

Post Graduate Diploma in Mobile Applications

Course Duration: 1 year (2 Semesters)

Course Description:

The one year PG Diploma in Mobile Applications provides career options for our students in the emerging technology sector of Mobile Applications. The student will possess the competent knowledge and skills to seek jobs in this sector. The course provides comprehensive knowledge, technical expertise and hands-on experience. This course also provides students with an understanding of major aspects of mobile technologies. Students will have an in-depth knowledge of Java and Android application development and testing of mobile apps

Employment Opportunities

Global Scenario

Mobile Applications have spawned a new industry aptly called the “Mobile Apps Economy” which continues to grow at a rapid pace.

- Number of Apps in Android market - Google Play: 1.5 million
- Number of Apps in Apple App Store: 1.4 million
- Estimated size of the current Mobile App Industry: \$ 35 billion*
- Global mobile app revenues amounted to 18.56 billion US dollars and are expected to grow to 76.52 billion US dollars in 2017**

The boom is set to create about 3 million Mobile Application Development related jobs worldwide.

**(Source: Gartner Inc) ** (Source: statista.com)*

Indian Scenario - Advantage India

The sector's exponential growth bodes well for India. With huge investments provided for developing both consumer and enterprise apps, the sector in India will open up challenging opportunities – for both outsourced and indigenous app development.

Indian App market estimated to be around Rs 150-200Cr; could grow up to Rs 2,000Cr by 2016: Avendus Report

The Indian app market was estimated to be Rs 150-200 crore during 2012, as per a study released by Avendus Partners. The total monthly revenues earned by Google Play and Apple app store from Indian customers was Rs 27.5 crore in October 2012 or an annualized run-rate of Rs 330 crore. Based on these estimates, the market size for 2012 has been pegged to be somewhere Rs 150-200 crore.

- As per the study, the Indian app market could reach Rs 2,000 crore by 2016.
- As per the estimates, Google Play and Apple App store are expected to cross Rs 800 crore each by 2016.

Apple accounted for 25% of Smartphone sales in Q1 2015, [according](#) to Kantar's data. Google Play downloads increased by 70% during the same time frame of Q3 2014 to Q1 2015. These increases were attributed to Android's growth in emerging markets.

Employment Opportunities

- Small, Medium and Large Professional Services IT Companies
- Enterprise Application Product and Service Companies
- Mobile Application Product and Service Companies
- VAS providers

Post Graduate Diploma in Mobile Applications

- e-Commerce, m-Commerce companies
- Internet companies

Career Progression Path - Mobile Applications

| Industry | Entry level (0-1 yrs exp.) | Mid Level (3-5 yrs exp.) | Advanced level (5 yrs plus exp.) |
|-----------------------|-------------------------------|-----------------------------------|--|
| Average Salary | Rs.2,00,000 – 4,00,000 | Rs.4,00,000 – 8,00,000 | Rs. 8,00,000 + |
| Job Role | Software Engineer / Developer | Sr. Software Engineer / Developer | Technical Lead / Technical Manager / Project Manager |
| | Test Engineer | Sr. Test Engineer | Test Manager |
| | Mobile Application Developer | Mobile Application Entrepreneur | CEO |
| | | Sr. Mobile Application Developer | Tech Lead/Project Manager |

Post Graduate Diploma in Mobile Applications

Course Objective:

Mobile Applications have spawned a new industry aptly called the ‘Mobile Apps Economy’ which continues to grow at a rapid pace. The boom is set to create about 3 million Mobile Application Development related jobs worldwide. The objective of this one year diploma program is to enhance the employability of students in the mobile application development industry.

Course Duration: 1 Year

Post Graduate Diploma in Mobile Applications

Course Matrix

| | | | | |
|--------------------|----------|--|------------------|----------------|
| Semester I | Theory 1 | Effective Communication Skills - I | 45 Hours | Credits |
| | Theory 2 | Mobile Architecture and Application Development | 60 Hours | Credits |
| | Theory 3 | Programming in Java | 45 Hours | Credits |
| | Theory 4 | Basic Android Programming | 60 Hours | Credits |
| | Theory 5 | Introduction to Security in Mobile Application Development | 60 Hours | Credits |
| | Lab 1 | Programming in Java - Lab | 45 Hours | Credits |
| | Lab 2 | Basic Android Programming - Lab | 60 Hours | Credits |
| | Lab 3 | Mini Project | 60 Hours | Credits |
| TOTAL HOURS | | | 435 Hours | Credits |
| Semester II | Theory 1 | Effective Communication Skills - II | 45 Hours | Credits |
| | Theory 2 | Advanced Android Programming | 60 Hours | Credits |
| | Theory 3 | Mobile Testing | 60 Hours | Credits |
| | Theory 4 | Mobile Ecosystem, Business Analysis and Models | 60 Hours | Credits |
| | Lab 1 | Advanced Android | 60 Hours | Credits |

| | | | | |
|--------------------|-------|----------------------|------------------|----------------|
| | | Programming - Lab | | |
| | Lab 2 | Mobile Testing - Lab | 45 Hours | Credit |
| | Lab 3 | Major Project | 120 Hours | Credits |
| TOTAL HOURS | | | 450 Hours | Credits |

Note: Credits are calculated based on 15 working weeks/semester.

