

Ahmednagar Jilha Maratha Vidya Prasarak Samaj's

**New Arts, Commerce and Science College, Ahmednagar  
(Autonomous)**

**(Affiliated to Savitribai Phule Pune University, Pune)**



**Choice Based Credit System (CBCS)**

**Master of Science (Computer Applications )**

**Structure of**

**Master of Science (Computer Applications)**

**Implemented from**

**Academic Year 2022 - 23**

**Ahmednagar Jilha Maratha Vidya Prasarak Samaj's**  
**New Arts, Commerce and Science College, Ahmednagar**  
**(Autonomous)**

**Board of Studies in Master of Science (Computer Applications)**

Sr. No.	Name	Designation
1.	Prof.Arun.D.Gangarde	Chairman
2.	Prof. Priyamvada Patil	Member
3.	Dr.Shraddha Ingale	Member
4.	Dr.Mudassar Shaikh	Member
5.	Dr.Santosh Khamitkar	Academic Council Nominee
6.	Dr. Shankar Mali	Academic Council Nominee
7.	Dr.Nitin Patil	Vice-Chancellor Nominee
8.	Mr.Summit Suryawanshi	Alumni
9.	Dr.Deepak Shikarpur	Industry Expert
10.	Prof.Deepali Jagdale	Member (co-opt)
11.	Dr. Madhukar Shelar	Member (co-opt)

**Program Structure and Course Titles:** (All academic years)

Sr. No.	Class	Semester	Course Code	Course Title	Credits
1.	MSC-CA	I	MSC-CA 111T	Internet and Java Programming	04
2.	MSC-CA	I	MSC-CA 112T	Design and Analysis of Algorithms	04
3.	MSC-CA	I	MSC-CA 113T	Advance Databases	04
4.	MSC-CA	I	MSC-CA 114P	Internet and Java programming (Lab)	04
5.	MSC-CA	I	MSC-CA 115T(A)	Web Technology	02
6.	MSC-CA	I	MSC-CA 115P(A)	Web Technology(Lab)	02
7.	MSC-CA	I	MSC-CA 115T(B)	Software Testing	02
8.	MSC-CA	I	MSC-CA 115P(B)	Software Testing (Lab)	02
9.	MSC-CA	I	MSC-CA 116 T/P	Python Programming	02
10.	MSC-CA	II	MSC-CA 211T	ASP.NET	04
11.	MSC-CA	II	MSC-CA 212T	Operating System Concepts	04
12.	MSC-CA	II	MSC-CA 213T	Advance Networking Concepts	04
13.	MSC-CA	II	MSC-CA 214P	ASP.NET (Lab)	04
14.	MSC-CA	II	MSC-CA 215T(A)	Django	02
15.	MSC-CA	II	MSC-CA 215P(A)	Django (Lab)	02
16.	MSC-CA	II	MSC-CA 215T(B)	Network Cyber Security	02
17.	MSC-CA	II	MSC-CA 215P(B)	Network Cyber Security (Lab)	02
18.	MSC-CA	II	MSC-CA 216 T/P	IoT	02
19.	MSC-CA	III	MSC-CA 311T	Mobile Application Development Using Android	04
20.	MSC-CA	III	MSC-CA 312T	Artificial Intelligence	04
21.	MSC-CA	III	MSC-CA 313T	Software Project Management	04
22.	MSC-CA	III	MSC-CA 314P	Mobile Application Development Using Android (Lab)	04

23.	MSC-CA	III	MSC-CA 315T(A)	Angular JS	02
24.	MSC-CA	III	MSC-CA 315P(A)	Angular JS (Lab)	02
25.	MSC-CA	III	MSC-CA 315T(B)	Block Chain Management	02
26.	MSC-CA	III	MSC-CA 315P(B)	Block Chain Management (Lab)	02
27.	MSC-CA	III	MSC-CA 316 T/P	Data Mining and Data Warehousing	02
28.	MSC-CA	IV	MSC-CA 411 I	Industrial Internship	16
29.	MSC-CA	IV	MSC-CA 412 P	Course Work	06

**Ahmednagar Jilha Maratha Vidya Prasarak Samaj's  
New Arts, Commerce and Science College, Ahmednagar (Autonomous)  
Syllabus of M.Sc.-Computer Applications Sem –III  
Under  
Faculty of Science**

<b>Semester – III</b>	<b>Paper – I</b>
<b>Course Code: MSC-CA 311 T</b>	<b>Title of the Course: Mobile Application Development Using Android</b>
<b>Credits: 04 Credits</b>	<b>Total Lectures: 60 Hrs.</b>

### Course Outcomes (COs):

- a. Gain knowledge about different mobile platform and application development.
- b. To know the programming using Android on IOS.
- c. To know the programming using Android on Windows platform.
- d. To develop the mobile applications.

