B.C.A. (5th Semester)

CS5002 : Fundamentals of Mobile Application Development

Teaching, Learning and Development Plan

Course Objective: To build knowledge of mobile technologies and its environment to design, develop and deploy applications for mobile devices using design elements, data management, system services, and media APIs.

Course Outcomes: Upon completion of the course, the student shall be able to

CO1:	Describe mobile technologies, its versions, mobile application development architecture and environment.	Understanding
CO2:	Describe the mobile application development life cycle and way of communication between application components.	Understanding, Analysis
CO3:	Design and develop mobile applications user interface using designing elements.	Understanding, Apply
CO4:	Analyze and use appropriate data storage options such as Shared Preferences, Internal, External and Database to manage data into mobile applications.	Apply, Analysis
CO5:	Creating and implement the background services and user alerts for improving the performance of the mobile application.	Analysis
CO6:	Integrate multimedia into mobile applications using media API.	Apply, Analysis

Programme Outcomes:

PO1: Ability to understand the concepts of key areas in computer science.
PO2: Ability to design and develop system, component or process as well as test and maintain it so as to provide promising solutions to industry and society.
PO3: Effective communication and presentation skill.
PO4: Ability to understand professional and ethical responsibility.
PO5: Recognition of the need for life-long learning.

Programme Outcomes and Course Outcomes mapping:

Course Outcomes	Programme Outcomes				
	PO1	PO2	PO3	PO4	PO5
CO1	√	√			√
CO2	√	√			√
CO3	√	√	√		
CO4	√	√		√	
CO5	√	√			√
CO6	√	√			√

Introductory Session — Hours: 01

Following points shall be addressed during the introductory session:

- Subject Introduction and its need
- Subject linkage with other subjects
- Discussion about emerging technology impact on mobile applications as well as job opportunity

Teaching Methodology :

- Discussion and formative questions to be asked based on student previous knowledge.

Unit: 1 Introduction to Mobile Application Development — Hours:07

Objective of unit :	To aware the students about mobile technologies- Android, iOS and Windows Mobile OS and IDE for mobile application development.		
Prerequisite :	Fundamental knowledge of Process and its role in Operating System, Method Overriding in Java.		
CO(s) mapping:	CO1	**PO(s) mapping:**	PO1, PO2, PO4, PO5
Learning Outcome:	Students shall able to use different mobile application development platforms and core components to build a mobile application.		

Sub Unit	Teaching Content	No. of Lecture(s)	Teaching Approach	References	Assessment
1.1	**Introduction of Mobile Technologies:** • Characteristics of Mobile Operating System and Desktop Computer Operating System • Mobile Technologies- Android, iOS and Windows	01	Discussion	WM#1, Page No:01–05, WR4, WR6	
1.2	**Features and Architecture:** • Mobile Platform Features • Job of Architecture in any Software • Working of Kernel in OS • Platform Architecture	02	Discussion and Presentation	WM#1, Page No:01–05, WR2	
1.3	**History of Operating System and Development Tools** • Versions: Android Version – 1.0 to 15 • Development tools: Android Studio, Android SDK, Anatomy of Mobile Application • Creating Sample Application	2	Discussion, Comparison and Demonstration	WM#1, Page No:02-03, WM#1, Page No:09-30, JFD#1, Page No:08-24,	
1.4	**Types of Mobile Application:** • Native, Hybrid and Web	01	Discussion and Comparison	WR1, WR5	
1.5	**Deployment Process :** • Becoming a Publisher, Rules for deployment & Deployment Process	01	Presentation and Demonstration	WM#30, Page No:677-689	