Syllabus - Semester I

Theory 1: Effective Communication Skills (45 Hours)

Introduction (9 hours) - Tips to learn a new language - The process of learning a language - Basics of English - The parts of speech – Noun; Topic discussion - Introduce Yourself

Verb - Verb Exercise - Tense - Present, Past, Future; Topic Discussion - Jaipur – Why is it called the Pink City?

Vocabulary (9 hours) – verbs - 15 words with meaning in Hindi - Perfect Tense - Tongue – Twisters to improve the pronunciation; Topic Discussion - IPL Matches

Verbs - Vocabulary 15 words - Grammar - Auxiliary Verbs - Verb - Exercise - Learn & Know – Fruits - Tongue Twisters - Topics Discussion - Hollywood v/s Bollywood, Indian Food v/s Junk Food

Vocabulary and Verbs II (9 hours) - Vocabulary - verbs - 15 words - Adjective - Degrees of comparison - Tongue – Twisters; - Translation - Hindi to English 30 sentences; Topic discussion - If I were the Prime Minister of the country.

Vocabulary - Verbs – 15 words - Grammar - Adverbs; Story Telling (Story of your choices)

Comprehension and Grammar (9 hours) - Vocabulary - Verbs - 15 words - Grammar - Pronoun; Reading Comprehension – Articles or short stories would be provided

Comprehension - continued. This is done to enhance the reading & listening skills

Grammar – Articles; Sentence and paragraph formation keeping articles in mind

Grammar - Preposition; Story writing

Grammar - Adjectives; Letter Writing – Business Communication & Emails

Grammar - Conjunction - Kinds of Sentences - Simple, Compound & complex sentences

Comprehension and Grammar (9 hours) - Effective Speaking and Analytical Skills

Vocabulary - Singular & Plural; Grammar - Interrogation; Sentence formations

Grammar - Exclamation - Conclusion of Parts of Speech - Why the parts of speech are important - Vocabulary - Genders

Grammar - Direct and Indirect Speech; Group Discussions

Theory 2: Mobile Architecture and Application Development (60 Hours)

Mobile Network Architecture (12 hours) - Wireless Communication Principles, Network Evolution, Radio Communication, Analog and Digital Communication, Computer Network, OSI Model, Mobile Network OSI layer functions, Mobile Network Protocol Layers, Telephony Networks, PSTN, Telecommunication Networks, Fixed Networks, Mobile Networks, Cellular Network Concepts, Cellular Networks, Cells and Base Stations, Frequency and Interface in Cells, Mobile Network Architecture, Wireless Network Generations, GSM, GPRS.

Mobile Device Architecture (12 hours) - Mobile Phone Evolution, Mobile Handset Characteristics, Bluetooth , Display, Keypad, Camera, Mobile Handset Categories, Handset Components, Handset Design, Handset hardware architecture, Elements inside a Mobile Handset, Hardware Architecture Evolution, Hardware architectural trends, CPU and Memory, Internal storage, Handset Power

Post Graduate Diploma in Mobile Applications

Requirements, Power Management, Introduction and Definition to the SIM, Functions and usage of the SIM, Phones without SIMs, Key Handset software components, Device Drivers.

Mobile Application Development (12 hours) - Mobile Application Development Paradigm, Mobile Programming Tools, Mobile Application Evolution, Thin Client, Fat Client, Future of Mobile App Development, Mobile Client Server App Architecture, Mobile App Programming in different languages, Mobile Programming best practices, Pros and Cons of Mobile Web App, SIM based Mobile App Development, SIM as a Platform, SIM as Service Differentiator, Evolution of Mobile Services, Types of Mobile Services, App Server, Mobile Context of AS, AS Deployment Architecture, App Server Layers.

Mobile Web Application (12 hours) - World Wide Web, Web Application, Web Application Architecture, Web Server, Web Server Features, Web Application Server, Mobile Internet Access, Mobile Web browser Evolution, Mobile Web Development Approaches, Dynamic Content, RSS, Feed, Mobile Advertising Motivation, Dynamic Mobile Advertising, Web Service Architecture, Users on the Go, Best Development Practices.

Mobile Operating System (12 hours) --Introduction to Mobile Operating Systems and why they are needed, Open Platforms, Mobile OS Features, Symbian, BlackBerry, Android, iOS, Windows, Tizen, Ubuntu, etc.