### Detailed Syllabus:

#### Unit I: Android Fundamentals (10)

- 1.1 Introduction to Android – Overview and evolution of Android.
- 1.2 Features of Android, Android architecture.
- 1.3 Components of an Android Application, Manifest file.
- 1.4 Android Activity, Service Lifecycle

#### Unit II: Android UI Design (10)

- 2.1 Basic UI Designing (Form widgets, Text Fields)
- 2.2. Intent (in detail)
- 2.3 All components (e.g Button, Slider, Image view, Toast) Event Handling
- 2.4 Adapters and Widgets.
- 2.5 Menu

#### Unit III: Android Thread and Notification (10)

- 3.1 Threads running on UI thread (runOnUiThread).
- 3.2 Worker thread
- 3.3 Handlers & Runnable
- 3.4 Asyn Task (in detail)
- 3.5 Broadcast Receivers
- 3.6 Services and notifications
- 3.7 Toast and Alarms

#### Unit IV: Advanced Android Programming (10)

- 4.1 Content Providers – SQLite Programming
- 4.2 JSON Parsing
- 4.3 Accessing Phone Service (Call, SMS, MMS)
- 4.4 Location based services

**Unit V: PhoneGap Programming (10)**

- 5.1 Why Use PhoneGap?
- 5.2 How PhoneGap Works
- 5.3 Designing for the Container
- 5.4 Writing PhoneGap Applications
- 5.5 Building PhoneGap Applications
- 5.6 PhoneGap Limitations
- 5.7 PhoneGap Plug-Ins
- 5.7 Hello, World! Program
- 5.8 Accelerometer
  - 5.8.1 Querying Device Orientation,
  - 5.8.2 Watching a Device's Orientation
- 5.9 Contact Management in PhoneGap
  - 5.9.1 Creating a Contact
  - 5.9.2 Searching for Contacts
  - 5.9.3 Cloning Contacts
  - 5.9.4 Removing Contacts.

**Unit VI: iOS Fundamentals (10)**

- 6.1 Introduction –
  - 6.1.1 What is IOS? IOS Features.
  - 6.1.2 IOS Architecture
  - 6.1.3 Frameworks
  - 6.1.4 Application Life Cycle
- 6.2 Swift
  - 6.2.1 Introduction to Swift
  - 6.2.2 General Concepts of Swift
- 6.3 Xcode
  - 6.3.1 Introduction to Xcode
  - 6.3.2 Navigator, Editor Utility, Tools, Console, Document, Simulator.
- 6.4 Storyboard
  - 6.4.1 Introduction to Storyboard
  - 6.4.2 Hello World Application,
  - 6.4.3 How 'Hello World' Works?

**Suggested Readings:**

1. **Beginning Android Application Development** by Wei-Meng Lee Wiley.
2. **IOS Apprentice** by Matthijs Hollemans.
3. **PhoneGap: Beginner's Guide** by Giorgio Natili, Purusothaman Ramanujam, PACKT Publication

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<b>Semester – III</b>	<b>Paper – II</b>
<b>Course Code: MSC-CA 312 T</b>	<b>Title of the Course: Artificial Intelligence</b>
<b>Credits: 04</b>	<b>Total Lectures: 60 Hrs.</b>

### Course Outcomes (COs):

- a. Discuss the core concepts and algorithms of advanced AI
- b. Apply the basic principles, models, and algorithms of AI
- c. To recognize, model, and solve problems in the analysis
- d. Design of information systems

### Detailed Syllabus:

#### Unit I: Introduction to Artificial Intelligence (03)

- 1.1. What is AI?
- 1.2. Comparison of AI, Machine Learning and Deep Learning
- 1.3. Applications AI and related fields
- 1.4. AI Techniques
- 1.5. Intelligent Agents, Agents and environments, structure of Agents

#### Unit II: Problems, Problem Spaces, and Search (06)

- 2.1 Defining AI problems as a State Space Search: example Production Systems
- 2.2 Search and Control Strategies
- 2.3 Problem Characteristics
- 2.4 Additional Problems (Water Jug, 8 puzzle, Missionaries and Cannibals and Block words problem)

