COURSE PACK

SCHEME

The scheme is an overview of work-integrated learning opportunities and gets students out in to the real world. This will give what a course entails.

<table>
<tr><td>Course Title</td><td colspan="3">Mobile Application Development</td><td colspan="2">Course Type</td><td colspan="4">Integrated</td></tr>
<tr><td>Course Code</td><td colspan="3">R1PC301B</td><td colspan="2">Class</td><td colspan="4">MCA III Sem</td></tr>
<tr><td rowspan="6">Instruction delivery</td><td>Activity</td><td>Credits</td><td>Credit Hours</td><td colspan="4" rowspan="2">Total Number of Classes per Semester</td><td colspan="2" rowspan="2">Assessment in Weightage</td></tr>
<tr><td>Lecture</td><td>3</td><td>3</td></tr>
<tr><td>Tutorial</td><td>0</td><td>0</td><td rowspan="3">Theory</td><td rowspan="3">Tutorial</td><td rowspan="3">Practical</td><td rowspan="3">Self-Study</td><td rowspan="3">CIE</td><td rowspan="3">SEE</td></tr>
<tr><td>Practical</td><td>1</td><td>2</td></tr>
<tr><td>Self-study</td><td>0</td><td>0</td></tr>
<tr><td>Total</td><td>4</td><td>5</td><td>40</td><td>0</td><td>15</td><td>0</td><td>50%</td><td>50%</td></tr>
<tr><td>Course Lead</td><td colspan="2">Dr. Anurag Gupta</td><td>Course Coordinator</td><td colspan="6"></td></tr>
<tr><td rowspan="2">Names Course Instructors</td><td colspan="3">Theory</td><td colspan="6">Practical</td></tr>
<tr><td colspan="3">Dr. Anurag Gupta
Dr. Shambhu Kumar Jha
Dr. Ashish Tripathi
Dr. Lalit Sharma
Dr. Rajnesh Singh
Ms. Richa Kumari
Ms. Shilpy Gupta</td><td colspan="6">Dr. Anurag Gupta
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</table>

COURSE OVERVIEW

The Android App Development course is designed to provide learners with a comprehensive understanding of developing applications for the Android platform. Throughout this program, students will gain hands-on experience and practical knowledge of the key concepts, tools, and best practices in Android app development. By the end of the course, learners will be equipped with the skills necessary to create their own Android applications and deploy them to the Google Play Store. The course equips them with the skills to meet market demands, seize career opportunities, and contribute to the growth of the Android ecosystem both in India and abroad.

PREREQUISITE COURSE

PREREQUISITE COURSE REQUIRED	**YES /NO**	
If, yes please fill in the details:	**Prerequisite course code**	**Prerequisite course name**
	PPFS (E1PA103B) **Data Structures (E1PY203B)**	**Programming Fundamentals**
	E1PY201B	**Java Programming**

COURSE OBJECTIVE

1. To familiarize students with the architecture, components, and development tools of the Android platform.
2. To gain a solid understanding of the fundamental principles of Android app development.
3. To explore and implement advanced features and functionalities in Android applications.
4. To enable students to create and publish apps on the Google Play Store and explore monetization options for Android apps.

COURSE OUTCOMES (COs)

After the completion of the course, the student will be able to:

CO No.	Course Outcomes
R1PC301B.1	Remember and understand the architecture of Android, including its history, features, and directory structure.
R1PC301B.2	Apply knowledge to design and develop user interfaces for Android applications
R1PC301B.3	Analyze the usage of core components of Android in creating android applications.
R1PC301B.4	Evaluate the advanced features in Android app development, including SQLite databases, Bluetooth, geo location, SMS, MMS, graphics, and animations.

BLOOM'S LEVEL OF THE COURSE OUTCOMES

Bloom's taxonomy is a set of hierarchical models used for the classification of educational learning objectives into levels of complexity and specificity. The learning domains are cognitive, affective, and psychomotor.

