MOBILE APPLICATION DEVELOPMENT **Course Code : 316006**

Programme Name/s	**: Artificial Intelligence/ Artificial Intelligence and Machine Learning/ Cloud Computing and Big Data/ Computer Technology/ Computer Engineering/ Computer Science & Engineering/ Data Sciences/ Computer Hardware & Maintenance/ Information Technology/ Computer Science & Information Technology/ Computer Science**
Programme Code	**: AI/ AN/ BD/ CM/ CO/ CW/ DS/ HA/ IF/ IH/ SE**
Semester	**: Sixth**
Course Title	**: MOBILE APPLICATION DEVELOPMENT**
Course Code	**: 316006**

I. RATIONALE

Android OS is one of the fastest growing environments which are widely used by smartphones, smart T.V, tablets and other equipments. Mobile Application Development course helps to design and covers the concepts which are required to understand and develop Android based applications.After completing this course students will be able to design, build and publish real-time Android applications.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the students to attain the following Industry Identified Outcomes through various teaching learning experiences:

• Build real-time Android applications.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- 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.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme												
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical							
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
316006	MOBILE APPLICATION DEVELOPMENT	MAD	DSC	2	-	4	2	8	4	-	-	-	-	-	25	10	25#	10	25	10	75

Total IKS Hrs for Sem. : 0 Hrs

Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination

Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Differentiate between Android and other operating systems. TLO 1.2 Enlist Android OS features. TLO 1.3 Explain android architecture. TLO 1.4 Identify IDEs for Android Application development.	**Unit - I Basics of Android OS** 1.1 Introduction to Android Operating System 1.2 Need and features of Android 1.3 Android Architecture Framework 1.4 Introduction to Android Application Development IDE (Android Studio, Eclipse, Visual Studio with Xamarin etc.)	Lecture Using Chalk-Board Hands-on
2	TLO 2.1 Explain JDK and SDK for developing Mobile application. TLO 2.2 Explain different Android tools. TLO 2.3 Distinguish between DVM and JVM. TLO 2.4 Explain various Android terminologies. TLO 2.5 Explain relevant analogy of Android directory structure.	**Unit - II Introduction to Android Environment** 2.1 Use of Java JDK and introduction to Android SDK 2.2 Different Android tools like Android Development Tools (ADT), Android Virtual Devices (AVD) and emulators 2.3 Dalvik Virtual Machine (DVM) , difference between DVM and JVM 2.4 Terminologies in Android : Android Run Time (ART), Over the Air (OTA), Firmware Over The Air (FOTA), Global Positioning System (GPS) , Google Cloud Messaging (GCM) 2.5 Android directory structure	Hands-on Demonstration

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
3	TLO 3.1 Describe to develop user interface for the given Android application. TLO 3.2 List steps to implement different layouts. TLO 3.3 Explain the process of developing Android application using given Android views. TLO 3.4 Write the steps to design Splash screen.	**Unit - III Design UI in Android** 3.1 GUI components like : Text View, Edit Text, Button, types of buttons like image button , toggle button, Checkbox, Radiobutton, Radiobutton Group, Progress bar, Scrollbars, List, Custom Toast Alert message etc. 3.2 Introduction to Layouts and types of Layouts : Constraint layout, Linear Layout, Frame Layout, Relative Layout etc. 3.3 Introduction to views and its types : List view, Grid view, Image view, Scroll view 3.4 Basics of splash screen , adding styles to splash screen	Demonstration Hands-on
4	TLO 4.1 Explain the use of given components for Android application development. TLO 4.2 Explain the use of different life cycle methods to develop Android Application. TLO 4.3 Write the steps to establish database connectivity to fire queries for performing the given database management operations.	**Unit - IV Android Components and Database Connectivity** 4.1 Major components in Android : Intent, Activity, Services, Broadcast Receiver 4.2 Life cycle of Android components like Activity, Broadcast Receiver, Services etc. 4.3 SQLite/Firebase database, necessity of SQLite/Firebase, creation and connection of the database, extracting data from the databases	Lecture Using Chalk-Board Presentations
5	TLO 5.1 Write the stpes to implement various advanced android concepts to develop an application. TLO 5.2 Explain the process to apply security services in android application development. TLO 5.3 Write steps to publish the given android application.	**Unit - V Android Application Deployment** 5.1 Advanced Concepts : Fragments,Location based services, SMS telephony, Audio capture, Camera, Bluetooth etc. 5.2 Security Concepts : Android security model, declaring and using permissions, using custom permission 5.3 Application Deployment : Process for creating and deploying Android applications on Google Play store, become a publisher	Presentations Lecture Using Chalk-Board

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Install any Android IDE .	1	*Install Android IDE and create Android virtual device	2	CO1
LLO 2.1 Use IDE to wirte and exceute Java program for Android application.	2	Develop a program to display “Hello World” on screen	2	CO2
LLO 3.1 Change the attributes in the directory structure.	3	*Explore the directory structure in Android IDE	2	CO2
LLO 4.1 Develop a program to implement Auto complete Text View and Edit Text.	4	* Develop android application using View Text and Edit Text.	2	CO3
LLO 5.1 Use different types of buttons in Android application.	5	*Develop a program to implement Button, Image Button and Toggle Button	2	CO3