#### Unit III: Search Techniques (09)

- 3.1 Uninformed Search Algorithms/Blind Search Techniques
  - 3.1.1 Breadth First Search
  - 3.1.2 Depth First Search
- 3.2 Informed /Heuristic Search Techniques
  - 3.2.1 Hill Climbing
  - 3.2.2 Generate and Test
  - 3.2.3 Best First Search
  - 3.2.4 Problem Reduction
  - 3.2.5 Constraint Satisfaction
  - 3.2.6 Mean-Ends Analysis
  - 3.2.7 A\* and AO\*

**Unit IV: Knowledge Representation (14)**

- 4.1 Definition of Knowledge
- 4.2 Types of Knowledge (Procedural and Declarative knowledge)
- 4.3 Approaches to Knowledge Representation
- 4.4 Knowledge representation using Propositional and Predicate logic Conversion to clause form
- 4.5 Resolution in Propositional logic
- 4.6 Unification algorithm
- 4.7 Resolution in Predicate logic
- 4.8 Question answering
- 4.9 Forward and Backward chaining

**Unit V: Slot and Filler Structures (10)**

- 5.1 Weak Structures
  - 5.1.1 Semantic Networks
  - 5.1.2 Frames
- 5.2 Strong Structures
  - 5.2.1 Conceptual Dependencies
  - 5.2.2 Scripts

**Unit VI: Game Playing (06)**

- 6.1 Overview
- 6.2 Minmax Search Procedures
- 6.3 Adding alpha-beta cutoffs

**Unit VII: Statistical Reasoning (06)**

- 7.1 Probability and Bayes' theorem
- 7.2 Certainty factor: Rule-based Systems
- 7.3 Bayesian Network
- 7.4 Dempster -Shafer Theory

**Unit VIII: Learning (06)**

- 8.1 What is learning?
- 8.2 Rote Learning
- 8.3 Learning by taking advice
- 8.4 Learning in problem solving
- 8.5 Learning from examples
- 8.6 Explanation based learning

**Suggested Readings:**

1. Computational Intelligence, Eberhart, Elsevier, ISBN 9788131217832
2. Artificial Intelligence: A New Synthesis, Nilsson, Elsevier, ISBN 9788181471901 .
3. Artificial Intelligence, Tata McGraw Hill, 2nd Edition, by Elaine Rich and Kevin Knight
4. Introduction to Artificial Intelligence and Expert System, Prentice Hall of India Pvt. Ltd., New Delhi, 1997.



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<b>Semester – III</b>	<b>Paper – III</b>
<b>Course Code: MSC-CA 313 T</b>	<b>Title of the Course: Software Project Management</b>
<b>Credits: 04</b>	<b>Total Lectures: 60 Hrs.</b>

### Course Outcomes (COs):

- a. Understand Project Management principles while developing software.
- b. Gain extensive knowledge about the basic project management concepts, framework and the process models.
- c. Obtain adequate knowledge about software process models and software effort estimation techniques.
- d. Estimate the risks involved in various project activities.
- e. Define the checkpoints, project reporting structure, project progress and tracking mechanisms using project management principles.

### Detailed Syllabus:

#### Unit I: Introduction to Project Management

(10)

- 1.1 What is Project?
- 1.2 What is Project Management?
- 1.3 Project phases and project life cycle
- 1.4 Role of Project Manager, Qualities of Project Manager
- 1.5 Ethics in Project Management.
- 1.6 A Systems View of Project Management
- 1.7 The Three-Sphere Model for Systems Management
- 1.8 Project Components
- 1.9 Project Integration Management
  - 1.9.1 What is Project Integration Management?
  - 1.9.2 Project plan development and execution
  - 1.9.3 Developing a Project Charter,
  - 1.9.4 Developing a Project Management Plan

#### Unit II: Project Scope, Time, Cost Management

(12)

- 2.1 Scope Management
  - 2.1.1 What Is Project Scope Management?
  - 2.1.2 Strategic planning, Scope planning, definition Collecting Requirements
  - 2.1.3 Defining Scope Creating the Work Breakdown Structure,
  - 2.1.4 Verification and Control-Verifying Scope, Controlling Scope
- 2.2 Time management
  - 2.2.1 The importance of Project Schedule

