GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering
Level: Diploma
Branch: Information Technology
Subject Code: DI04016051
Subject Name: Mobile Application Development

w. e. f. Academic Year:	2025-26
Semester:	4th
Category of the Course:	Professional Elective - I

Prerequisite:	Knowledge of Core Java Programming and XML basics.
Rationale:	Mobile applications have become a vital part of every business and service. Understanding how to design, develop, and deploy mobile applications helps students apply software engineering and programming principles to real-world mobile platforms. This course focuses on Android app development using Android Studio and Java, emphasizing UI design, event handling, data storage using SQLite and Firebase, and exposure to emerging technologies like APIs, JSON, and cross-platform frameworks. It lays the foundation for developing industry-ready, user-friendly mobile applications.

Course Outcome:

After Completion of the Course, Student will be able to:

S. No	Course Outcomes	RBT Level
01	Understand the fundamentals of Android OS.	Remember /Understand
02	Understand Android architecture and use its core components.	Understand
03	Develop interactive User Interfaces using layouts and views.	Apply
04	Implement data storage using SQLite and Firebase Realtime Database.	Apply
05	Explore and demonstrate modern technologies such as Kotlin, Flutter (Cross-platform development), APIs, and JSON parsing.	Understand / Apply

**Revised Bloom's Taxonomy (RBT)*

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Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA(M)	PA(I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Introduction to Android** 1.1. Overview of Mobile Operating Systems 1.2. Android and iOS comparison 1.3. Features and Versions of Android 1.4. Introduction to Android Studio 1.5. Running Apps on Emulator / Physical Device	04	10
2.	**Android Architecture & App Components** 2.1. Android Architecture 2.1.1. Linux Kernel 2.1.2. Libraries 2.1.3. Android Runtime 2.1.4. Application Framework 2.1.5. Applications 2.2. Application Components Overview 2.2.1. Activity and its lifecycle 2.2.2. Service and its lifecycle 2.2.3. Broadcast Receiver 2.2.4. Content Provider 2.3. Android Manifest	08	18
3.	**UI Design and Event Handling** 3.1. Layouts: 3.1.1. Linear Layout 3.1.2. Relative Layout 3.1.3. Constraint Layout	14	32

	3.1.4. Grid Layout 3.2. Views & Widgets: 3.2.1. Text View 3.2.2. Edit Text 3.2.3. Button 3.2.4. Image View 3.2.5. Scroll View 3.2.6. List View 3.2.7. Recycler View 3.3. Concept of Event-driven Programming 3.3.1. Event Listeners and Callback Methods 3.3.2. Event Handling Methods: on Click(), on Key(), on Touch (), on Focus Change() 3.3.3. Item Selection Events using on Item Selected() (List View) 3.4. Intents (Explicit & Implicit) and passing data between activities 3.5. Toasts, Dialogs, and Menus (Options, Context, Popup)		
4.	**Data Storage** 4.1. Shared Preferences 4.2. SQLite Database 4.2.1. SQLiteOpenHelper Class 4.2.2. CRUD Operations (Insert, Read, Update, Delete) 4.3. Firebase Realtime Database: 4.3.1. Setup, Connection with Android Studio 4.3.2. Insert, Retrieve, and Display Data using Firebase	12	25
5.	**Recent Trends and Technologies in Android App Development** 5.1. Introduction to Kotlin for Android 5.2. Overview of Cross-platform Mobile Application Development: Flutter and React Native 5.3. Introduction to APIs and JSON Parsing 5.4. Overview of Publishing an Android App	07	15
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	**32**	**28**	**-**	**-**	**-**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:
(a) Books:

Sr. No.	Title of Book	Author	Publication with place, year and ISBN
1	Head First Android Development	Dawn Griffiths, David Griffiths	O'Reilly Media, ISBN: 978-1-492-07647-6
2	Android Programming for Beginners	John Horton	Packt Publishing, ISBN: 978-1789538505
3	Professional Android	Reto Meier	Wiley India Pvt. Ltd., ISBN: 978-8126535082
4	Android Studio 4.2 Development Essentials - Java Edition	Neil Smyth.	Payload Media, Inc. ISBN-10: 1951442318

(b) Open-source software and website:

1. https://developer.android.com
2. https://www.geeksforgeeks.org/android-tutorial
3. https://www.tutorialspoint.com/android/index.htm

Suggested Course Practical List:

The following practical outcomes (PrOs) are the subcomponents of the COs. These PrOs need to be attained to achieve the COs.

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Install Android Studio, configure SDK, and create a simple "Hello World" application.	1	2
2	Develop a simple app that demonstrates the activity lifecycle.	2	2
3	Design a static user interface using Linear Layout and Relative Layout.	3	2
4	Design a user interface using Constraint Layout and Grid Layout.	3	2
5	Develop a simple calculator app that takes user input and performs basic arithmetic operations like addition, subtraction, multiplication, and division.	3	2
6	Develop an Android application that uses an Intent to pass data between different activities.	3	2
7	Develop an Android application that uses Implicit intent to open the dialer with a given phone number.	3	2
8	Develop an Android application to change screen color as per the user choice from a menu.	3	2
9	Develop an Android application that uses Content Providers to share data between different apps and components.	2	2
10	Develop an Android application that stores and retrieves username using shared preferences.	4	2
11	Develop an Android application that creates a database using SQLiteOpenHelper Class and performs Insert and Read from the SQLite database.	4	2
12	Develop an Android application to Update and Delete data from the SQLite database using SQ Lite Open Helper class.	4	2

13	Develop an Android application that integrates Firebase real-time database and store the data into it.	**4**	**2**
14	Develop an Android application to retrieve data from Firebase Realtime Database or a JSON data source (REST API), parse the JSON response, and display the data in a Recycler View.	**5**	**4**
	Total		**30**

Note:- More Practical Exercises can be designed and offered by the respective course teacher to develop the industry relevant skills/outcomes to match the COs. The above table is only a suggestive list.

List of Laboratory/Learning Resources Required:

Sr. No.	Laboratory/Learning Resources/Equipment Name with Broad Specifications	PrO. No.
1	Computer System with Windows 10 or higher, 8GB RAM, Android Studio installed, Firebase SDK, Emulator / Test Device	**All**

Suggested Project List:

Only one project is planned to be undertaken by each student, assigned at the beginning of the semester. Each project should integrate at least two Course Outcomes (COs).

Sample Projects:

i) Expense Tracker App – Store daily expenses using SQLite and display reports.
ii) To-Do List App – Add, edit, and delete tasks using Firebase.
iii) Student Information App – CRUD operations with SQLite & simple UI.

Suggested Activities for Students:

a) Seminar on emerging technologies in Android (Kotlin, Flutter).
b) Build a small app integrating UI and SQLite database.
c) Group presentation on Firebase integration and cloud storage.
d) Organize an institute-level Android app development hackathon.

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