

# Savitribai Phule Pune University, Pune

*Faculty of Commerce and Management*

Master of Computer Applications (MCA)

Programme Curriculum ( Sem. III & IV)

(2020-2022)

## Semester III

Course Code: IT-31

Course Name: Mobile Application Development

Credit Scheme			Evaluation Scheme				
Lecture	Practical	Credit	Internal			External	Total
			Written	Practical	Tutorial		
3 Hrs./Week	-	3	25	-	-	50	75

### Course Description:

#### *Course Objectives:*

1. To understand the different mobile application Architectures.
2. To understand different types of widgets like buttons, views, layout etc.
3. To know the ways of application handling like intents, adapters, Notifications, Web Services and Web View.
4. To learn and know about data storing, retrieval and sharing in android.
5. To explore cross platform mobile application development framework, React Native and Flutter.

#### *Course Outcomes:*

Student will be able to

- CO1: Understand Various Mobile Application Architectures. (Understand)
- CO2: Apply different types of widgets and Layouts. (Apply)
- CO3: Describe Web Services and Web Views in mobile applications. (Understand)
- CO4: Implement data storing and retrieval methods in android. (Apply)
- CO5: Demonstrate Hybrid Mobile App Framework. (Apply)

#### *Course Structure:*

Unit No.	Topics Details	Weightage in %	No of Sessions
1	1. Mobile application development architectures 1.1. Introduction to Mobile Application technologies 1.2. Android Architecture 1.3. IOS Architecture 1.4. Windows Architecture 1.5. Hybrid Architecture	14	5
2	2. Creating Android Application 2.1. Creating Android project 2.2. Project Structure 2.3. Activity and Activity Life Cycle 2.4. Fragment and Fragment Life Cycle 2.5 Views and View groups	20	10
3	3. Interactivity Tools 3.1. Intents and Filters 3.2. Adapters 3.3. Dialogs 3.4. Menus 3.5. Notifications	20	10
4	4. Interaction with Database 4.1. Introduction to Database (SQLite and Firebase) 4.2. Cursors and content values 4.3. CRUD Operations	16	6
5	5. Web Services and Web View 5.1. Introduction to web services 5.2. Receiving HTTP Response (JSON, XML) 5.3. Parsing JSON and XML 5.4. Introduction to Web View	12	5
6	6. React Native 6.1. Introduction 6.2. Environment Setup 6.3. JavaScript ES6 Overview 6.4. Create React Native App 6.5. React Native Alert API 6.6. React Native Geolocation API 6.7. Third Party Libraries	10	5
7	7. Introduction Flutter 7.1. Overview of Flutter 7.2. Installation of Flutter 7.3. Architecture of Flutter 7.4. Introduction to Dart Programming 7.5. Demonstration of Simple application	8	4
<b>Total:</b>		<b>100</b>	<b>45</b>

## *Course References:*

### Reference Books:

1. Professional Android 4 Application Development by Meier, Reto - Wiley Education
2. Beginning Android 4 Application Development by Lee, Wei- Meng - Wiley Education
3. Android application Development: in 24 hours by Delessio, Carmen; Darcey, Lauren; Conder, Shane - Pearson Education
4. Android by Dixit, Prasanna Kumar - Vikas Publishing House
5. Android Studio Development Essentials Book by Neil Smith
6. Beginning App Development with Flutter by Rap Payne
7. Flutter in Action by Eric Windmill
8. REACT NATIVE IN ACTION DEVELOPING IOS AND ANDROID APPS WITH JAVASCRIPT BOOK BY NADER DABIT

### Web Reference:

1. <https://developer.android.com>
2. <https://facebook.github.io/react-native/docs/tutorial>
3. <https://flutter.dev/docs/get-started/install>

## Course Code: IT-32

## Course Name: Data Warehousing and Data Mining

Credit Scheme			Evaluation Scheme				
Lecture	Practical	Credit	Internal			External	Total
			Written	Practical	Tutorial		
3 Hrs./Week	-	3	10	10	5	50	75

### Course Description:

#### **Course Objectives:**

1. To introduce the concepts, techniques and applications of data warehousing and data mining.
2. To understand how to Preprocess, understand and analyze various kinds of data
3. To Study data warehouse Concepts, architectures, OLAP and the project planning aspects in building a data warehouse
4. To enable students to understand and implement various techniques of association, classification and clustering in data mining
5. To enable students to understand and implement the concepts of Web mining and Text Mining in data mining

#### **Course Outcomes:**

Student will be able to

CO1: Understand Data warehouse concepts, architecture and models (Understand)

CO2: Learn and understand techniques of preprocessing on various kinds of data (Understand)

CO3: Apply association Mining and Classification Techniques on Data Sets (Apply)

CO4: Apply Clustering Techniques and Web Mining on Data Sets (Apply)

CO5: Understand other approaches of Data mining (Understand)