2.2.2 Activity planning, defining activities, sequencing activities,  
Estimating Activity Resources, Estimating Activity Durations

2.2.3 Schedule development and control Developing the Schedule

**2.3 Cost Management**

2.3.1 The importance of Cost Management

2.3.2 Cost estimation and Control

2.3.3 Basic Principles of Cost Management

2.3.4 Estimating Costs, Controlling Costs Earned Value Management

**Unit III: Quality Management (08)**

3.1 The Importance of Project Quality Management,

3.2 What Is Project Quality Management?

3.3 Quality Planning

3.4 Quality Assurance

3.5 Quality Control, Modern Quality Management, Deming and his 14 Points for Management

**Unit IV: Human Resource and Communication Management (08)**

4.1 Organizational planning

4.2 Staff acquisition

4.3 Information distribution

4.4 Reporting

**Unit V: Risk Management (08)**

5.1 Risks and Risk Types

5.2 Risk Management Process

5.2.1 Risk Analysis

5.2.2 Risk Planning

5.2.3 Risk Monitoring

5.2.4 Quantification and control

**Unit VI: Procurement Management (07)**

6.1 Solicitation

6.2 Contract administration

**Unit VII: Software Metrics (07)**

7.1 The scope of software metrics

7.2 Software metrics data collection

7.3 Analyzing software data

7.4 Measuring size, structure, external attributes

**Suggested Readings:**

1. Information Technology Project Management, 6th Edition Kathy Schwalbe ISBN-13 9781111221751 , Cenage Learning
2. Software Engineering: A Practioner's Approach by Roger S. Pressman ISBN: 9780071267823
3. Software Project Management Black Book Kogent, Wiley publication
4. Software Project Management: A real world Joel Henry Pearson publication

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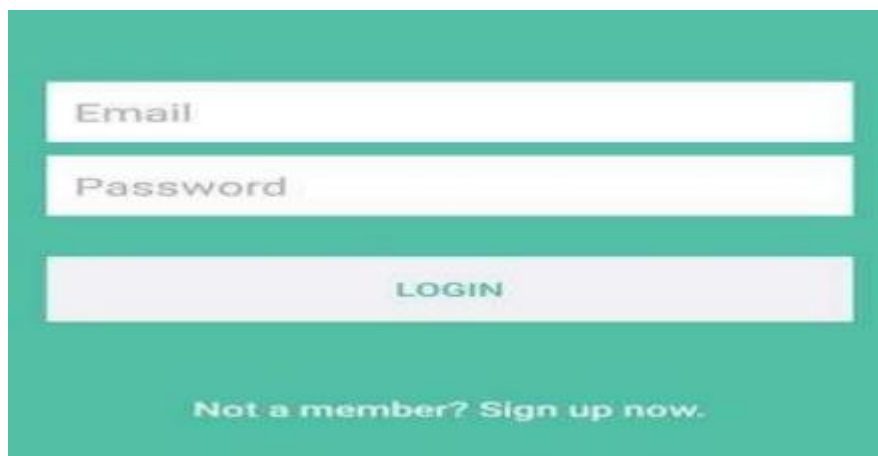
Semester – III	Paper – IV
Course Code: MSC-CA 314 P	Title of the Course: Mobile Application Development Using Android (Lab)
Credits: 04 Credits	Total Lectures: 60 Hrs.

### Course Outcomes (COs):

- Gain knowledge about different mobile platform and application development.
- To know the programming using Android on IOS and Windows platform.
- To develop the mobile app

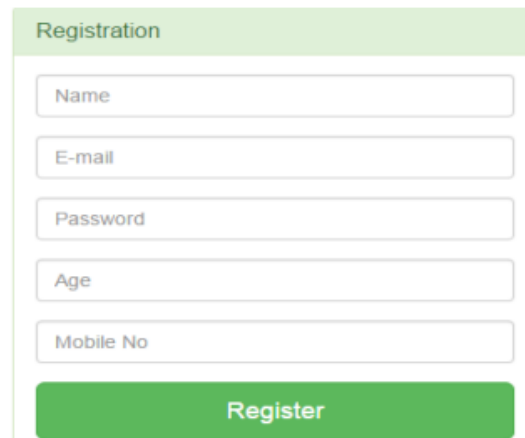
### List of Assignments:

- Create an Application Which will Send —Hello message from one activity to another with help of Button (Use Intent).