Reading references:	**Books References:** 1. Wei-Meng Lee, Beginning Android 4 Application Development, Wiley India Pvt Ltd.[WM] 2. J. F. DiMarzio, Beginning Android Programming with Android Studio, Wrox A Wiley Brand. [JFD]
	Web References: [WR= Web Reference] 1. https://www.pcloudy.com/types-of-mobile-apps/ [WR1] 2. https://developer.android.com/guide/platform [WR2] 3. https://developer.android.com/studio/intro [WR3] 4. **Week 6 – Lecture 27**: https://nptel.ac.in/courses/106/106/106106156/ [WR4] 5. **Week 6 – Lecture 28:** https://nptel.ac.in/courses/106/106/106106156/ [WR5] 6. https://www.ibm.com/topics/mobile-technology [WR6]

Unit: 2 Core Components Hours:07

Objective of unit :	To create mobile screen and learn its life cycle and working of built-in application.		
Prerequisite :	Method Overriding in Java		
CO(s) mapping:	CO2	**PO(s) mapping:**	PO1, PO2, PO4, PO5
Learning Outcome:	Student shall able to work with screen, modular screen.		

Sub Unit	Teaching Content	No. of Lecture(s)	Teaching Approach	References	Assessment
2.1	**Screen: Introduction and Life cycle:** • Phases of activity life cycle and methods	02	Presentation and Hands-on	WM#2, Page No: 36-40, JFD#3, Page No: 48-53, JFD#3, Page No: 61 – 75	**A1 [Quiz 1]**
2.2	**Linkage between Screen and In-Built application:** • Intents: Implicit Intent & Explicit Intent	02			
2.3	**Fragment:** • Introduction, Need, Lifecycle, Creation and Interfragment Communication	02	Presentation and Demonstration	WM#2, Page No: 69-84 JFD#3, Page No: 75 – 92	
2.4	**Application Resources and Assets:** • Storage and Retrieval of strings.xml, colors.xml, styles.xml, dimens.xml	01	Presentation and Hands-on	RM#3,Page No:64-81	**A6[Practical Quiz-1]**

Reading references:	**Books References:** 1. Wei-Meng Lee, Beginning Android 4 Application Development, Wiley India Pvt Ltd.[WM] 2. J. F. DiMarzio, Beginning Android Programming with Android Studio, Wrox A Wiley Brand. [JFD]
	Web References: [WR= Web Reference] 1. https://developer.android.com/guide/topics/ui/look-and-feel/themes [WR1] 2. https://material.io/components/menus#usage [WR2]

Unit: 3 Design Elements Hours:10

Objective of unit :	To identify that students are able to use the designing elements in Mobile Application.
Prerequisite :	Basic knowledge of GUI elements

CO(s) mapping:	CO3	PO(s) mapping:	PO2, PO4, PO5
Learning Outcome:	Students shall able to characterize, explore and demonstrate User Interface containers, GUI elements for designing an application.		

Sub Unit	Teaching Content	No. of Lecture(s)	Teaching Approach	References	Assessment
3.1	**Overview of User Interface:** • Comparisons between Desktop, Web, and Mobile	01	Presentation and Hands-on	DM#2,Page No:50-55	
3.2	**Designing UI with Layouts(Containers):** • Overview, Need • Screen elements: View and ViewGroup • Types: Linear, Relative, Constraint, and Grid-based	03			**A2 [Assignment - 1]**
3.3	**Screen Elements:** • User Input Elements : EditText, RadioButton, CheckBox, Spinner, Dialogs • Navigational Elements : Navigation Drawer, TabActivity • Informational Elements: Button, TextView, Cards, Toast Message • Data Representation Elements: ListView, RecyclerView	02	Presentation and Demonstration	JFD#5, Page No: 147 – 167, 175-186	
3.4	**Dialog Box in Application :** • Dialog : Need, Types: DatePicker dialog, TimePicker dialog, Alert dialog, Progress dialog	02	Presentation and Hands-on	JFD#3, Page No: 53 – 55, WR1	
3.5	**Exploring Menu:** • Menu : Need, Types : Option Menu & Context Menu	02	Discussion and Presentation	JFD#5,Page No: 215-225 , WR2, JFD#3,Page No: 56 – 61, JFD#5,Page No: 167-174	**A4 [Unit Tes Th & PR]**

Reading references:

Books References:

1. Wei-Meng Lee, Beginning Android 4 Application Development, Wiley India Pvt Ltd.[WM]
2. J. F. DiMarzio, Beginning Android Programming with Android Studio, Wrox A Wiley Brand. [JFD]
3. Dave MacLean, Satya Komatineni and Grant Allen, Pro Android 5, Apress.[DM]

Web References: [WR= Web Reference]

1. https://developer.android.com/guide/topics/ui/look-and-feel/themes [WR1]
2. https://material.io/components/menus#usage [WR2]

Unit: 4 Working with Data Storage Mechanism Hours:09

Objective of unit :	To classifying data storage mechanisms in mobile applications and understand their working mechanisms.

Prerequisite :	Basic knowledge of file operation, DBMS		
CO(s) mapping:	CO4	**PO(s) mapping:**	PO1, PO2, PO4, PO5
Learning Outcome:	Students shall able to work with different data storage mechanisms of a mobile application.		

Sub Unit	Teaching Content	No. of Lecture(s)	Teaching Approach	References	Assessment
4.1	**User Preference:** • Essentials, Saving and loading data to preference file	02	Presentation and Demonstration	DM#25,Page No:559-561 WM#6,Page No: 251-263 JFD#7, Page No: 231 - 250	
4.2	**Persisting Data to Files :** • Internal Storage • External Storage • Reading and Writing Data	02			
4.3	**CRUD operations :** • Overview, Essesntial of SQLite Database • Helper class creation and usage of Database • Data Manipulation operations, Data over View	03	Presentation and Demonstration	JFD#7, Page No: 254 - 266	**A3[Open Book Exam]**
4.4	**Shared Storage (Content Providers):** • Overview, Need, Advantages • Working with Built-In Providers: Call Log & Contact	02	Self Learning	WR1,WR2 JFD#8, Page No: 269 – 280	**A6[Practical Quiz-2]**
Reading references:	**Books References:** 1. Wei-Meng Lee, Beginning Android 4 Application Development, Wiley India Pvt Ltd.[WM] 2. J. F. DiMarzio, Beginning Android Programming with Android Studio, Wrox A Wiley Brand. [JFD] 3. Dave MacLean, Satya Komatineni and Grant Allen, Pro Android 5, Apress.[DM]				
	Web References: [WR= Web Reference] **1.** https://dzone.com/articles/how-read-call-logs 2. http://www.theappguruz.com/blog/android-call-logs-code-sample				

Unit: 5 Service and User Alerts Hours:08

Objective of unit :	To concise the concepts of background services and utilize the functionalities of Alarm, SMS and Notifications feature in the mobile application.		
Prerequisite :	Basic knowledge of web services.		
CO(s) mapping:	CO5	**PO(s) mapping:**	PO2, PO4, PO5
Learning Outcome:	Students shall able to utilize the background services and user alerts for improving the performance of mobile application development.		

Sub Unit	Teaching Content	No. of Lecture(s)	Teaching Approach	References	Assessment
5.1	**Service:** Introduction, Need, Life Cycle, and Creation	01	Presentation	DM#2,Page No:50-55	
5.2	**Service Task Management:** • Long service	02			**A2**

	• Repeated Service Management				**[Assignment - 2]**
5.3	**Management of SMS and Notification Services:** • SMS Manager • Service Manager	02	Presentation Demonstration	DM#5,Page No:130-140 WM#3,Page No: 105-123	
5.4	**User Alerts:** • Alarm : Overview, Needs	01	Presentation Demonstration	WM#8,Page No:321-324 DM#16,Page No:346-350, WM#2,Page No: 98-103	**A1 [Quiz 2]**
5.5	**Web Services:** Overview and Integration in application	02		WR1, WR2	