INTEGRATED

CO No.	Remember (KL1)	Understand (KL2)	Apply (KL3)	Analyze (KL4)	Evaluate (KL5)	Create (KL6)
R1PC301B.1	✓	✓				
R1PC301B.2			✓			
R1PC301B.3				✓		
R1PC301B.4					✓	✓

PROGRAM OUTCOMES (POs):

1. Computational Knowledge: Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.

2. Problem Analysis: Identify, formulate, research literature, and solve complex computing

problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.

3. Design /Development of Solutions: Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

4. Conduct investigations of complex Computing problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern Tool Usage: Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.

6. Professional Ethics: Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.

7. Life-long Learning: Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.

8. Project management and finance: Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

9. Communication Efficacy: Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

10. Societal and Environmental Concern: Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practices.

11. Individual and Team Work: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.

12. Innovation and Entrepreneurship: Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

PROGRAMME SPECIFIC OUTCOME (PSO):

PSO1: Have the ability to work with emerging technologies in computing requisite to Industry 4.0.

PSO2: Demonstrate application development skills learned through technical training and projects to solve real world problems.

COURSE ARTICULATION MATRIX

The Course articulation matrix indicates the correlation between Course Outcomes and Program Outcomes and their expected strength of mapping in three levels (low, medium, and high).

Course Articulation matrix

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
R1PC301B.1	2	3												
R1PC301B.2		3	2	2	2									1
R1PC301B.3	3													
R1PC301B.4													1	2

Note: 1-Low, 2-Medium, 3-High

COURSE ASSESSMENT

The course assessment patterns are the assessment tools used both in formative and summative examinations.

Assessment Tools	CIE						Total CIE marks	SEE
	QUIZ 1 /AAT	MTE	QUIZ2/AAT	LAB	LAB EXAM	Course-based Project		
Integrated		X		X				
		50		25	25		100	100

Assignment, Quiz, Class test, SWAYAM/NPTEL/MOOCs and etc.

COURSE CONTENT
(THEORY + PRACTICAL)

CONTENT
Theory: History of Android, Features of Android, Android Devices, Android Versions, Open Handset Alliance (OHA), Advantages of Android, Comparing Android with other platform, Architecture of Android. Android Directory Structure, Structure of Manifest files, Android Development Tools. Views, Views Group, Widgets – Button, EditText, CheckBox, TextView, ToggleButton, Layouts, Styles, Themes, Orientation, Screen Size and Density, Unit of measurement - px, dp, sp and dpi, pt, conversion of dp to px Activities, Activity life cycle, Intents, types of intents, Intent Filter, Fragment, fragment lifecycle, Services, Broadcast receivers, Content providers, Starting a new activity, Sending and Receiving of data. SQLite database, Cursors and content values, Opening and closing Database, Sensors, Bluetooth, Geo Location, SMS & MMS, Graphics and Animation Security Creating a signing certificate, Signing your applications for distribution, Publishing on Google Play, Monetization strategies, Application promotion strategies, Using Google Analytics **Practical:** 1. Develop an application that uses GUI components, Font and Colours 2. Develop an application that uses Layout Managers and event listeners. 3. Develop a native calculator application. 4. Write an application that draws basic graphical primitives on the screen. 5. Develop an application that makes use of database. 6. Develop an application that makes use of RSS Feed. 7. Implement an application that implements Multi-threading. 8. Develop a native application that uses GPS location information. 9. Implement an application that writes data to the SD card. 10. Implement an application that creates an alert upon receiving a message. 11. Write a mobile application that creates alarm clock. 12. Create an application to display various activity life cycle. 13. Create an application to display fragment life cycle methods. 14. Create an application to display services life cycle. 15. Create an application that makes use of implicit and explicit intent. 16. Create an application for Broadcast sender and receivers.