References Books:

1. Wireless and Mobile Network Architectures by Yi-Bang Lin and Imrich Chlamtac, Wiley-India, 2008
2. Mobile Networks Architecture by [Andre Perez](#), Wiley, March 2012
3. Mobile Computing – Technology, Application & Service Creation by Asoke. K Talukder, Roopa R. Yavagal, Asoke K. Talukder, Tata McGraw-Hill, 2005
4. GSM - Architecture, Protocols and Services by [Jörg Eberspächer](#), [Hans-Joerg V ögel](#), [Christian Bettstetter](#), [Christian Hartmann](#) John Wiley & Sons, Dec-2008

5. Mobile Handset Design by Sajal K. Das, John Wiley and Sons, 2010
6. Smart Phone and Next Generation Mobile Computing by Pei Zheng and Lionel M. Ni., Morgan Kaufmann, 2006
7. Professional Mobile Application Development by [Jeff McWherter](#), [Scott Gowell](#), 2012
8. Mobile Computing Principles: Designing and Developing Mobile Applications by Reza B'Far, Cambridge University, 2005
9. Mobile Applications: Architecture, Design, and Development by Valentino Lee, Heather Schneider and Robbie Schell, Pearson Education, 2004
10. Mobile Web Development by Nirav Mehta, Packt Publishing, 2008
11. Next Generation Wireless Applications: Creating Mobile Applications in a Web 2.0 and Mobile 2.0 World by Paul Golding, John Wiley & Sons, 2008
12. Head First Mobile Web by [Lyza Danger Gardner](#), [Jason Grigsby](#), 2011

Theory 3: Programming in Java (45 hours)

Introduction (9 hours) - History and Overview of Java, Object Oriented Programming, Control statements- if and for loop

Using Blocks of codes, Lexical issues - White space, identifiers, Literals, comments, separators, Java Key words, Data types - Integers, Floating point, characters, Boolean, A closer look at Literals, Variables, Type conversion and casting. Automatic type promotion in Expressions Arrays. Operators - Arithmetic operators, Bit wise operators, Relational Operators, Boolean Logical operators, Assignment Operator, Operator Precedence. Control Statements – Selection Statements - if, Switch, Iteration Statements - While, Do-while, for Nested loops, Jump statements

Classes (9 hours) - Class Fundamentals, Declaring objects, Assigning object reference variables. Methods - constructors, “this” keyword, finalize () method A stack class, Over loading methods.

Using objects as parameters, Argument passing, Returning objects. Recursion, Access control, Introducing final, understanding static. Introducing Nested and Inner classes. Using command line arguments. Inheritance – Basics, Using super, method overriding, Dynamic method Dispatch, Using abstract classes and final with Inheritance

Packages: (9 hours) - Definition. Access protection importing packages. Interfaces: Definition and implementation. Exception Handling – Fundamentals, types, Using try and catch and Multiple catch clauses, Nested try Statements, throw, throws, finally. Java’s built-in exception, using Exceptions

Multithreaded Programming (9 hours) - Java thread model – main thread, creating single and multiple thread. is alive () and join (). Thread – Priorities, Synchronization, Inter thread communication, suspending, resuming and stopping threads, using multi threading. I / O basics – Reading control input, writing control output, Reading and Writing files. Applet Fundamentals – AWT package, AWT Event handling concepts, the transient and volatile modifiers. Using instance of using assert

JAVA Database Connectivity (JDBC) (9 hours) - Database connectivity – JDBC architecture and Drivers. JDBC API - loading a driver, connecting to a database, creating and executing JDBC statements, handling SQL exceptions. Accessing result sets: ypes and methods. An example - JDBC application to query a database

References:

1. The complete reference Java –2: V Edition by Herbert Schildt Pub. TMH.
2. SAMS teach yourself Java – 2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education.

Theory 4: Basic Android Programming (60 Hours)

Introduction to Android (12 hours) - Introduction to Android Architecture: Introduction, History, Features and Android Architecture. Android Application Environment, SDK, Tools: Application Environment and Tools, Android SDK. Programming paradigms and Application Components - Part 1: Application Components, Activity, Manifest File, Programming paradigms and Application Components Part 2: Intents, Content providers, Broadcast receivers, Services

User Interface Design (12 hours) -User Interface Design part 1: Views &View Groups, Views : Button, Text Field, Radio Button, Toggle Button, Checkbox, Spinner, Image View, Image switcher, Event Handling, Listeners, Layouts : Linear, Relative, List View, Grid View, Table View, Web View, Adapters. User Interface Design part 2: Menus, Action Bars, Notifications : Status, Toasts and Dialogs, Styles and Themes, Creating Custom Widgets, Focus, Touch Mode, Screen Orientation. Designing for Tablets – Working with tablets: Developing for different android platforms, Fragments, Manipulating objects with drag and drop, Optimizing applications for high screen resolution, combining fragments into a multilane UI. Resources, Assets, Localization: Resources and Assets, Creating Resources, Managing application resources and assets, Resource-Switching in Android. Localization, Localization Strategies, Testing Localized Applications, Publishing Localized Applications