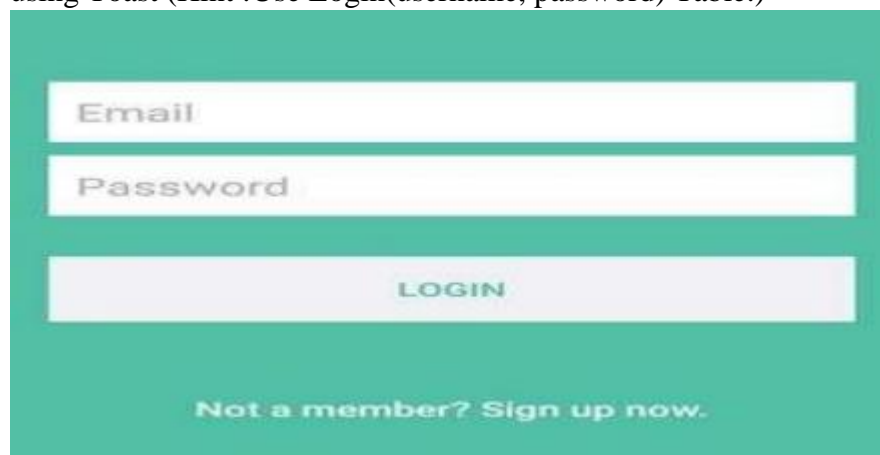


- Create application with Login Screen. On successful login, gives message go to next Activity (Without Using Database).
- Create First Activity to accept information like Student First Name, Middle Name, Last Name, Date of birth, Address, Email ID and display all information on Second Activity when user click on Submit button.
- Create a "Contact" layout to hold multiple pieces of information, including: Photo, Name, Contact Number, E-mail id.
- Construct an app to display the image.
- Construct a bank app to display different menu like withdraw, deposit etc.
- Construct a register app to display different menu like add, delete, edit etc

8. Create registration form given below. Also perform appropriate validation.

A registration form with a light green header labeled "Registration". Below the header are five input fields: "Name", "E-mail", "Password", "Age", and "Mobile No". At the bottom of the form is a green button labeled "Register".

9. Create sample application with login module (Check username and password). On successful login, pass username to next screen And on failing login, alert user using Toast (Hint :Use Login(username, password) Table.)

A login form with a teal background. It features two input fields: "Email" and "Password". Below these fields is a light purple button labeled "LOGIN". At the bottom of the form, there is a link that says "Not a member? Sign up now."

10. Create Table project (pno, p\_name, ptype, duration) and employee (id, e\_name, qualification, joindate) Project – employee have many to many relationship. Using database perform following operation.
- Add new record into table.
  - Accept a project name from user and display information of employees working on the project.
11. Create application to send and receive messages using SMS Manager.
12. Create application to send email.
13. Create application to design login form, validate it. Write and send email with appropriate message.
14. Write a program to search a specific location on Google Map
15. Write a program to calculate distance between two locations on Google Map.

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<b>Semester – III</b>	<b>Paper – V</b>
<b>Course Code: MSC-CA 315 T(A)</b>	<b>Title of the Course: Angular JS</b>
<b>Credits: 02</b>	<b>Total Lectures: 30 Hrs.</b>

**Course Outcomes (COs):**

- a. By the end of this course, the students should be able to Understand Client Side MVC and SPA
- b. Explore AngularJS Component
- c. Develop an AngularJS Single Page Application
- d. Apply filter in AngularJS application

**Detailed Syllabus:****Unit I: Angular JS Core Concepts****(4)**

- 1.1 What is AngularJS?
- 1.2 Difference between Javascript and Angular JS
- 1.3 Advantages of Angular
- 1.4 AngularJS MVC Architecture
- 1.5 Introduction to SPA
- 1.6 Setting up the environment
- 1.7 First App using MVC architecture

**Unit II: Angular JS Directives and Expressions****(6)**

- 2.1 Understanding ng attributes: ng-app, ng-init, ng-model, ng-controller, ng-bind, ng-repeat, ng-show, ng-readonly, ng-disabled, ng-if, ng-click
- 2.2 Expression and Data Binding
- 2.3 Working with directives

**Unit III: AngularJS Modules, Controller, View and Scope****(6)**

- 3.1 Angular Modules
- 3.2 Angular Controller
- 3.3 Angular View
- 3.4 Scope hierarchy

**Unit IV: Filter, Forms and Ajax Filters****(8)**

- 4.1 Built-in filters  
upper case and lower case filters, date ,currency and number formatting ,  
orderBy, filter ,custom filter.

