mobile applications.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:

1. Ability to design Android applications with a Navigation Drawer for better user experience.

## III Course Level Learning outcome(s)

CO5 - Develop advanced Android applications that requires relevant permissions for security.

## IV Laboratory Learning outcome(s)

LLO 29.1 Build a Navigation drawer application.

## V Relevant Affective Domain Related Outcomes

1. Shows interest and enthusiasm in creating intuitive and organized user interfaces.
2. Demonstrates responsibility in designing seamless navigation and managing app components effectively.
3. Values teamwork and constructive feedback during development and testing.
4. Exhibits patience, persistence, and attention to detail while debugging fragment transitions and UI behavior.

## VI Relevant Theoretical Background

Methods available in the Google Map class are given below.

1. addCircle(CircleOptions options): This method add a circle to the map
2. addPolygon(PolygonOptions options): This method add a polygon to the map
3. addTileOverlay(TileOverlayOptions options): This method add tile overlay to the map
4. animateCamera(CameraUpdate update): This method Moves the map according to the update with an animation
5. clear(): This method removes everything from the map
6. getMyLocation(): This method returns the currently displayed user location
7. moveCamera(CameraUpdate update): This method repositions the camera according to the instructions defined in the update
8. setTrafficEnabled(boolean enabled): This method Toggles the traffic layer on or off
9. snapshot(GoogleMap.SnapshotReadyCallback callback): This method Takes a snapshot of the map
10. stopAnimation(): This method stops the camera animation if there is one in progress

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Write a program to draw a route between two locations.
2. Write the syntax for method which is used to add compass in Google Map.

**(Space for Answer)**

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

## XI References / Suggestions for further Reading

1. https://www.tutorialspoint.com/android/android_location_based_services.htm

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| Performance Indicators | | Weightage |
|---|---|---|
| **Process related (15 Marks)** | | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| **Product related (10 Marks)** | | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |

# Practical No. 30: Write a program to create a simple flashlight app and check for permissions.

## I Practical Significance

This practical helps students understand how to develop a simple Android application that controls the device's flashlight (torch) feature. It demonstrates how to interact with the phone's hardware safely using CameraManager's torch mode and manage runtime permissions effectively. Students gain hands-on experience in building utility-based Android apps that access device features securely.

## II Industry/Employer Expected outcome(s)

The aim of this course is to attain following Industry Identified Competency through various Teaching Learning Experiences:

1. Ability to develop mobile applications that interact with hardware components.

## III Course Level Learning outcome(s)

CO5 - Develop advanced Android applications that requires relevant permissions for security.

## IV Laboratory Learning outcome(s)

LLO 30.1 Build a torch application.

## V Relevant Affective Domain Related Outcomes

1. Shows interest and curiosity in integrating device hardware features into practical applications.
2. Demonstrates responsibility in managing permissions and user privacy safely.
3. Values collaboration and constructive feedback during development and testing.
4. Exhibits patience, persistence, and attention to detail while debugging and ensuring reliable app functionality.

## VI Relevant Theoretical Background

1. **Flashlight Control in Android:**
   - The flashlight can be controlled using the **CameraManager** class without opening the camera.
   - The method setTorchMode(cameraId, true/false) toggles the flashlight ON/OFF.
2. **Permission Handling:**
   - The flashlight feature requires the **android.permission.CAMERA** permission even though the camera itself is not used for capturing images.
   - For Android 6.0 (API 23) and above, **runtime permission requests** must be implemented.

Example Manifest Entry:

```
<uses-permission android:name = "android.permission.CAMERA" />
<uses-feature android:name = "android.hardware.camera.flash"
        android:required = "false" />
```

3. **Key Classes and Methods:**
   - **CameraManager:** Accesses the device's camera hardware to control the torch.
   - **ContextCompat** and **ActivityCompat:** Used for checking and requesting permissions.
   - **Button/Switch:** Used to toggle the flashlight state in the UI.
4. **Application Flow:**

- Step 1: Check if the device has a flashlight.
- Step 2: Request camera permission if not already granted.
- Step 3: On button click, toggle the flashlight ON/OFF using setTorchMode().
- Step 4: Display the flashlight state on the screen.

## VII Resources required (Additional)

| Sr. No. | Name of Resource | Specification | Quantity | Remarks (If any) |
|---|---|---|---|---|
| 1. | Android enabled smartphone / Android version supporting emulator | 4GB RAM | 1 | Data cable is mandatory for emulators |

## VIII Precautions to be followed

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

## IX Conclusion

……

……

……

## X Practical related Questions

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

1. Which Android class is used to control the flashlight?
2. How can you check at runtime if a device supports flashlight functionality?
3. What is the purpose of setTorchMode() method in CameraManager?
4. What exceptions can occur when accessing flashlight hardware?
5. How can you prevent overheating or battery issues when using flashlight apps?

**(Space for Answer)**

……

……

……

……

……

……

……

……

……

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………

……………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION * MUMBAI

……

……

……

……

## XI References / Suggestions for further Reading

1. https://dev.to/dhruvjoshi9/how-to-make-a-simple-flash-light-android-app-step-by-step-detailed-guide-with-code-4coo
2. https://www.geeksforgeeks.org/android/how-to-build-a-simple-flashlight-torchlight-android-app/
3. https://medium.com/@aahsanaahmed26/building-a-flashlight-app-in-android-studio-java-a-step-by-step-guide-758e3818210e

## XII Assessment Scheme

***The given performance indicators should serve as a guideline for assessment regarding process and product related marks. Faculty must fill only the table at bottom.***

| | Performance Indicators | Weightage |
|---|---|---|
| | **Process related (15 Marks)** | **60%** |
| 1 | Logic formation | 30% |
| 2 | Debugging ability | 20% |
| 3 | Follow ethical practices | 10% |
| | **Product related (10 Marks)** | **40%** |
| 4 | Expected output | 10% |
| 5 | Timely Submission | 15% |
| 6 | Answer to sample questions | 15% |
| | **Total: 25 Marks** | **100%** |

| Marks obtained | | | Dated Sign of Teacher |
|---|---|---|---|
| **Process Related (15)** | **Product Related (10)** | **Total (25)** | |
| | | | |