Mobile Data Management (12 hours) - Content Providers: Contents provider, Uri, CRUD access, Browser, CallLog, Contacts, Media Store, and Setting. Data Access and Storage: Shared Preferences, Storage External, Network Connection. SQLite - SQLite Databases

Native Capabilities (12 hours) - Camera, Audio, Sensors and Bluetooth: Android Media API: Playing audio/video, Media recording. Sensors - how sensors work, listening to sensor readings. Bluetooth. Maps & Location: Android Communications: GPS, Working with Location Manager, Working with Google Maps extensions, Maps via intent and Map Activity, Location based Services. Location Updates, location-based services (LBS), Location Providers, Selecting a Location Provider, Finding Your Location, Map - Based Activities, How to load maps, To finding map API key.

Testing (12 hours) - Testing: Testing and Commercializing Applications - Basics of Testing, Testing from an IDE (Eclipse), Activity testing, Service testing, Content provider testing, Test Classes, Debugging using DDMS, How to get your app on the app store.

References:

1. Professional Android 4 Development by Reto Meier, John Wiley and Sons, 2012
2. Android in Action, Third Edition, by W. Frank Ableson, RobiSen, Chris King, C. Enrique Ortiz, 2012
3. Android Application Development Cookbook, by Wei-Meng Lee, John Wiley and Sons, 2013
4. Beginning Android 4, by Grant Allen, Apress, 2011

Theory 5: Introduction to Security in Mobile Application Development (60 Hours)

Software Development Life Cycle (SDLC) (12 hours) - Introduction, Software Engineering Paradigms, Software Process, Software Characteristics, Verification and Validation of Software, Software Development Lifecycle - Waterfall Model, Spiral Model, System Engineering, Business Process Engineering, Product Engineering, Agile Methodology

Information Security Concepts (12 hours) - Definition of Information Security, Evolution of Information Security; Basics Principles of Information Security; Critical Concepts of Information Security; Components of the Information System; Balancing Information Security and Access; Implementing IT Security, The system Development Life cycle, Security professional in the organization.

Building Security into Software Life Cycle (12 hours) - Understanding security requirements, building security into design of application, approach for secure coding and security testing

Web Application Security (12 hours) - Understanding web security vulnerabilities, attack types, controls and overview of OWASP

Secure SDLC in Mobile Application Development (12 hours) - Understanding mobile app SDLC challenges, security issues in mobile apps, security design aspects in mobile apps, approach to secure SDLC in mobile app development

References:

1. Information Security Risk Analysis - Thomas R. Peltier, Third Edition, Pub: Auerbach, 2012
2. Information security: Principles and Practice - Mark Stamp, 2nd Edition, Pub: John Wiley & Sons, Inc., 2011
3. Ian Sommerville, "Software engineering", Seventh Edition, Pearson Education Asia, 2007
4. Roger S. Pressman, "Software Engineering – A practitioner's Approach", Sixth Edition, McGraw-Hill International Edition, 2005

Lab 1: Programming in Java - Lab (45 Hours)

Part A (23 hours)

1. Write a program to check whether two strings are equal or not.
2. Write a program to display reverse string.
3. Write a program to find the sum of digits of a given number.
4. Write a program to display a multiplication table.
5. Write a program to display all prime numbers between 1 to 1000.
6. Write a program to insert element in existing array.
7. Write a program to sort existing array.
8. Write a program to create object for Tree Set and Stack and use all methods.
9. Write a program to check all math class functions.
10. Write a program to execute any Windows 95 application (Like notepad, calculator etc)
11. Write a program to find out total memory, free memory and free memory after executing garbage Collector (gc).

Part B (22 hours)

1. Write a program to copy a file to another file using Java to package classes. Get the file names at run time and if the target file is existed then ask confirmation to overwrite and take necessary actions.
2. Write a program to get file name at runtime and display number of lines and words in that file.
3. Write a program to list files in the current working directory depending upon a given pattern.
4. Create a textfield that allows only numeric value and in specified length.
5. Create a Frame with 2 labels, at runtime display x and y coordinate of mouse pointer in the labels.

References:

1. The complete reference Java –2: V Edition by Herbert Schildt Pub. TMH.
2. SAMS teach yourself Java – 2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education.

Lab 2: Basic Android Programming - Lab (60 Hours)

1. Display Hello World
2. Add two Edit Text. When a number is entered in Edit Text 1, the square of that number should be displayed in Edit Text 2.
3. Add an Edit Text and a button. When the button is clicked, the text inputted in Edit Text should be retrieved and displayed back to the user.
4. Add two Edit Text and a button. When the button is clicked, the text inputted in Edit Text 1 should be retrieved and displayed in EditText2.
5. Program a calculator
6. Create a Unit convertor for height
7. Create a Unit convertor for height and weight in the same application. Selection of height/weight can be done using a spinner.
8. Add a spinner. When the spinner is selected, there should be three options (e.g., android, java, testing). When you click on each option, it should go to another page containing some other components. Each of these pages should have a “back” button, which on pressing will take you back to the page with the spinner.
9. Create applications to include Action Bar, Menus, Dialogs and Notifications
10. Create a user login form and registration form. First time users have to register through the registration form and the details should be stored in the database. Then they can login using the login page.
11. Create a camera application, where you can click a picture and then save it as the wallpaper.
12. Create a media player which plays an mp3 song.
13. Create a media recorder which will record the sound.