- 4.2 Angular JS Forms
  - 4.2.1 Working with AngularJS forms
  - 4.2.2 model binding,
  - 4.2.3 form controller
  - 4.2.4 Using CSS classes
  - 4.2.5 form events
  - 4.2.6 custom model update triggers
  - 4.2.7 custom validation
  - 4.2.8 \$http service
- 4.3 Ajax implementation using \$http

**Unit V: Dependency Injection, Services****(6)**

- 5.1 What is dependency injection?
- 5.2 Understanding services
- 5.3 Using built-in service
- 5.4 Creating custom service,
- 5.5 Injecting dependency in service

**Suggested Readings:**

1. Beginning Angular with Typescript (updated to Angular 5) by Greg Lim
2. Mastering Web Application Development with AngularJS by Pawel Kozlowski, Peter Bacon Darwin  
<https://www.tutorialsteacher.com/angularjs/angularjs-scope>

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<b>Semester – III</b>	<b>Paper – VI</b>
<b>Course Code: MSC-CA 315 P(A)</b>	<b>Title of the Course: Angular JS ( Lab )</b>
<b>Credits: 02</b>	<b>Total Lectures: 30 Hrs.</b>

### Course Outcomes (COs):

- a. By the end of this course, the students should be able to Understand Client Side MVC and SPA
- b. Explore AngularJS Component
- c. Develop an AngularJS Single Page Application
- d. Apply filter in AngularJS application

### List of Experiments:

1. Write an Angular JS Script to display list of games stored in an array on click of button using ng-click. And also demonstrate ng-init, ng-bing directive of Angular JS
2. Write a HTML Code using AngularJS to generate the following (hint: use ng-init, ng-repeat directive)
3. Using Angular JS display the 10 student details in Table format.(Using ng-repeat directive , use array to store data)
4. Write an Angular JS Script to print details of bank.(bank name,MICR Code, IFSC Code,address etc) in tabular format using ng-repeat.
5. Write an Angular JS Script for addition of two numbers using ng-init, ng-model & ng-bind. And also demonstrate ng-show,ng-disabled,ng-click directives on button component.
6. Using angular JS create a SPA tha show syllabus content of all subjects of MSc-Ca(Use ng-view)
7. Create an HTML form using AngularJS that contain the Student Registration details and validate Student first and last name as it should not contain other than alphabets and age should be between 18 to 50 and display greeting message depending on current time using ng-show(eg.Good Morning, Good Afternoon,etc)(Use Ajax)
8. Create an HTML form using AngularJS that contain the Employee Registration details and validate DOB, Joining Date,and Salary and also create a simple arithmetic calculator using radio buttons(use ng-switch,ng-switch-when)
9. Using AngularJS create SPA that show address and contact details of some 5-10 top hotels which are in Ahmednagar location( use ng-view)
10. Using AngularJS create SPA that show History of some 4-8 historical places.(Use MVC)
11. Using AngularJS create SPA for customer registration visiting a departmental store. Form should consists of fields such as name,contact no, gender, favourite item(to be selected from