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Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 6.1 Write a program to demonstrate the use of Checkbox and Radiobutton.	6	*Develop a program to design Checkbox and Radiobutton.	2	CO3
LLO 7.1 Implement progress Bar in android application.	7	Develop a program to implement Progress Bar	2	CO3
LLO 8.1 Create a login form using various UI components.	8	*Develop a program to create a login form using the above UI controls	2	CO3
LLO 9.1 Build android application using Linear and Constraint Layouts.	9	* Write program to implement Linear layout and Constraint layout to create any registration form with Custom Toast Alert	2	CO3
LLO 10.1 Develop android application using Frame, Table and Relative Layout.	10	Develop a program to implement Frame layout, Table layout and Relative layout for any e-commerce application	2	CO3
LLO 11.1 Create Android application to implement different types of views.	11	*Develop a program to implement Grid View, Image View, Scroll View, List View for any management system like library management/hotel management	2	CO3
LLO 12.1 Create an application to implement grid layout.	12	Develop a simple calculator which uses grid layout and GUI concepts	2	CO3
LLO 13.1 Write program to develop relevant GUI for given application.	13	* Develop a splash screen in android	2	CO3
LLO 14.1 Design a convertor application.	14	*Design and develop any convertor application like temperature convertor /currency convertor/ volume convertor	2	CO3
LLO 15.1 Implement a timer application.	15	Design and develop a simple countdown timer	2	CO3
LLO 16.1 Construct a date picker in application.	16	*Develop a program to implement Date Picker in application	2	CO3
LLO 17.1 Construct a time picker in application.	17	Develop a program to implement Time Picker in application	2	CO3
LLO 18.1 Create android activities.	18	Develop a program to create two simple activities for Login application	2	CO3
LLO 19.1 Implement intents in android application development.	19	*Develop a program to implement new Activity using explicit intent and implicit intent to open any other website	2	CO4
LLO 20.1 Implement android services to develop android applications.	20	*Develop a program to implement services like bluetooth/wifi	2	CO4
LLO 21.1 Implement the concept of broadcast receiver to develop and android application.	21	*Develop a program to implement a broadcast receiver to switch between different modes like Airplane mode/Silent Mode/Loud Mode	2	CO4
LLO 22.1 Implement the database operations with android front end.	22	*Develop a registration application to insert and retrieve the data from the database	2	CO4
LLO 23.1 Create an Android application for user authentication .	23	Develop an authentication application which uses database concepts	2	CO4
LLO 24.1 Develop an application which uses database.	24	Develop a MyContacts application which uses database concepts	2	CO4

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 25.1 Create Android application that uses camera with permissions.	25	Develop a program to use camera	2	CO5
LLO 26.1 Create application to Send and Receive SMS.	26	* Write a program for SMS application	2	CO5
LLO 27.1 Implement an email application.	27	*Develop a program to send and receive email	2	CO5
LLO 28.1 Develop GPS application.	28	Write a program that uses location services and checks for permissions	2	CO5
LLO 29.1 Build an Navigation drawer application.	29	*Write a program that creates Navigation drawer using fragment concepts	2	CO5
LLO 30.1 Build an torch application.	30	Write a program to create a simple flashlight app and check for permissions	2	CO5

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (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.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Micro project

- The micro project has to be industry based, internet based ,laboratory based or field based as suggested by teacher.

a) Simple chatting application - A real-time chat application is a software application that enables users to exchange messages and communicate with each other in real-time.
b) Class time-table application - It helps to keep track of your classes but also allows you to add events to your weekly schedule.

Other

- Complete course of Android App Development on NPTEL
- Complete course of Android Development Courses on Spoken Tutorial

Note :

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Any compatible open source Android IDE (like - Android Studio, Eclipse,Visual Studio with Xamarin with SQLite / Firebase database compatibility)	All
2	Computer System (Computer system with i3 and above processors which is available in the laboratory with minimum 8GB RAM)	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Basics of Android OS	CO1	2	0	0	0	0
2	II	Introduction to Android Environment	CO2	2	0	0	0	0
3	III	Design UI in Android	CO3	6	0	0	0	0
4	IV	Android Components and Database Connectivity	CO4	10	0	0	0	0
5	V	Android Application Deployment	CO5	10	0	0	0	0
Grand Total				**30**	**0**	**0**	**0**	**0**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Continuous Assessment based on Process and Product related Performance Indicators. Each Practical will be assessed considering:

60% weightage is to Process.
40% weightage is to Product.

Summative Assessment (Assessment of Learning)

- Laboratory Performance, Viva Voce

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	2	-	-	1	-	-	-			
CO2	2	1	-	3	-	-	1			
CO3	3	2	3	2	1	2	2			
CO4	2	2	2	2	1	3	1			
CO5	2	3	3	2	1	3	1			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Dixit, Prasanna Kumar	Android	Vikas Publication, New Delhi 2014, ISBN : 9789325977884
2	Maclean David , Komatineni Satya, Allen Grant	Pro Android 5	Apress Publications, 2015, ISBN :978-1-4302-4680-0
3	Hortan, John	Android Programming for Beginners	Packet Publications, 2015, ISBN : 978-1-78588-326-2
4	Pradeep Kothari	Android Application Development	Kogent Learning Solutions ISBN : 9789351194095

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.udemy.com/topic/android-development	Introduction to Android Operating system
2	https://onlinecourses.swayam2.ac.in/nou21_ge41/preview	Introduction to Android IDE tools.
3	https://www.geeksforgeeks.org/android-tutorial/	Basics of GUI components, layouts and views in android.
4	https://www.tutorialspoint.com/android/index.htm	Advanced components of android like intents, services, broadcast recevier and activities.
5	https://developer.android.com/training/data-storage/sqlite	Steps to insert and reteive data from the Databases.
6	https://developer.android.com/guide/topics/permissions/overview	Setting permissions in Android.
7	https://firebase.google.com/docs/database/android/start	Connectivity with Firebase database

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students