LESSON PLAN FOR INTEGRATED COURSES

FOR THEORY 15 weeks * 3 Hours = 45 Classes) (1credit = 1 Lecture Hour)
FOR PRACTICAL 15 weeks * 2Hours = 30 Hours lab sessions (1 credit = 2 lab hours)
FOR COURSE - BASED PROJECT 15 weeks * 3 Hours = 45 Hours lab sessions
(1 credit = 3 self-Learning hours) (Not to mention in lesion plan)

THEORY

L-No	Topic for Delivery	Tutorial/ Practical Plan	CO	KL	Competency
1	History of Android, Features of Android,	Introduction to Android Development	CO1	L1	Understanding Android architecture and history
2	Android Devices, Android Versions		CO1	L2	
3	Open Handset Alliance (OHA),		CO1	L2	
4	Advantages of Android		CO1	L2	
5	Comparing Android with other platforms		CO1	L4	
6	Architecture of Android		CO1	L4	
7	Android Directory Structure		CO1	L3	Configuring Android Studio environment
8	Structure of Manifest files		CO1	L4	
9	Android Development Tools		CO2	L2	Creating a basic Android application
10	Views	Basic UI Components - Button, EditText, CheckBox, TextView	CO2	L2	Designing user interfaces with basic components
11	Views Group		CO2	L3	Designing user interfaces with advanced components
12	Widgets	Basic UI Components - RadioButton, ImageView, Spinner	CO2	L4	Designing complex and responsive user interfaces
13	Button		CO2	L4	
14	Layouts		CO2	L3	
15	Styles		CO2	L3	
16	Themes		CO2	L3	
17	Orientation, Screen Size and Density,	UI Layouts - Linear, Relative, Constraint, Frame	CO3	L2	
18	Unit of measurement - px, dp, sp and dpi, pt		CO3	L2	
19	Conversion of dp to px	UI Layouts - Table, Grid, ScrollView	CO3	L2	
20	Activities	Handling User Input - Buttons, EditText	CO3	L2	Managing user input in Android apps
21	Activity life cycle		CO3	L3	
22	Intents,	Handling User Input - CheckBox, RadioButton	CO3	L3	Communicating between activities using intents
23	Types of intents		CO3	L4	
24	Intent Filter	Fragments - Creating and Managing	CO3	L4	
25	Fragment lifecycle	Fragments - Communication with	CO4	L2	Implementing fragments in Android

		Activity			apps, Managing fragment lifecycle in Android apps
26	Services	Creating and Starting Services	CO4	L2	Implementing services in Android apps
27	Broadcast receivers	Registering Broadcast Receivers	CO4	L2	Handling broadcasted events in Android apps
28	Content providers	Implementing Content Providers	CO4	L2	Managing data storage and retrieval in Android
29	Starting a new activity	Navigating between Activities	CO4	L2	Managing activity navigation in Android apps
30	Sending and Receiving data	Sending data between Activities	CO4	L3	Exchanging data between activities in Android
31	SQLite database	Creating and Managing SQLite Databases	CO4	L3	Working with SQLite databases in Android apps
32	Cursors and content values	Querying and Updating SQLite Databases	CO4	L3	Manipulating data in SQLite databases
33	Opening and closing Database	Working with SQLite in Android Apps	CO4	L3	Properly managing SQLite database connections
34	Sensors	Accessing Sensors Data	CO4	L3	Utilizing sensors in Android apps
35	Bluetooth	Establishing Bluetooth Connections	CO4	L3	Implementing Bluetooth functionality
36	GeoLocation	Getting Location Data	CO4	L2	Utilizing geolocation in Android apps
37	SMS & MMS	Sending and Receiving SMS and MMS	CO4	L3	Integrating SMS and MMS features in Android apps
38	Graphics and Animation	Creating Graphics and Animations	CO4	L2	Adding visual effects to Android apps
39	Security	Creating a Signing Certificate	CO4	L3	Securing Android apps with signing certificates
40	Signing your applications for distribution	Signing APK for Release	CO4	L3	Releasing Android apps on Google Play Store
41	Publishing on Google Play	Preparing App for Google Play Store	CO4	L4	
42	Monetization strategies	Exploring App Monetization Options	CO4	L4	Implementing monetization strategies