- a list of items with Quantity), and suggestions. Display the Bill with total no of items selected and total amount to be paid(use filter).
12. Using AngularJS create SPA that accept the details of student and display marksheet(roll\_no, Student\_name, class, sub1, sub2, sub3, total, percentage, grade)
  13. Using AngularJS create SPA to take the information of a customer for booking a plan consisting of fields such as name, address, contact no, gender, Date of booking, date of journey, no of passenger, name of passenger etc. Display the e-Ticket.
  14. Using AngularJS create SPA for Bus Ticket Reservation consisting of fields: Name, Address, contact no, source station(Dropdown list), Destination station, Date of booking, date of journey, no of passenger, name of passenger, gender etc. Display the e-Ticket.
  15. Using AngularJS display the student details who are live in pune in Table format(using ng-repeat directive, use Array to store data, use filter)
  16. Write an AngularJS script to search student name according to the character typed and display details (use array and filter)
  17. Using AngularJS create a SPA that shows Teacher Profile who are teaching to MSc-CA class with photo.
  18. Using AngularJS display the Employee details order by salary in Table format(using ng-repeat directive, use Array to store data, use filter)
  19. Using AngularJS create a SPA that accept the details such as name, mobile number, pincode and email address and make validation. Name should contain character only, mobile number should contain only 10 digit, Pin code should contain only 6 digit, email id should contain only one @ symbol.
  20. Using AngularJS create a SPA that accept the details of doctor(5-6) having fields dno, dname, address, and phone number. Display those in table format(use MVC)
  21. Using AngularJS create a SPA that accept Voter details and check proper validation for(name, age, and nationality) as Name should be in Upper case letters, Age should not be less than 18 yrs and Nationality should be Indian.
  22. Using AngularJS create a SPA to carry out validation for username entered in textbox. If the textbox is blank, alert 'Username is too short'. If value entered is appropriate the print 'Valid username' and password should be minimum 8 characters.
  23. Using AngularJS create a SPA to fetch suggestions when is user is typing in a textbox(eg. Like google suggestions. Hint create array of suggestions and matching string will be displayed).
  24. Create an HTML form Using AngularJS for Login system and validate email ID using Regular Expression and password should be minimum 8 characters.
  25. Using AngularJS create a SPA for eLearning system.
  26. Using AngularJS create a SPA for a Recipe book.
  27. Using AngularJS create a SPA that clone the "Hacker News " website.
  28. Using AngularJS Develop online School System.
  29. Using AngularJS Implement E-Commerce website.
  30. Using AngularJS service method, write a program to calculate area of Circle and Circumference of Circle.



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<b>Semester – III</b>	<b>Paper – VII</b>
<b>Course Code: MSC-CA 315 T(B)</b>	<b>Title of the Course: Block Chain Management</b>
<b>Credits: 02 Credits</b>	<b>Total Lectures: 30 Hrs.</b>

### Course Outcomes (COs):

- a. How blockchain System Works.
- b. Design, build and deploy smart contracts and distributed applications to securely interact with them
- c. Understanding of emerging abstract model of blockchain Technology

### Detailed Syllabus:

#### Unit I: Introduction to Blockchain

(07)

- 1.1 Blockchain- Public Ledgers Blockchain as Public Ledgers –Bitcoin
- 1.2 Blockchain 2.0, Smart Contracts
- 1.3 Block in a Blockchain
- 1.4 Transactions-Distributed Consensus
- 1.5 The Chain and the Longest Chain –  
Cryptocurrency to Blockchain 2.0 - Permissioned Model of Blockchain
- 1.6 Cryptographic -Hash Function
- 1.7 Properties of a hash function-Hash pointer and Merkle tree

#### Unit II: Bitcoin and Cryptocurrency

(06)

- 2.1 A basic crypto currency, Creation of coins, Payments and double spending
- 2.2 FORTH – the precursor for Bitcoin scripting, Bitcoin Scripts , Bitcoin P2P Network
- 2.3 Transaction in Bitcoin Network, Block Mining, Block propagation and block relay
- 2.4 Consensus introduction, Distributed consensus in open environments-  
Consensus in a Bitcoin network

#### Unit III: Bitcoin Consensus

(07)

- 3.1 Bitcoin Consensus
- 3.2 Proof of Work (PoW)- Hashcash PoW , Bitcoin PoW, Attacks on PoW
- 3.3 Monopoly problem- Proof of Stake- Proof of Burn –  
Proof of Elapsed Time - Bitcoin Miner, Mining Difficulty,  
Mining Pool-Permissioned model and use cases
- 3.4 Design issues for Permissioned Blockchains

3.5 Contracts- Consensus models for permissioned blockchain-

3.6 Distributed consensus in closed environment Paxos

**Unit IV: Distributed Consensus Raft**

**(06)**

4.1 Consensus-Byzantine general problem

4.2 Byzantine fault tolerant system-Agreement Protocol

4.3 Lamport-Shostak-Pease BFT Algorithm-BFT over Asynchronous systems

4.4 Practical Byzantine Fault Tolerance

**Unit V: Blockchain Applications**

**(04)**

5.1 Internet of Things-Medical Record Management System

5.2 Blockchain in Government and Blockchain

5.3 Security-Blockchain Use Cases –Finance

**Suggested Readings:**

1. Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks by Bashir, Imran, 2017.
2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016.
3. Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin and cryptocurrency, IEEE Symposium on security and Privacy, 2015