#### **Course Structure:**

Unit No.	Topics Details	Weightage in %	No of Sessions
1	<p>1. Data Warehouse Fundamentals</p> <p>1.1. Introduction to Data Warehouse, OLTP Systems; Differences between OLTP Systems and Data Warehouse:</p> <p>1.2. Characteristics of Data Warehouse; Functionality of Data Warehouse:</p> <p>1.3. Advantages and Applications of Data Warehouse; Top- Down and Bottom-Up Development Methodology:</p> <p>1.4. Tools for Data warehouse development: Data</p>	15	6

	<p>Warehouse Types</p> <p>1.5. Planning and Project Management in constructing Data warehouse: Data Warehouse Project;</p> <p>1.6. Data Warehouse development Life Cycle, Kimball Lifecycle Diagram</p>		
2	<p>2. Data Warehouse Architecture</p> <p>2.1. Introductions, Components of Data warehouse Architecture</p> <p>2.2. Technical Architectures; Federated Data Warehouse Architecture: Tool selection;</p> <p>2.3. Dimensional Modeling: E-R Modeling VS Dimensional Modeling</p> <p>2.4. Data Warehouse Schemas; Star Schema, Inside Dimensional Table, Inside Fact Table, Fact Less Fact Table, Granularity, Star Schema Keys: Snowflake Schema, Fact Constellation Schema</p> <p>2.5. Introduction to Metadata : Categorizing Metadata:</p> <p>2.6. Metadata management in practice; Meta data requirements gathering, Metadata classification, Meta data collection strategies, Tools for Metadata Management</p>	15	6
3	<p>3. Data Preprocessing and ETL</p> <p>3.1. Data Pre-processing: Data Cleaning tasks</p> <p>3.2. Data Integration and Data Reduction</p> <p>3.3. Discretization and Concept Hierarchy Generation</p> <p>3.4. Data Transformation; Basic Tasks in Transformation, Major Data Transformation Types</p> <p>3.5. Introduction to ETL(Extract, Transform and Load)</p> <p>3.6. ETL requirements and steps: Data Extraction; Extraction Methods, Logical Extraction Methods, Physical Extraction Methods</p> <p>3.7. Data loading; Data Loading Techniques, ETL Tools</p>	20	7
4	<p>4. Data Warehouse &amp; OLAP:</p> <p>4.1. Introduction: What is OLAP?; Characteristics of OLAP,</p> <p>4.2. Steps in the OLAP Creation Process, OLAP operations, Advantages of OLAP: Multidimensional Data:</p> <p>4.3. OLAP Architectures; MOLAP, ROLAP, HOLAP:</p> <p>4.4. Data Warehouse and OLAP: Hypercube &amp; Multicubes</p>	10	5
5	<p>5. Introduction to Data Mining:</p> <p>5.1. Introduction and Scope of Data Mining</p> <p>5.2. How does Data Mining Works, Predictive Modeling</p> <p>5.3. Data Mining and Data Warehousing</p> <p>5.4. Architecture for Data Mining</p>	5	4

	5.5. Profitable Applications: Data Mining Tools:		
6	6. Data Mining Techniques 6.1. An Overview: Introduction, Data Mining, Data Mining Versus Database Management System, 6.2. Data Mining Techniques- Association rules( Apriori, FP Tree algorithms) 6.3. Classification (Decision Tree induction, Bayesian classification, SVM, KNN) 6.4. Clustering, Neural networks. 6.5. Evaluating Association rules , Classification model	15	6
7	7. Clustering 7.1. Introduction to Clustering, Cluster Analysis 7.2. Clustering Methods- K means, Hierarchical clustering, Agglomerative clustering, Divisive clustering, 7.3. clustering and segmentation software 7.4. Evaluating clusters 7.5. Data Mining trends and Applications	10	5
8	8. Web Mining 8.1. Introduction, Terminologies 8.2. Categories of Web Mining: Web Content Mining, Web Structure Mining, Web Usage Mining 8.3. Applications of Web Mining, and Agent based and Database approaches, Web mining Software/Tools. 8.4. Text Mining: process and types, steps in Text Mining, applications and tools of Text Mining 8.5. Data visualization, Dashboard- KPI, Business Intelligence and its future.	10	6
Total:		<b>100</b>	<b>45</b>

*List of Practicals (if any)*

1. Creating a simple data warehouse & performing OLAP operations using simple tools
2. Extracting data from any Operational database (ETL) and performing pre-processing tasks
3. Performing association mining on large data sets and extracting best possible rules / a case study
4. Performing classification and evaluating the efficient model / a case study
5. A case study on finding efficient Clusters on very large set of documents data
6. A case study on Web mining and Text mining using software tools

Students may practice or implement Data warehouse, ETL & Data mining concepts on the following software/ tools (Students versions) at on premise / Cloud based platform

- 1) Data warehouse - My-SQL, MongoDB / Google BigQuery / Amazon Redshift / Talend
- 2) ETL Tools : Pentaho Kettle / Talend-Open Studio / Apache Kafka / Informatica Power Center
- 3) BI and Analytics tools : Python / XL-Miner, R-Studio / Rapid-Miner Studio
- 4) Visualization Tools : Tableau / Power-BI / Qlick sense

### *Course References:*

#### Recommended Books:

##### Text Books:

1. Data Mining: Introductory and Advanced Topics, by Margaret Dunham, Pearson Education
2. Data Mining by Arun K. Pujari – University Press.