Reading references:	**Books References:** 1. Wei-Meng Lee, Beginning Android 4 Application Development, Wiley India Pvt Ltd.[WM] 2. J. F. DiMarzio, Beginning Android Programming with Android Studio, Wrox A Wiley Brand. [JFD] 3. Dave MacLean, Pro Android 5, Apress.[DM]
	Web References: [WR= Web Reference] 1. https://androidexample.com/Restful_Webservice_Call_And_Get_And_Parse_JSON_Data-Android_Example/index.php?view=article_discription&aid=101&aaid=123 2. https://www.tutlane.com/tutorial/android/android-json-parsing-with-examples 3. https://developer.android.com/guide/topics/ui/notifiers/notifications 4. https://developer.android.com/reference/android/app/AlarmManager

Unit: 6 Working with Multimedia Hours:07

Objective of unit :	To identify that students are able • To exemplifying Multimedia Integration • Design and construct the Animation • Work with Audio, Video and Audio Recorder		
Prerequisite :	Basic knowledge of GUI elements		
CO(s) mapping:	CO6	**PO(s) mapping:**	PO1, PO2, PO5, PO6
Learning Outcome:	Students shall able to understand the concept of multimedia and its working mechanism with different media APIs.		

Sub Unit	Teaching Content	No. of Lecture(s)	Teaching Approach	References	Assessment
6.1	**Media APIs:** Introduction, Need, Usage of raw folder	01	Presentation and Demonstration Presentation	DM#20 ,Page No:451-452 RM#3,Page No:64-66 , WR1	
6.2	**Working with Camera:** • Overview, Usage, Camera Parameters, Configuration, Capturing Still image	02			

6.3	**Animation:** • Need, Types: Frame by Frame and Tweened Animation	02	Presentation and Demonstration	RM#3,Page No:64-66 , WR1	
6.4	**Working with Audio, Video, Audio Recorder:** • Usage and Operations : Creating, Playing and Killing Memory	02	Demonstration	DM#20,Page No:453-457	**A5 [Internal Exam TH & PR]**
Reading references:	**Books References:** 1. Wei-Meng Lee, Beginning Android 4 Application Development, Wiley India Pvt Ltd.[WM] 2. J. F. DiMarzio, Beginning Android Programming with Android Studio, Wrox A Wiley Brand. [JFD] 3. Dave MacLean, Satya Komatineni and Grant Allen, Pro Android 5, Apress.[DM]				
	Web References: [WR= Web Reference] **1.** https://developer.android.com/reference/android/view/animation/Animation				

Assessment Plan:

Composition of CIE for Theory:

Assessment Code	Assessment Type	Duration of each	Occurrence	Each of marks	Weightage in CIE of 40 marks
A1	Quiz	30 minutes	2	10	04 x 02 = 08
A2	Poster Presentation	-	1	20	01 x 03 = 03
A3	Self-Creation	-	1	20	01 x 05 = 05
A4	Unit Test	1.5 Hours	1	30	01 x 10 = 10
A5	Internal Examination	3 Hours	1	60	14 x 01 = 14

Composition of CIE for Practical:

Assessment Code	Assessment Type	Duration of each	Occurrence	Each of marks	Weightage in CIE of 20 marks
A6	Practical Quiz	30 minutes	1	10	01 x 04 = 04
A7	Mid Term Examination	3 Hours	1	20	05 x 01 = 05
A8	Internal Examination	3 Hours	1	30	08 x 01 = 08
A9	Practical Workbook	-	-	15	03 x 01 = 03

Execution plan of Assessment:

<table>
<tr><td>Assessment Code: A1</td><td colspan="2">Assessment Type: Quiz</td><td colspan="2">Weightage of Unit:
Quiz – 1: Unit 1(1.1 to 1.6)(70%) Unit 2 (2.1 to 2.2) (30%)
Quiz – 2: Unit 1 (10%), Unit 2 (20%), Unit 3 (20%), Unit 4 (30%), Unit 5 (5.1 to 5.4) (20%)</td></tr>
<tr><td>Assessment Question Format:</td><td colspan="4">Multiple Choice Questions (MCQ) of understanding and analysis type where each Multiple Choice Questions (MCQ) consists of 1 or 0.5 mark. [Total Marks : 10 marks]</td></tr>
<tr><td>Objective :</td><td colspan="4">To test student's understanding skills and analytical skills for the core concepts of mobile technologies.</td></tr>
<tr><td>Quiz – 1</td><td rowspan="2">Course Outcome mapping:</td><td>CO1,CO2</td><td rowspan="2">Programme Outcome mapping:</td><td>PO1, PO2, PO5</td></tr>
<tr><td>Quiz – 2</td><td>CO1, CO2, CO3, CO4, CO5</td><td>PO1, PO2, PO5</td></tr>
</table>