43	Application promotion strategies	Promoting Android Apps	CO4	L4	Promoting Android apps to increase visibility
44	Using Google Analytics	Implementing Analytics in Android Apps	CO4	L4	Tracking app usage and user behavior
45	Revision		CO4	L4	

PRACTICAL

L-No	Topic for Delivery	Tutorial/ Practical Plan	CO	KL	Skill	Competency
1	Develop an application that uses GUI components, Font and Colors	Create a basic Android app with GUI components and customize font and colors	CO1	L4	Android app development basics	Designing user interfaces with GUI components
2	Develop an application that uses Layout Managers and event listeners	Design an Android app with different layout managers and handle event listeners	CO1	L4	Android app development basics	Implementing layouts and event handling
3	Create an application to display various activity life cycle	Develop an Android app that demonstrates the different lifecycle methods of an activity	CO1	L4	Android app development basics	Understanding and implementing activity lifecycle methods
4	Create an application to display fragment life cycle methods	Build an Android app that showcases the lifecycle methods of fragments	CO2	L4	Android app development basics	Understanding and implementing fragment lifecycle methods
5	Create an application to display services life cycle	Design an Android app that demonstrates the lifecycle of services	CO2	L4	Android app development basics	Understanding and implementing service lifecycle methods
6	Create an application that makes use of implicit and explicit intents	Develop an Android app that utilizes both implicit and explicit intents for navigation and communication between components	CO2	L4	Android app development basics	Applying and utilizing implicit and explicit intents
7	Create an application for Broadcast sender and receivers	Build an Android app that sends and receives broadcast messages using broadcast receivers	CO3	L4	Android app development basics	Implementing broadcast sender and receiver components
8	Develop a native calculator application	Build a calculator app with arithmetic operations and user input handling	CO3	L4	Android app development basics	Implementing calculator functionality
9	Write an application	Create an Android app that	CO3	L4	Graphics	Implementing basic

L-No	Topic for Delivery	Tutorial/ Practical Plan	CO	KL	Skill	Competency
	that draws basic graphical primitives on the screen	can draw basic shapes and graphics on the screen			and animation	graphics in Android apps
10	Develop an application that makes use of a database	Design an app that integrates SQLite database and performs CRUD operations	CO4	L4	Database management	Working with databases in Android apps
11	Develop an application that makes use of an RSS Feed	Create an app that fetches and displays RSS feed data	CO4	L4	Network communication	Integrating RSS feed functionality
12	Implement an application that implements Multithreading	Build an app that utilizes multithreading for concurrent tasks	CO4	L4	Multithreading	Implementing multithreading in Android apps
13	Develop a native application that uses GPS location information	Design an app that accesses and displays GPS location data	CO4	L4	Hardware integration	Utilizing GPS functionality in Android apps
14	Implement an application that writes data to the SD card	Create an app that can write and retrieve data from the device's SD card	CO4	L4	File I/O	Managing SD card operations in Android apps
15	Implement an application that creates an alert upon receiving a message	Build an app that triggers an alert when a message is received	CO4	L4	Messaging	Handling incoming messages in Android apps

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- **Text Books**

1. Android: A Programming Guide by J.F. DiMarzio (50%)
2. Android Programming for Beginners Third Edition by John Horton(50%)

- **Reference Books**

3. Programming android by Zigurd Mednieks
4. Android User Interface Design: Turning Ideas and Sketches into Beautifully Designed Apps byIan G. Clifton
5. Using SQLite (2010) by Jay A. Kreibich

- **Journals/Magazines/Govt. Reports/Gazatte/Industry Trends**

6. International Journal of Human–Computer Interaction: Taylor and Francis.
7. International Journal of Human-Computer Studies: Science Direct

- **Webliography**

8. https://developer.android.com/courses
9. https://learndigital.withgoogle.com/digitalgarage/course/android-developer

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10. https://nptel.ac.in/courses/106106147
11. https://onlinecourses.swayam2.ac.in/nou21_ge41/preview