##### Reference Books:

1. DATAWAREHOUSING FUNDAMENTALS: A COMPREHENSIVE GUIDE FOR IT PROFESSIONALS, by Paulraj Poonniah, Latest Edition
2. Building the Data Warehouse, 3rd edition by W. H. Inmon
3. Data Mining concepts and Techniques by Jiawei Han, Micheline Kamber –Elsevier.
4. Data Mining practical Machine Learning Tools and Techniques by Ian H. Witten Eibe Frank Mark Hall - Elsevier publication
5. Introduction to Data Mining with Case Studies by G. K. Gupta, Prentice Hall

##### Web Reference:

1. [www.ibm.com/in/en/](http://www.ibm.com/in/en/)
2. [www.pentaho.com/](http://www.pentaho.com/)
3. [www.jaspersoft.com/](http://www.jaspersoft.com/)
4. [www.amazon.com/Data-Mining-Business-Intelligence-Applications](http://www.amazon.com/Data-Mining-Business-Intelligence-Applications)
5. [www.ibm.com/insights/in](http://www.ibm.com/insights/in)
6. [www.sas.com](http://www.sas.com)
7. Weka– Data Mining with Open Source Machine Learning Software, [www.cs.waikato.ac.nz/ml/weka](http://www.cs.waikato.ac.nz/ml/weka).
8. <https://cloud.google.com/bigquery/>
9. <https://www.rstudio.com/> 10. <https://aws.amazon.com/redshift/>

## Course Code: IT-33

## Course Name: Software Testing and Quality Assurance

Credit Scheme			Evaluation Scheme				
Lecture	Practical	Credit	Internal			External	Total
			Written	Practical	Tutorial		
3 Hrs./Week	-	3	10	10	5	50	75

### Course Description:

#### *Course Objectives:*

1. To understand the principles of software development emphasizing processes and activities of quality assurance
2. To study fundamental concepts in software testing, including software testing objectives, process, strategies and methods.
3. To understand test design techniques based on functionality and structure of software
4. To understand test planning, monitoring and control process
5. To gain the techniques and skills on how to use software testing tools to support software testing activities

#### *Course Outcomes:*

Student will be able to

CO1: Understand the role of software quality assurance in contributing to the efficient

delivery of software solutions. (Understand)

CO2: Demonstrate specific software tests with well-defined objectives and targets. (Apply)

CO3: Apply the software testing techniques in commercial environments. (Apply)

CO4: Construct test strategies and plans for software testing. (Analyze)

CO5: Demonstrate the usage of software testing tools for test effectiveness, efficiency and coverage (Apply)

#### *Course Structure:*

Unit No.	Topics Details	Weightage in %	No of Sessions
1	<ol style="list-style-type: none"><li>1. Software Quality Assurance Fundamentals<ol style="list-style-type: none"><li>1.1. Definition of Quality, Quality Assurance, Quality Control, Difference between QA and QC, Software Quality Assurance Challenges</li><li>1.2. Software Quality Assurance, SQA Planning &amp; Standards (ISO 9000, Six Sigma)</li><li>1.3. SQA Activities</li></ol></li></ol>	20	6



	<p>1.4. Building Blocks of SQA  1.5. Software Quality factors  1.6. Software Quality Metrics: Process Metrics &amp; Product Metrics  1.7. Software Reliability &amp; Reliability Measurement Factors: ROCOF, MTTF, MTTR, MTBF, POFOD, Availability</p> <p>Extra Reading:  ISO/IEC 9126, ISO/IEC 25010:2011, Malcom Balridge</p>		
2	<p>2. Software Testing Fundamentals  2.1. Definition &amp; Objectives of Testing  2.2. Role of testing and its effect on quality  2.3. Causes of software failure: Definition of -Error, Bug, Fault, Defect and Failure,  2.4. Economics of Testing  2.5. Seven Testing Principles  2.6. Software Testing Life cycle  2.7. Validation &amp; Verification Concepts - V Model and W Model  2.8. Agile Testing- Test Driven Software Development  2.9. Levels of Testing-  2.9.1. Unit (Component) Testing  2.9.2. Integration Testing  2.9.3. System Testing  2.9.4. User Acceptance Testing (UAT)  2.10. Test Types  2.10.1. Functional testing (Black-box)  2.10.2. Non-functional testing (Testing of software product characteristics)  2.10.3. Structural testing (White-box)  2.10.4. Testing related to changes - Confirmation (Re-testing) and Regression Testing  2.11. Non-Functional Testing Types –  2.11.1. Performance (Load &amp; Stress)  2.11.2. Usability  2.11.3. Maintainability  2.11.4. Portability  2.11.5. Security  2.11.6. Localization &amp; Internationalization  2.12. Concept of Smoke testing and Sanity Testing</p>	17	10
3	<p>3. Static Testing  3.1. Static Techniques – Review  3.1.1. Review Process (Informal &amp; Formal)  3.1.2. Desk Checking,  3.1.3. Technical or Peer Review  3.1.4. Walkthrough</p>	8	3