Assessment Code: A2	**Assessment Type: Poster Presentation**	
Assessment Question Format:	• This parameter will be conducted in two phases. In phase – I, Topics from Unit-1, 2 and 3 will be given as a poster presentation to 50% students of the class. • In phase – II, another 50% students of the class, the topics from Unit-4, 5, and 6 will be given as a poster presentation. • Topic will be assigned by the course teacher on a prior basis. • One team consists of 4 members of the student's choice. • Phase – 1 will be conducted on 4th August 2023 and Phase –2 will be conducted on 29th September 2023. **Evaluation Criteria based on Rubric: (20 Marks)** Content Originality Organization Visual Design Innovation Usage of Supporting Materials Contribution	
Objective :	• To improve understanding and expository writing skill.	
Course Outcome mapping:	CO1, CO2, CO4, CO5	**Programme Outcome mapping:** PO1, PO2, PO4, PO5, PO6, PO7

Assessment Code: A3	**Assessment Type: Self Creation (Video-based Learning)**	**Weightage of Unit:** Unit 2(25%), Unit 3(25%), Unit 4(30%), Unit 5(10%), Unit 6(10%),
Assessment Question Format:	• Each student is required to find a video from the internet that discusses Mobile Application Development using the "Kotlin" programming language. Based on the content of the video, they should create an app.	

	• The app should include a minimum of three activities.
	• Repetition is prohibited.
	  ○ If one student selects a video from YouTube and decides to work on three related activities, another student from any class cannot choose to perform the exact same three activities.
	  ○ The second student can watch the same YouTube video, but they must select three different activities from the application.
	  ○ The course teacher is responsible for ensuring that there is no redundancy in the activities chosen by the students.
	• Prepare a report for your build activity and submit it to a course teacher. Report should contains following details, such as:
	  ○ Title of Application with short description.
	  ○ Put the code of each and every file where you made a change, such as Manifest file, layout files, and java files.
	  ○ Screenshots of working App including each activity with brief description.
	
	Evaluation Criteria based on Rubric: (20 Marks)
	In time submission
	Quality of Document (Correctness of code, Screenshots of developed application with brief description)
	Technical Viva	

Objective :	• To test student's understanding skills and analytical skills and self-learning skill.	
Course Outcome mapping:	CO1, CO2, CO3, CO4	**Programme Outcome mapping:** PO1, PO2, PO4, PO5, PO6, PO7

Assessment Code: A4	**Assessment Type: Unit Test**	**Weightage of Unit:** Unit 1(20%), Unit 2(40%), Unit 3(40%)
Assessment Question Format:	Q-1 (A): Answer in brief. Each question of 1 mark and having understanding type. (4 questions, marks will be 01 X 04 = 04 marks) Q-1 (B): Answer in brief. Each question of 2 marks and having understanding type. (3 out of 4 questions, marks will be 02 X 03 = 06 marks) Q-2 Do as directed. Each question of 5 marks and having analysis type. ((A) or (A) & (B) or (B) questions, marks will be 05 X 02 = 10 marks) Q-3 Answer in detail. Each question of 5 marks and having remembering type. (2 out of 3 questions, marks will be 05 X 02 = 10 marks)	
Objective :	To test a student's conceptual understanding, analysis and applying skills and the presence of the mind in the lecture.	
Unit Test - 1	**Course Outcome mapping:** CO1, CO2, CO3	**Programme Outcome mapping:** PO1, PO2, PO5