PROBLEM-BASED LEARNING

Exercises in Problem-based Learning (Assignments) (Min 45 Problems*)

SNo	Problem	Bloom's Taxonomy Level
1	Develop an application that displays "Hello, World!" on the screen.	KL2
2	Create an app that allows users to input their name and displays a personalized welcome message.	KL3
3	Develop a calculator app that performs basic arithmetic operations (addition, subtraction, multiplication, division).	KL3
4	Design an app that converts temperature between Celsius and Fahrenheit.	KL3
5	Create an app that plays a sound or music when a button is pressed.	KL3
6	Develop a currency converter app that converts between different currencies.	KL3
7	Design an app that displays random quotes or facts when a button is clicked.	KL3
8	Create a weather app that fetches and displays current weather information for a specific location.	KL4
9	Develop a notes-taking app that allows users to create, edit, and delete notes.	KL4
10	Design a recipe app that displays recipes with ingredients and instructions.	KL4
11	Create a stopwatch app that starts, stops, and resets the timer.	KL4
12	Develop a countdown timer app with adjustable time settings and a notification when the time is up.	KL4
13	Design a quiz app with multiple-choice questions and keeps track of the user's score.	KL4
14	Create a flashlight app that turns the device's camera flash on and off.	KL4
15	Develop a music player app that allows users to play, pause, and skip songs.	KL4
16	Design a calendar app that allows users to add, edit, and delete events.	KL4
17	Create a photo editing app that applies filters and effects to images.	KL4
18	Develop a reminder app that sends notifications for important tasks or events.	KL4
19	Design a chat app that allows users to send and receive messages.	KL5
20	Create a location-based app that displays nearby restaurants, shops, or landmarks.	KL5
21	Develop a fitness tracking app that records and displays user's exercise data (steps, distance, calories burned).	KL5
22	Design a to-do list app that helps users manage their tasks and deadlines.	KL5

SNo	Problem	Bloom's Taxonomy Level
23	Create a social media app that allows users to post, like, and comment on posts.	KL5
24	Develop a music streaming app that plays songs from an online database.	KL5
25	Design a language learning app that provides lessons, quizzes, and vocabulary exercises.	KL5
26	Create a camera app that captures photos and allows users to apply filters and share them.	KL5
27	Develop a ride-sharing app that connects drivers and passengers for shared transportation.	KL6
28	Design a news app that displays headlines, articles, and allows users to save articles for offline reading.	KL6
29	Create a fitness challenge app that sets goals and tracks progress for various fitness activities.	KL6
30	Develop a barcode scanner app that scans and provides product information from barcodes.	KL6
31	Design a travel planning app that suggests itineraries, attractions, and booking options.	KL6
32	Create a virtual reality app that offers immersive experiences using VR technology.	KL6
33	Develop a food delivery app that allows users to order food from local restaurants.	KL6
34	Design an augmented reality app that overlays digital information on the real world.	KL6
35	Create a language translation app that translates text or speech between different languages.	KL6
36	Develop a navigation app that provides turn-by-turn directions and real-time traffic information.	KL6
37	Design a video streaming app that plays movies, TV shows, or live streams.	KL6
38	Create an e-commerce app that allows users to browse and purchase products online.	KL6
39	Develop a social networking app that connects users based on shared interests or activities.	KL6
40	Design a meditation app that offers guided meditation sessions and relaxation techniques.	KL6
41	Create a virtual assistant app that responds to voice commands and performs tasks.	KL6
42	Develop a productivity app that helps users organize their tasks, schedules, and goals.	KL6

SNo	Problem	Bloom's Taxonomy Level
43	Design an educational app that provides interactive lessons, quizzes, and progress tracking.	KL6
44	Create a budgeting app that helps users track their expenses and manage their finances.	KL6
45	Develop a ticket booking app that allows users to book tickets for movies, events, or flights.	KL6

Dr. Anurag Gupta

Course-Coordinator