	<ul style="list-style-type: none"> <li>3.1.5. Inspection</li> <li>3.2. Static Techniques – Static Analysis <ul style="list-style-type: none"> <li>3.2.1. Data flow analysis</li> <li>3.2.2. Control flow analysis,</li> <li>3.2.3. Static Analysis by Tools (Automated Static Analysis)</li> </ul> </li> </ul> <p><b>Case Study on Preparation of Inspection Checklist</b></p>		
4	<ul style="list-style-type: none"> <li>4. Dynamic Testing <ul style="list-style-type: none"> <li>4.1. Test Design Techniques-Black Box Testing Techniques: <ul style="list-style-type: none"> <li>4.1.1. Equivalence Partitioning</li> <li>4.1.2. Boundary Value Analysis</li> <li>4.1.3. Decision Table Testing</li> <li>4.1.4. State Transition Testing</li> </ul> </li> <li>4.2. Test Design Techniques -White Box Testing Techniques (coverage based and fault-based) <ul style="list-style-type: none"> <li>4.2.1. Statement coverage</li> <li>4.2.2. Branch &amp; Decision coverage</li> <li>4.2.3. Path coverage</li> <li>4.2.4. McCabe’s Cyclomatic Complexity Metric (Computation of Cyclomatic Complexity to be covered)</li> <li>4.2.5. Data Flow based Testing</li> <li>4.2.6. Mutation Testing</li> </ul> </li> <li>4.3. Test Design Techniques -Experience based techniques: <ul style="list-style-type: none"> <li>4.3.1. Error Guessing</li> <li>4.3.2. Exploratory Testing</li> </ul> </li> </ul> </li> </ul> <p><b>Problems based on Black Box and White Box Testing Techniques to be covered</b></p>	15	7
5	<ul style="list-style-type: none"> <li>5. Test Management <ul style="list-style-type: none"> <li>5.1. Test Organization- Roles &amp; Skills of Tester, Test Lead, Test Manager</li> <li>5.2. Test Planning- Test Plan as per IEEE 829 STANDARD TEST PLAN TEMPLATE</li> <li>5.3. Test Process Monitoring &amp; Control <ul style="list-style-type: none"> <li>5.3.1. Test Monitoring through -Test Log (IEEE 829: TEST LOG TEMPLATE to be discussed) and Defect Density</li> <li>5.3.2. Reporting Test Status (IEEE 829: TEST SUMMARY REPORT TEMPLATE to be discussed)</li> <li>5.3.3. Test Control</li> </ul> </li> <li>5.4. Requirement Traceability Matrix (Horizontal &amp; Vertical), Test Scenario, Test Suite, Test Cases (both Positive &amp; Negative Test Cases, as per IEEE 829:</li> </ul> </li> </ul>	25	10

	<p>TEST CASE SPECIFICATION TEMPLATE)</p> <p>5.5. Configuration Management- Configuration Management support for Testing</p> <p>5.6. Risk and Testing- Project Risk &amp; Product Risk</p> <p>5.7. Incident/ Defect Management</p> <p>5.7.1. Defect Life Cycle</p> <p>5.7.2. Defect/ Incident Report (IEEE 829: TEST INCIDENT REPORT TEMPLATE to be discussed)</p> <p><b>Case Study on Test Plan for applications and Case study on Test Cases for different features within applications</b></p> <p><b>Extra Reading:</b> Version Control Tool: SVN, Defect Tracking Tool: Bugzilla, JIRA</p>		
6	<p>6. Tool Support for Testing</p> <p>6.1. Types of Test tools –CAST (only type &amp; their purpose should be covered)</p> <p>6.2. Effective Use of Tools: Potential Benefits and Risks</p> <p>6.3. Introduction of a tool into an organization</p> <p>6.4. Testing tools</p> <p>6.4.1. Selenium -WebDriver and Test NG</p> <p>6.4.2. Appium</p> <p>6.4.3. JMeter</p> <p><b>Extra Reading:</b> Functional Test Automation Tools: Quick Test Professional (QTP), IBM Rational Robot, Non-functional Test Automation Tools: Load Runner, Test Management Tools: Test Director, Test Link, Bugzilla, Redmine, API Testing Tool: Postman, ETL Testing Tool, Big Data Testing Tool, AI based Testing Tool: Test Craft, UI Testing, Website Testing: TestRail</p>	15	9
Total:		<b>100</b>	<b>45</b>

### *List of Practicals (if any)*

#### Practicals based on Selenium

1. Focusses on how to invoke the Firefox browser, maximizing the window, navigate commands, etc.

Scenario:

- 1.1. Open the Firefox browser.
- 1.2. Maximize the browser window.
- 1.3. Navigate to a particular URL (let say, SPPU website)  
"http://www.unipune.ac.in/".