Assessment Code: A5	**Assessment Type: Internal Examination**	**Weightage of Unit:** Unit 1(15%), Unit 2(20%), Unit 3(15%), Unit 4(15%), Unit 5(20%), Unit 6(15%)
Assessment Question Format:	**Section-1** Q-1 (A) Answer in brief. Each question of 1 marks and having understanding type. (4 questions, marks will be 01 X 04 = 04 marks) Q-1 (B) Answer in brief. Each question of 2 marks and having understanding type. (3 out of 4 questions, marks will be 02 X 03 = 06 marks) Q-2 Do as directed. Each question of 5 marks and having analysis type. ((A) or (A) & (B) or (B) questions, marks will be 05 X 02 = 10 marks) Q-3 Answer in detail. Each question of 5 marks and having remembering type. (2 out of 3 questions, marks will be 05 X 02 = 10 marks) **Section-2** Q-4 (A) Answer in brief. Each question of 1 marks and having understanding type. (4 questions, marks will be 01 X 04 = 04 marks) Q-4 (B) Answer in brief. Each question of 2 marks and having understanding type. (3 out of 4 questions, marks will be 02 X 03 = 06 marks) Q-5 Do as directed. Each question of 5 marks and having analysis type. ((A) or (A) & (B) or (B) questions, marks will be 05 X 02 = 10 marks) Q-6 Answer in detail. Each question of 5 marks and having remembering type. (2 out of 3 questions, marks will be 05 X 02 = 10 marks)	
Objective :	To measure student's comprehension and analysis skills of mobile application development concepts.	
Course Outcome mapping:	CO1, CO2, CO3, CO4, CO5, CO6	**Programme Outcome mapping:** PO1, PO2, PO5

Assessment Code: A6	**Assessment Type: Practical Quiz**	
Practical Quiz	**Assessment Question Format:** Q-1. Do as directed. [20 marks]	**Weightage of Unit:** Unit 1(30%), Unit 2(70%)
	Minimum completed practical workbook questions: 2	
	Course Outcome mapping: CO1, CO2,CO3	**Programme Outcome mapping:** PO1, PO2, PO4
Objective:	To measure the student's understanding, analytical and technical skills.	

Assessment Code: A7	**Assessment Type : Mid Term Examination (PR)**	
Mid Term Examination	**Assessment Question Format:** Q-1 Do as directed. [5 marks] Q-2 Implement the solution of the given problem. [25 marks]	**Weightage of Unit:** Unit 1(15%), Unit 2(50%), Unit 3(35%)
	Minimum completed practical workbook questions: 6	

	Course Outcome mapping: CO1, CO2,CO3	**Programme Outcome mapping:** PO1, PO2, PO4
Objective:	To measure the student's understanding, analytical and technical skills regarding their learning during the covered units of the course.	

Assessment Code: A8	**Assessment Type: Internal Exam (PR)**	**Weightage of Unit:** Unit 1 to 6 (100%)	
Assessment Question Format:	Q-1: Do as directed. [05 marks] Q-2: Implement the solution of the given problem. [22 marks] Q-3: Viva [03 marks]		**Minimum completed practical workbook questions**: All practical
Objective :	Evaluate student's understanding, analytical, technical skills and system-based problem-solving skills.		
Course Outcome mapping:	CO1, CO2, CO3, CO4, CO5, CO6	**Programme Outcome mapping:** PO1, PO2, PO4	

Assessment Code: A9	**Assessment Type: Practical Workbook**	**Weightage of Unit:** Unit 1 to 6 (100%)
Assessment Question Format:	Student shall be solved the practical workbook definition given by the course teacher. Practical definition will be based on understanding and analytical type.	
Objective :	To test student's understanding, analytical and technical skills regarding real-time problems.	
Course Outcome mapping:	CO1, CO2, CO3, CO4, CO5, CO6	**Programme Outcome mapping:** PO1, PO2, PO4