14. Testing applications

References:

1. Professional Android 4 Development by Reto Meier, John Wiley and Sons, 2012
2. Android in Action, Third Edition, by W. Frank Ableson, RobiSen, Chris King, C. Enrique Ortiz, 2012
3. Android Application Development Cookbook, by Wei-Meng Lee, John Wiley and Sons, 2013
4. Beginning Android 4, by Grant Allen, Apress, 2011

Lab 3: Mini Project (60 Hours)

Details of the project will be provided on commencement.

Syllabus - Semester II

Theory 1: Effective Communication Skills - II (45 hours)

Advanced Grammar (9 hours) - Recap of Grammar done in Semester I

Grammar - Active and Passive Voice; Extempore

Vocabulary (9 hours) - Vocabulary - Opposites; JAM Sessions

Communication Skills I (9 hours) -Communication Skills – Introduction, Good Communication v/s Effective Communication

Communication Skills II (9 hours) - How to become an Effective Communicator, Styles of Communication, The art of being Assertive

Grammar (9 hours) - Listening Skills – Introduction, Hearing or Listening, The qualities of being a good listener; Telephone etiquette

Theory 2: Advanced Android Programming (60 hours)

App Development Topics (12 hours) -Services: Services and Notifications – bound/unbound services, Starting and stopping services, Android Interface Definition Language, Handler and Messenger, Passing objects over IPC, Scheduling of services, Remote service communication, Running Background Jobs, Setting up notifications, Notification manager, Connecting Devices Wirelessly - using Network Service Discovery , P2P Connections with Wi-Fi P2P for Service Discovery, Networking Parsing XML Data

Networking: Introduction Android networking capabilities, Android SDK networking packages, Android Socket programming, Proxy Settings, Broadcasting, SMS application using Broadcast Receiver. Android Xml remote procedure calls on android, what is XML-RPC, History, Data types, using web services on android phones.

Integrating with Embedded Applications: Embedded Apps: Telephony, SMS, etc.

Graphics & Multimedia (12 hours) – Introduction to Graphics, Frame Animations, Tweening, scale, rotate, translate, alpha, Interpolation, Canvas/Drawing into a view, Surface View/Surface Holder. **Animation** - Crossfading Two Views, ViewPager for Screen Slide, Card Flip, Zooming, Layout Changes. **Bitmaps** - Loading, Processing Bitmaps with thread, managing Bitmap Memory and UI

Threads & Processes(12 hours) - Tasks & Processes: Tasks, Switching between Task, Process, Process lifecycle. **Threads**, Thread Life cycle, Worker Threads, Thread Handlers, Threads & Loopers and IPC.

Web Applications (12 hours) -Web Apps & Web Services: Web Applications - Web View, ViewPort, Page navigation, Debugging web applications Web Services – Android Server Communication: communication protocols, interacting with server-side applications, developing clients for web services, Exchanging Data over the Internet data parsing using json and xml parsing. Cloud - Connectivity and Sync to the Cloud, Google Services. **Integrating with 3rd party Apps using Web Services**

Commercializing your application (12 hours) - Security, Performance - Kernel, Application level Security, Using permissions, designing for Performance & Designing for Performance. Security with HTTPS and SSL, Security with Device Management Policies

Text Books:

1. Professional Android 4 Development by Reto Meier, John Wiley and Sons, 2012
2. Android in Action, Third Edition, by W. Frank Ableson, RobiSen, Chris King, C. Enrique Ortiz, 2012

References:

1. Android Application Development Cookbook, by Wei-Meng Lee, John Wiley and Sons, 2013
2. Beginning Android 4, by Grant Allen, Apress, 2011
3. Beginning Tablet Programming, by Robbie Matthews, Apress, 2011

Theory 3: Mobile Testing (60 hours)

Testing Fundamentals (12 hours) - SDLC, SDLC Phases, need of Testing, methods of Testing: Functional, Black Box, White Box, Regression, Stress, Monkey etc., TestCase, Rules to write TestCase, Testsuite and Test Runner

Introduction to Android testing framework (12 hours) - JUnit: JUnit Test Framework, Features of JUnit Test Framework, Testing Fundamentals-TestCase, TestSuite,TestRunners, JUnit classes, JUnit in Android, Android Testing Framework, Test Projects-Directory Structure, Android Testing API, Mock Objects, Activity Testing, what to Test, ContentProvider Testing, service Testing, choosing devices to test, Testing tools