- 1.4. Write a method to print PASS if the title of the page matches with the page title else FAIL. (If you are familiar with TestNG or JUnit use assert statement like `assert.assertEquals(actual, expected)` to give a verdict of the pass or fail status.
  - 1.5. Navigate to another URL (let say, the Facebook page)  
"https://www.facebook.com"
  - 1.6. Navigate back to the QA Tech Hub website.
  - 1.7. Print the URL of the current page.
  - 1.8. Navigate forward.
  - 1.9. Reload the page.
  - 1.10. Close the Browser.
2. Focusses on interacting with form elements like textbox, buttons, radio buttons and drop-down (Facebook Signup)

Scenario:

- 2.1. Open a browser.
- 2.2. Navigate to "http://www.fb.com"
- 2.3. Verify that the page is redirected to "http://www.facebook.com", by getting the current URL. (use if-else condition to verify this condition or use `Assert.assertEquals()` in case you are familiar with TestNG or JUnit)
- 2.4. Verify that there is a "Create an account" section on the page.
- 2.5. Fill in the text boxes: First Name, Surname, Mobile Number or email address, "Re-enter mobile number", new password.
- 2.6. Update the date of birth in the drop-down.
- 2.7. Select gender.
- 2.8. Click on "Create an account".
- 2.9. Verify that the account is created successfully.

3. Focusses on working with links and `getAttribute()` method.

Scenario:

- 3.1. Open a Browser (write the generic code such that by changing the parameter browser can be changed.)
- 3.2. Navigate to `https://flipkart.com` website.
- 3.3. Write a method to find the count (number of) links on the homepage of Flipkart.
- 3.4. Write another method to print link text and URLs of all the links on the page of Flipkart.

4. Focusses on Frame Handling, mouse over operations (Login to an application)

Scenario:

- 4.1. Open any browser of your choice, for example, Chrome Browser.
- 4.2. Navigate to Snapdeal site (`http://www.snapdeal.com`)
- 4.3. Move to Sign In Button and hold
- 4.4. Move to the Sign In button and click.
- 4.5. Enter valid Email Id and click continue.
- 4.6. Enter the valid password and click LOGIN.
- 4.7. Verify that the user is logged in successfully.

5. Focuses on writing dynamic xpath (Login to Gmail Account and sending a mail from Gmail)

Scenario:

- 5.1. Open any browser of your choice, say Mozilla Firefox
- 5.2. Navigate to <https://www.gmail.com>
- 5.3. Enter a valid Email Id or Phone Number
- 5.4. Click Next button
- 5.5. Enter Password and click "Sign in" button.
- 5.6. Verify that Gmail is logged in successfully.
- 5.7. Click compose button and verify that a new mail window is opened.
- 5.8. Enter an Email Id
- 5.9. Enter some subject, say "Test Mail"
- 5.10. Enter some text in body
- 5.11. Click send button.

### *Course References:*

Recommended Books:

Text Books:

1. Foundations of Software Testing by Rex black, Erik Van Veenendaal, Dorothy Graham (2012)-Cengage Learning: London UK, 3rd Edition
2. Software Engineering by Sommerville-Pearson,8thEdition
3. Daniel Galin, "Software Quality Assurance: From Theory to Implementation", Pearson Addison-Wesley, 2012. 2.
4. Effective Methods for Software Testing by William Perry- Wiley Pub, 3rd Edition.

Reference Books:

1. Roger S. Pressman, "Software Engineering-A Practitioner's Approach", McGraw Hill pub.2010
2. Software Testing in Real World Edward Kit- Pearson Pub
3. Software Testing Techniques by Boris Beizer-DreamTech Pub,2nd Edition
4. Software Testing by Ron Patton, TechMedia Pub.
5. Introducing Software by Testing Louise Tamres
6. Fundamentals of Software Engineering –Rajib Mall, 3rd Edition
7. Allen Gilles "Software quality: Theory and management", International Thomson, Computer press 1997.
8. Software Testing Principles Techniques and Tools by Milind. G. Limaye- Tata McGraw Hill Pub.
9. Stephen H. Kan, "Metrics and models in software quality Engineering", Addison –Wesley 2003.

## Web Reference:

1. [www.istqb.org](http://www.istqb.org)
2. <https://www.seleniumhq.org/>
3. <https://www.softwaretestingmaterial.com/selenium-tutorial/>
4. <https://www.toolsqa.com/selenium-tutorial/>
5. [www.guru99.com/software-testing.html](http://www.guru99.com/software-testing.html)
6. [www.guru99.com/selenium-tutorial.html](http://www.guru99.com/selenium-tutorial.html)
7. [www.guru99.com/mobile-testing.html](http://www.guru99.com/mobile-testing.html)
8. <https://www.softwaretestinghelp.com/appium-tutorial-for-beginners/>
9. [www.professionalqa.com](http://www.professionalqa.com)
10. [www.resources.sei.cmu.edu/library](http://www.resources.sei.cmu.edu/library)
11. [www.iist.org](http://www.iist.org)

Course Code: IT-34

Course Name: Knowledge Representation and Artificial Intelligence: ML, DL

Credit Scheme			Evaluation Scheme				
Lecture	Practical	Credit	Internal			External	Total
			Written	Practical	Tutorial		
3 Hrs./Week	-	3	25	--	--	50	75

**Course Description:**

*Course Objectives:*

*Course Outcomes:*

Student will be able to

CO1: Understand basic building block of Artificial Intelligence and Knowledge Representation.

(Understand)

CO2: Apply Propositional Logic for knowledge representation. (Apply)

CO3: Design various models based on Machine Learning methodology (Apply)

CO4: Design various models based on Deep Learning methodology (Apply)

CO5: Understand various hardware and software aspect used for AI and its application.

(Understand)

*Course Structure:*

Unit No.	Topics Details	Weightage in %	No of Sessions
1	1. Artificial Intelligence and Knowledge representation 1.1. Introduction to Artificial Intelligence and its evolution. 1.2. What is Intelligence and Artificial Intelligence 1.3. How AI is affecting on real life? 1.4. Different branches of AI 1.5. Limitations of AI 1.6. Need of knowledge Representation 1.7. Knowledge Representation and Mapping schemes 1.8. Properties of good knowledge-based system 1.9. Types of knowledge 1.10. Knowledge Representation issues 1.11. AND-OR Graph 1.12. The Wumpus World	15	3

2	<p>2. Propositional Logic</p> <p>2.1. Mathematical Logic and Inference</p> <p>2.2. First Order Logic: Syntax and Semantic, Inference in FOL</p> <p>2.3. Forward chaining, backward Chaining</p> <p>2.4. Language</p> <p>2.5. Semantics and Reasoning</p> <p>2.6. Syntax and Truth Values,</p> <p>2.7. Valid Arguments and Proof Systems</p> <p>2.8. Rules of Inference and Natural Deduction</p> <p>2.9. Axiomatic Systems and Hilbert Style Proofs</p> <p>2.10. The Tableau Method</p> <p>2.11. The Resolution Refutation Method</p> <p><b>Problems based on FOPL</b></p>	15	8
3	<p>3. Machine Learning</p> <p>3.1. History of Machine Learning</p> <p>3.2. Machine Learning Vs Statistical Learning</p> <p>3.3. 3Type of Machine Learning - Supervised, Unsupervised Learning, Reinforcement Learning</p> <p>3.3.1. Linear Regression</p> <p>3.3.2. Logistic Regression</p> <p>3.3.3. Support Vector Machines</p> <p>3.3.4. Random Forest</p> <p>3.3.5. Naïve Bayes Classification</p> <p>3.3.6. Ordinary Least Square Regression</p> <p>3.3.7. K-means</p> <p>3.4. Essentials of Data and its analysis</p> <p>3.5. Framework of Data Analysis</p> <p><b>Extra Reading:</b> Forms of Learning, Inductive Learning, Ensemble Methods, Apriori Algorithm, Principal Component Analysis, Singular Value Decomposition, Reinforcement or Semi-Supervised Machine Learning, Independent Component Analysis</p>	30	15
4	<p>4. Deep Learning</p> <p>4.1. Fundamentals of Deep networks and Defining Deep learning</p> <p>4.2. Deep learning Problem types</p> <p>4.2.1. ANN</p> <p>4.2.2. CNN</p> <p>4.2.3. RNN</p> <p>4.2.4. GAN</p> <p>4.2.5. NLP</p> <p>4.3. Building blocks of Deep learning</p> <p>4.4. Classification and Detection</p>	30	15



	<b>Algorithms should be taught using Python Library – Pytorch</b>  <b>Extra Reading:</b> DNN, Transfer Learning, Architectural Principals of Deep networks – AlexNet, VGG 16, Inception, MobileNet		
5	5. Hardware and Software for AI 5.1. Data Center 5.2. Gateway edge computing 5.3. Keyprocessor for AI 5.4. CPU and GPU 5.5. Field Programmable Gate Array (FPGA)	5	2
6	6. Application of AI 6.1. Robotics Process Automation – Chatbot 6.2. NLP 6.3. Image Processing 6.4. Speech Recognition	5	2
Total:		<b>100</b>	<b>45</b>

### *Course References:*

#### Recommended Books:

##### Reference Books:

1. Artificial Intelligence, 3rd Edition, Elaine Rich, Kevin Knight, S.B. Nair - Tata McGraw Hill.
2. Artificial Intelligence: A Modern Approach Textbook by Peter Norvig and Stuart J. Russell
3. Artificial Intelligence by Patrick Henry Winston - Addison-Wesley, Third Edition.
4. Artificial Intelligence and Intelligent Systems by N.P.Padhy - Oxford University Press.
5. Data Mining practical Machine Learning Tools and Techniques by Ian H. Witten Eibe Frank Mark Hall - Elsevier publication
6. Python Machine Learning and Deep Learning with Python Scikit-learn, and TensorFlow 2, 3rd Edition by Sebastian Raschka, Vahid Mirjalil
7. Machine Learning by Tom M Mitchell – TMGH Publication
8. Machine Learning using Python by Manaranjan Pradhan and U. Dinesh Kumar – WILEY Publication
9. Machine Learning for Big Data – Hands on for Developers and Technical Professionals by Jason Bell – WILEY Publication

## Course Code: IT-35

### Course Name: Cloud Computing

Credit Scheme			Evaluation Scheme				
Lecture	Practical	Credit	Internal			External	Total
			Written	Practical	Tutorial		
3 Hrs./Week	-	3	10	10	5	50	75

#### **Course Description:**

##### *Course Objectives:*

1. To introduce the fundamentals of cloud computing, its technologies, Challenges and Applications
2. To give Insights into the virtualization technologies and Architecture
3. To know the relationship between Cloud and SOA
4. To classify and evaluate Cloud Security Issues
5. To apply theory to practical knowledge through case Studies

##### *Course Outcomes:*

Student will be able to

CO1: Describe the concepts of Cloud Computing and its Service Models& Deployment Models.