Mobile apps testing (12 hours) - Need of testing, Mobile applications testing landscape, Common types of testing, UI and functional testing strategies of mobile applications, compatibility testing need and methods, non-functional testing methods of mobile applications - Performance, security, types of operations testing for mobile applications - Installation, un-installation, upgrade, methods of testing the mobile application integration with phone features, challenges in testing, difference between testing mobile web and testing native app

Mobile testing tools (12 hours) - Testing lifecycle of mobile applications, alternatives of testing environments for mobile apps testing, Differentiate between testing on physical devices, cloud devices and emulators, different test automation tools for mobile

applications, key features of monkey talk tool, installation and use of monkeytalk tool for a mobile application on emulator, installation and use of monkeytalk tool for a mobile application on PC connected device, installation and use of monkeytalk tool for a mobile web, installation and use of monkeytalk tool for a mobile application for cloud device.

UI and functional testing (12 hours) - Using monkey talk - creation of test project, test suite and test script, record and playback feature, different verification techniques, data driven testing methods, synchronization, script parameterization, reporting features.

Using Robotium - creation of test project, test suite, Robotium Framework, data driven testing methods

References:

1. Android Application Testing Guide, Diego Torres Milano, 2010
2. Robotium Automated Testing for Android, Hrushikesh Zadgaonkar, 2011
3. A Practical Guide to Testing Wireless Smartphone Applications by Julian Harty, Mahadev Satyanarayanan, 2011
4. Testing Applications on the Web: Test Planning for Mobile and Internet-Based Systems Hung Q. Nguyen, Bob Johnson, Michael Hackett, 2012

Theory 4 : Mobile Ecosystem, Business Analysis and Models (60 hours)

Understanding Business Models and Ecosystem (12 hours) - Business ecosystems, Methodological Approach, Ecosystem Evolution, Value chains, Business Models

Overview of Mobile Market (12 hours) - Mobile ecosystem, Global mobile ecosystem, Mobile ecosystem in India, Impact of Open Source, Open Source Operating Systems Vs. Proprietary Operating Systems – Cost Effectiveness.

Mobile Application Monetization (12 hours) - Prevailing Business Models, Disruption and Innovation, Trends, Monetizing App: free and paid apps, app store search, advertising, e-mail marketing, types of apps, native or cross platform apps.

Mobile Marketing and Advertising (12 hours) - Mobile Marketing, M-Coupons, Mobile Advertising: Mobile advertising and search, mobile products and service offerings, incentives and loyalty programs, banner display ads, interstitial ads, in-content ads, ads to download other apps, making money with ads, app advertising, ad networks vs. media owners. affiliate marketing, Case studies on Google and Apple Ecosystem.

M-Commerce and Ecosystem Case Studies (12 hours) - M-commerce: future of mobile marketing, mobile sites, services, benefits, mobile banking, mobile purchase, m-commerce apps, challenges. Case Studies: Ecosystem of a Mobile Application Development Company, Ecosystem of a Device Manufacturer.

References:

1. Mobile Marketing - How technology is revolutionizing marketing, communications and advertising, by Daniel Rowles, 2014
2. Mobile Design and Development Practical concepts and techniques for creating mobile sites and web apps, by Brian Fling, O'Reilly Media, 2009
3. M-Commerce, by Paul Skeldon, 2013
4. Mobile Advertising: Supercharge Your Brand in the Exploding Wireless Market – 2008, by Chetan Sharma, Joe Herzog, Victor Melfi, 2013

5. Mobile App Marketing and Monetization, by Alex Genadinik, 2014

Lab 1: Advanced Android Programming - Lab (60 hours)

1. Start a service
2. Stop a service
3. Demonstrate startService(), stopService() and onBindService()
4. Manipulate notifications
5. Android socket programming
6. Create web services
7. Working with processes and threads
 - a. Create a thread which performs a single task
 - b. Perform multithreading
8. Graphics apps in android
 - a. Create an application where different shapes of different colours are displayed.
 - b. Create an application where
 - c. Create an application to show a cyclist moving from one direction to another
9. Animation apps like
 - a. Bouncing ball
 - b. Moving arrow, etc

10. Game creation in android like
 - a. Shooting bubbles
 - b. Shooting arrows
 - c. Simple snake game, etc.

Text Books:

1. Professional Android 4 Development by Reto Meier, John Wiley and Sons, 2012
2. Android in Action, Third Edition, by W. Frank Ableson, RobiSen, Chris King, C. Enrique Ortiz, 2012

References:

4. Android Application Development Cookbook, by Wei-Meng Lee, John Wiley and Sons, 2013
5. Beginning Android 4, by Grant Allen, Apress, 2011
6. Beginning Tablet Programming, by Robbie Matthews, Apress, 2011

Lab 2: Mobile Testing - Lab (45 hours)

1. Consider a scenario:

A developer develops the simple “SMS App”. The app functionality is as follows

- a. Simple SMS functionality.
- b. When you open the app it asks you your “age”.
- c. If “age” is less than 16, then the app will ask you your parent’s number.
- d. If you send more than 10 messages the report goes to your parent. Test this app. Write all the possible test cases for this app.