(Understand)

CO2: Classify the types of Virtualization. (Understand)

CO3: Describe the Cloud Management and relate Cloud to SOA. (Understand)

CO4: Interpret Architecture and Pharrell Programing of Cloud Computing. (Apply)

CO5: Demonstrate practical implementation of Cloud computing. (Apply)

##### *Course Structure:*

Unit No.	Topics Details	Weightage in %	No of Sessions
1	1. Cloud Services and Cloud Models 1.1. Introduction to Cloud 1.2. Cloud Computing vs. Cluster Computing vs. Grid Computing 1.3. Introduction to Cloud Service Models 1.4. Characteristics, Advantages, Security 1.5. XAAS- Anything as a Service – Storage as a service, Network as a Service, Database as a Service etc. 1.6. IAAS, PAAS, SAAS characteristics, benefits and Applications 1.7. Comparison of SAAS, PASS and IAAS 1.8. Cloud Deployment Models-Public, Private, Hybrid	20	7

	<p>1.9. Cloud Platforms :</p> <p>1.9.1. Google Cloud Platform, 1.9.2. Microsoft Azure 1.9.3. SalesForce, 1.9.4. AWS.</p> <p><b>Extra Reading:</b> Offerings of AWS</p>		
2	<p>2. Virtualization</p> <p>2.1. Introduction to Virtualization concept &amp; Hypervisors 2.2. Types of Virtualization: Server, Storage and Network 2.3. Pros and Cons of Virtualization 2.4. Machine Image, Virtual Machine (VM) 2.5. Technology Examples 2.5.1. Xen: Para virtualization 2.5.2. VMware: Full Virtualization 2.5.3. Open Source Virtualization Manager</p>	15	8
3	<p>3. SOA &amp; Cloud Management</p> <p>3.1. Definition of Service Oriented Architecture 3.2. Basic concepts of SOA 3.3. Web Services: SOAP and REST 3.4. Cloud APIs (RESTful) 3.5. Relating SOA and Cloud Computing. 3.6. Cloud Availability 3.7. Cloud Governance 3.8. Service Level Agreement</p> <p><b>Extra Reading:</b> Pricing Model: Usage Reporting, billing and metering (AWS), Cloud Statistics</p>	15	8
4	<p>4. Multi Core Architecture</p> <p>4.1. Cloud Computing Architecture 4.2. Multi Core Architecture 4.3. Multi Cloud Environment 4.4. Parallel Programming 4.5. Parallel Processing 4.6. Edge Computing Concepts</p>	15	6
5	<p>5. Moving Applications to the Cloud</p> <p>5.1. Cloud Migration Strategies and Process 5.2. Issues in Inter Cloud 5.3. Applications in the Clouds 5.4. Cloud Service Attributes 5.5. Cloud Bursting. 5.6. Data Migration in Cloud 5.7. 5Quality of Services in cloud Computing</p> <p><b>Extra Reading:</b> Six R for Cloud Migration</p>	15	6

6	6. Cloud Security & Implementation of Cloud 6.1. Cloud Security Fundamentals 6.2. Cloud Security Architecture 6.3. Cloud Computing Security Challenges 6.4. Privacy and Security in Cloud 6.5. Identity Management and Access control 6.6. Demonstrate the commercial cloud computing Infrastructures 6.7. Introduction to Dockers Container 6.8. Case Study's based on Cloud Computing Concepts.	20	10
Total:		<b>100</b>	<b>45</b>

### *List of Practicals (if any)*

1. Create an Account to Cloud Service Provider (AWS, AZURE, Google Cloud, etc.)
2. Create an Instance on Cloud
3. Provide Access Control and Permission to Users
4. Execute the Web Page on Cloud
5. Provide Security Mechanism to your instance.

### *Course References:*

#### Recommended Books:

#### Reference Books:

1. Cloud Computing Bible by Barrie Sosinsky, Wiley India Pvt. Ltd,
2. Cloud Computing : Automating the Virtualized Data Center
3. Cloud Computing by Dr. Kumar Saurabh ,Wiley–India
4. Cloud computing: A practical approach by Anthony T. Velte, Tata McGraw-Hill
5. Cloud Computing Concepts, Technology & Architecture by Thomas Erl, Zaigham Mahmood, and Ricardo Puttin
6. Mastering Cloud Computing by Rajkumar Buyya, Christian Vecchiola, S.Thamarai Selvi - McGraw Hill Education (India) Private Limited,
7. Cloud Computing Web –Based Applications that change the way you work and Collaborate Online by Michael Miller, Pearson
8. Cloud Computing for Dummies by Judith Hurwitz, Robin Bloor, Marcia Kaufman, FernHalper

#### Web Reference:

1. <http://www.cloudcomputingpatterns.org/>
2. <http://whatiscloud.com>
3. [www.w3schools.com](http://www.w3schools.com)

**Course Code: IT-31L**  
**Course Name: Practicals**

Credit Scheme			Evaluation Scheme				
Lecture	Practical	Credit	Internal			External	Total
			Written	Practical	Tutorial		
-	10 Hrs./Week	5	-	75	-	50	125

**Course Description:**

This Practical course contains 2 sections. –

1. List of Practicals – Mobile Application Development
2. List of Practicals – KR an AI, ML, DL

*Course Outcomes:*

Student will be able to

- CO1: Develop mobile application. (Apply)
- CO2: Develop ML, DL models using Python (Apply)

*Course Structure:*

**Suggestive List of Practicals**

**Mobile Application Development**

1. Demonstrate different Layouts with different views in android Layouts- ConstraintLayout, RelativeLayout, TableLayout Views- Button, TextView, EditText, WebView, CheckBox, RadioButton, ToggleButton, ImageButton, RatingBar, ProgressBar, SeekBar, VideoView, DatePicker, CalendarView, Spinner
2. Write an android code to make phone call using Intent
3. Write an android code to turn ON/OFF Bluetooth
4. Write an android code to turn ON /OFF the Wi-Fi
5. Design android application for login activity. Write android code to check login credentials with username = "mca" and password = "android". Display appropriate toast message to the user.
6. Create a fragment that has its own UI and enable your activities to communicate with fragments.
7. Demonstrate Array Adapter using List View to display list of fruits.
8. Write an application to demonstrate Alert Dialog Box in android
9. Demonstrate Options Menu, Context Menu and Popup Menu in android
10. Write an application to produce Notification

11. Write an android application using SQLite to create table and perform CRUD operations (Example. COURSE table (ID, Name, Duration, Description), perform ADD, UPDATE, DELETE and READ operations)
12. Create an Android app, powered by Firebase Realtime database that supports: Adding Data to Firebase Realtime database, Retrieving Data from Firebase and Deleting data from firebase data.
13. Demonstrate WebView to display the web pages in an android application.
14. Write an android app to write JSON data into a file and read JSON data from created file.
15. Write an application to display a PDF as an image in React app using URL
16. Develop simple flutter application to open a browser using Android SDK

### KR an AI, ML, DL

1. Find the correlation matrix.
2. Plot the correlation plot on dataset and visualize giving an overview of relationships among data on iris data.
3. Analysis of covariance: variance (ANOVA), if data have categorical variables on iris data.
4. Apply linear regression Model techniques to predict the data on any dataset.
5. Apply logical regression Model techniques to predict the data on any dataset.
6. Clustering algorithms for unsupervised classification.
7. Association algorithms for supervised classification on any dataset
8. Developing and implementing Decision Tree model on the dataset
9. Bayesian classification on any dataset.
10. SVM classification on any dataset
11. Text Mining algorithms on unstructured dataset
12. Plot the cluster data using python visualizations.
13. Creating & Visualizing Neural Network for the given data. (Use python)
14. Recognize optical character using ANN.
15. Write a program to implement CNN
16. Write a program to implement RNN
17. Write a program to implement GAN
18. Web scraping experiments (by using tools)

## Course Code: ITC31

### Course Name: Mini Project

Credit Scheme			Evaluation Scheme				
Lecture	Practical	Credit	Internal			External	Total
			Written	Practical	Tutorial		
-	10 Hrs./Week	5	-	75	-	50	125

#### **Course Description:**

A mini project is an assignment that the student needs to complete at the end of every semester to strengthen the understanding of fundamentals through effective application of the subjects learnt.

#### ***Course Outcomes:***

Student will be able to

CO1: Create working project using tools and techniques learnt in this semester  
(Create)

#### ***Course Structure:***

#### **Guidelines for Mini Project**

1. Students are expected to undertake one mini project starting from first semester till third semester.
2. The student may take up the mini project in first semester based on the courses learnt in that semester and for every next semester the mini project may be based on the courses learnt in the current semester along with all the subjects learnt in earlier semesters.
3. The student may take up the project individually or in group. However, if project is done in group, each student must be given a responsibility for distinct modules.
4. Selected project/module must have relevant scope as per the marks assigned and must be carried out in the Institute.
5. Internal guide should monitor and evaluate the progress of the project on individual basis through handwritten workbook (Project Diary) maintained by students containing various project milestones with learnings and remarks from internal guide for concurrent evaluation.
6. The Project Synopsis should contain an Introduction to Project clearly stating the project scope in detail justifying enough scope for 125 marks. The project work will carry 75 marks for internal assessment and 50 marks for external assessment.
7. Students are expected to show working demo of the project during final evaluation.
- 8. Students are expected to upload mini-project on GITHUB as project repository of the institution.**
9. Students are expected to submit the soft copy of mini project report as a part of final submission.
10. The project will be assessed internally as well as externally by the examiners appointed by University. University may appoint Industry Experts as an external examiner