2. A developer develops the simple “Calculator” application - plain java application. The application has all the basic functionalities of calculator. As a JUnit Tester; write a java code to test the “Calculator” application.

3. Write a java code to test “Activity” using Android Testing Framework.

Given: “Login App”

4. Write a code to test “Activity” using Robotium Framework.

Given: “Login App”

5. Write a code to test “Service” using Android Testing Framework.

Given: “Service App”

6. Write a code to test “Content Provider” using Android Testing Framework.

Given: “Student Registration App”

7. Test the simple “Activity” using Monkeyrunner.

8. Test app using monkey-talk framework - install the monkey talk framework for a mobile application on emulator.

9. Create “Test Suite” and “Test Scripts” using Monkey Talk framework. I

10. Create “Test Suite” and “Test Scripts” using Monkey Talk framework. II

11. Create “Test Suite” and “Test Scripts” using Monkey Talk framework. III

Test any simple “Activity” using Monkey Talk framework by using record and playback technique

References:

1. Android Application Testing Guide, Diego Torres Milano, 2010
2. Robotium Automated Testing for Android, Hrushikesh Zadgaonkar, 2011
3. A Practical Guide to Testing Wireless Smartphone Applications by Julian Harty, Mahadev Satyanarayanan, 2011
4. Testing Applications on the Web: Test Planning for Mobile and Internet-Based Systems Hung Q. Nguyen, Bob Johnson, Michael Hackett, 2012

Lab 3: Major Project

Details of the project will be provided on commencement

| Hardware Requirements – MA | | | | |
|--|---------------------------|------------------|---|-------------------------|
| Labs - Student Nodes & Phones | | | | |
| Hardware | Required Resources | Numbers | Remarks | Required Numbers |
| Semester I and II | | | | |
| Processors | Intel Core i5 - 2.60GHz | Per Student node | | One per student |
| RAM | 8GB | Per Student node | | One per student |
| HDD Capacity | 500GB | Per Student node | | One per student |
| NIC Card | 1 GBPS | Per Student node | | |
| Speakers | 1 per lab | 1 Set | Speakers required in each Lab | 6 Channel speakers |
| Graphic Cards | NVIDIA | Per Student node | Dedicated graphics card, 128 or 256 MB of memory, WDDM 1.1 (Windows 7) drivers, DirectX 9 and 10 capable. | One per student |
| DVD Drives (RW) | DVD writer | | | 1 |
| Keyboard and Mouse | | Per Student node | | One per student |
| Microphone | 1 per Lab | 1 per Lab | | 1 per Lab |
| Web Camera | Logitech | 1 | | 1 |

| | | | | |
|------------------------------------|-------------------------------------|------------------|--|-------------------------|
| Headphone & Mic | Logitech PC Headset | 2 | | 2 |
| Android Phone | Android - latest OS -Samsung or HTC | 5 | For testing Android Applications | 1 per 6 students |
| | | | | |
| Class Room/Lab - Facilities | | | | |
| Hardware | Required Resources | Numbers | Remarks | Required Numbers |
| AC | 1.5 ton | | 1 per lab | 1 |
| Projectors | 1 | 1 | 1 Ceiling mounted projector required in each class/lab | 1 |
| Faculty Systems | 1 | 1 | Faculty System with Internet | 1 |
| White Boards | 1 | 1 | | 1 |
| Internet Line (2 MBPS) | 2 | 2 | For guest lectures and internet access for student learning/projects | |
| Software Requirements | | | | |
| Software | Required Resources | Numbers | Remarks | Required Numbers |
| Operating System | Windows 7 or 8, Linux | Per student node | | 1 per node |
| Office Tool | Microsoft office | Per student node | For windows OS | 1 per node |

| | | | | |
|---|------------------------------|------------------|--|------------|
| Other basic software like Adobe Reader, WinRAR, VLC media player, Google Chrome, etc. | | | | |
| Java | JDK 6 or 7 | Per student node | | 1 per node |
| Android | Latest Bundle/Android Studio | Per student node | | 1 per node |
| ADT | | Per student node | | 1 per node |
| Integrated Development Environment (IDE) | | Per student node | | 1 per node |

Faculty Room

| S/W / H/W | Required Resources | Required Numbers |
|------------------|---------------------------|-------------------------|
| Systems | Same as lab machine setup | 1 per faculty |
| Software | Same as lab machine setup | 1 per faculty |
| Internet | Same as lab machine setup | 1 per faculty |

Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur
Faculty of Engineering & Technology
Course and Examination Scheme of Post Graduate Diploma Mobile Application
First Semester

| Subject Code | H R | Subject | Teaching Scheme | | | | Examination Scheme | | | | | | | | | |
|---------------|-----|---|-----------------|----|----|----------------|--------------------------|----------------------------------|-------------------------------|-------------|--------------------|----------------------------------|-------------------------------|-------------|--------------------|--|
| | | | Hours per week | | | No. of Credits | Theory | | | | | Practical | | | | |
| | | | L | T | P | | Duration of Paper (Hrs.) | Max. Marks University Assessment | Max. Marks College Assessment | Total Marks | Min. Passing Marks | Max. Marks University Assessment | Max. Marks College Assessment | Total Marks | Min. Passing Marks | |
| PGDMA101 T | 45 | Effective Communication Skills - I | 02 | 01 | - | 03 | 01 | 30 | 20 | 50 | 20 | - | - | - | - | |
| PGDMA102 T | 60 | Mobile Architecture and Application Development | 04 | - | - | 04 | 03 | 80 | 20 | 100 | 40 | - | - | - | - | |
| PGDMA103 T | 45 | Programmin | 03 | - | -- | 03 | 2 | 40 | 10 | 50 | 20 | - | - | - | - | |

| | | | | | | | | | | | | | | | |
|---------------|----------------------------------|--|----------------|----------------|----------------|-----------|------------------|------------|-----------|------------|----------|------------|------------|------------|----------|
| | | g in Java | | | | | | | | | | | | | |
| PGDMA103 P | 45 | Programmin g in Java Lab | -- | - | 0 3 | 02 | - | - | - | - | - | 25 | 25 | 50 | 25 |
| PGDMA104 T | 60 | Basic Android Programmin g | 0 4 | - | - | 04 | 03 | 80 | 20 | 100 | 40 | | | | |
| PGDMA104 P | 60 | Basic Android Programmin g Lab | -- | - | 0 4 | 02 | | | | | | 25 | 25 | 50 | 25 |
| PGDMA105 T | 60 | Introduction to Security in Mobile Application Development | 0 4 | - | - | 04 | 03 | 80 | 20 | 100 | 40 | | | | |
| PGDMA106 P | 60 | Mini Project | -- | - | 0 4 | 04 | - | - | - | - | -- | 50 | 50 | 100 | 50 |
| Total | 435 | | 1 7 | 0 1 | 1 1 | - | - | 270 | 80 | 350 | - | 100 | 100 | 200 | - |
| | Semester Total 29 Hrs | | | | | 26 | Marks 550 | | | | | | | | |

Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur

Faculty of Engineering & Technolog

Course and Examination Scheme of Post Graduate Diploma in Mobile Application

Second Semester

| Subject Code | HR | Subject | Teaching Scheme | | | | Examination Scheme | | | | | | | | | |
|--------------|----|-------------------------------------|-----------------|----|---|----------------|--------------------------|----------------------------------|-------------------------------|-------------|--------------------|----------------------------------|-------------------------------|-------------|--------------------|--|
| | | | Hours per week | | | No. of Credits | Theory | | | | | Practical | | | | |
| | | | L | T | P | | Duration of Paper (Hrs.) | Max. Marks University Assessment | Max. Marks College Assessment | Total Marks | Min. Passing Marks | Max. Marks University Assessment | Max. Marks College Assessment | Total Marks | Min. Passing Marks | |
| PGDMA201T | 45 | Effective Communication Skills - II | 02 | 01 | - | 03 | 01 | 30 | 20 | 50 | 20 | - | - | - | - | |
| GDIR202T | 60 | Advanced Android Programming | 04 | - | - | 04 | 03 | 80 | 20 | 100 | 40 | - | - | - | - | |
| PGDMA202 | 60 | Advanced Android | -- | - | 0 | 02 | - | - | - | - | -- | 25 | 25 | 50 | 25 | |

| | | | | | | | | | | | | | | | | |
|---------------|---------|--|----------------|----------|----------------|-----------|------------------|------------|-----------|------------|----------|------------|------------|------------|----------|--|
| P | | Programmin g Lab | | | 4 | | | | | | | | | | | |
| PGDMA203 Y | 60 | Mobile Testing | 0 4 | - | - | 04 | 03 | 80 | 20 | 100 | 40 | - | - | - | - | |
| PGDMA203 P | 45 | Mobile Testing Lab | -- | - | 0 3 | 02 | - | - | - | - | -- | 25 | 25 | 50 | 25 | |
| PGDMA204 T | 60 | Mobile Ecosystem, Business Analysis and Models | 0 4 | - | - | 04 | 03 | 80 | 20 | 100 | 40 | | | | | |
| PGDMA205 P | 12 0 | Major Project | -- | - | 0 8 | 08 | - | - | - | - | - | 100 | 100 | 200 | 100 | |
| Total | | 450 hours | 1 2 | - | 1 6 | - | - | 270 | 80 | 350 | - | 150 | 150 | 300 | - | |
| | | Semester Total 28 | | | | 26 | Marks 650 | | | | | | | | | |