**Ahmednagar Jilha Maratha Vidya Prasarak Samaj's  
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Syllabus of M.Sc.-Computer Applications Sem –III  
Under  
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<b>Semester – III</b>	<b>Paper – VIII</b>
<b>Course Code: MSC-CA315 P(B)</b>	<b>Title of the Course: Block Chain Management (Lab)</b>
<b>Credits: 02 Credits</b>	<b>Total Lectures: 30 Hrs.</b>

**Course Outcomes (COs):**

- a. How blockchain System Works.
- b. Design, build and deploy smart contracts and distributed applications to securely interact with them
- c. Understanding of emerging abstract model of blockchain Technology

**List of Experiments:**

1. Write a python program to create simple blockchain
2. Write a python program to create block
3. How to create a bitcoin wallet address with python
4. To implement a mining procedure
5. Create your own python blockchain by using python code to define a single block record ,define proof of work system and a mining procedure
6. Write a python program to create miners in blockchain
7. Using python to add blocks in blockchain.
8. Creating a blockchain using hashfunction
9. Implementing cryptography in blockchain using python
10. Create a blockchain bitcoin cryptocurrency

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<b>Semester – III</b>	<b>Paper – IX</b>
<b>Course Code: MSC-CA 316 T/P</b>	<b>Title of the Course: Data Mining and Warehousing</b>
<b>Credits: 02 Credits</b>	<b>Total Lectures: 30 Hrs.</b>

**Course Outcomes:**

- a. Design a Data warehouse system and perform business analysis with OLAP tools.
- b. Apply suitable pre-processing and visualization techniques for data analysis
- c. Apply frequent pattern and association rule mining techniques for data analysis
- d. Apply appropriate classification and clustering techniques for data analysis

**Detailed Syllabus:****Unit I: Introduction to Data Mining****(06)**

- 1.1 Introduction to Data Mining
- 1.2 Need of Data Mining
- 1.3 What Can Data Mining Do and Not Do?
- 1.4 Data Mining Applications
- 1.5 Data Mining Process
- 1.6 Data Mining Techniques
  - 1.6.1 Predictive modeling
  - 1.6.2 Database segmentation
  - 1.6.3 Link analysis
  - 1.6.4 Deviation detection
- 1.7 Difference between Data Mining and Machine Learning

**Unit II: Data Warehouse****(06)**

- 2.1 The Need for an Operational Data Store (ODS)
- 2.2 Operational Data Store
  - 2.2.1 Types of ODS
  - 2.2.2 Architecture of ODS
  - 2.2.3 Advantages of the ODS
- 2.3 Data Warehouse
  - 2.3.1 Historical developments in data warehousing

- 2.3.2 Defining data warehousing
- 2.3.3 Data warehouse architecture
- 2.3.4 Benefits of data warehousing
- 2.4 Data Marts
- 2.5 Comparative Study of Data Warehouse with OLTP and ODS
  - 2.5.1 Data warehouses versus OLTP: similarities and distinction

**Unit III: Data Preprocessing, Data Warehouse Schema, Online Analytical Processing** (06)

- 3.1 Need for Data Preprocessing
- 3.2 Data Preprocessing Methods
  - 3.2.1 Data cleaning
  - 3.2.2 Data integration
  - 3.2.3 Data transformation
  - 3.2.4 Data reduction
- 3.3 Introduction to Data Warehouse Schema
  - 3.3.1 Dimension
  - 3.3.2 Measure
  - 3.3.3 Fact Table
  - 3.3.4 Multi-dimensional view of data
    - 3.3.4.1 Star Schema
    - 3.3.4.2 Snowflake Schema
    - 3.3.4.3 Fact Constellation Schema (Galaxy Schema)
  - 3.3.5 Comparison among Star, Snowflake and Fact Constellation Schema
- 3.4 Introduction to Online Analytical Processing
  - 3.4.1 Defining OLAP
  - 3.4.2 OLAP applications
  - 3.4.3 Features of OLAP
  - 3.4.4 OLAP Benefits
  - 3.4.5 Strengths of OLAP
  - 3.4.6 Comparison between OLTP and OLAP
  - 3.4.7 Differences between OLAP and data mining
  - 3.4.8 Representation of Multi-dimensional Data
    - 3.8.1 Data Cube
    - 3.8.2 Implementing Multi-dimensional Data

**Unit IV: Classification and Prediction** (06)

- 4.1 What Is Classification? What Is Prediction?
- 4.2 Issues Regarding Classification and Prediction
  - 4.2.1 Preparing the Data for Classification and Prediction
  - 4.2.2 Comparing Classification and Prediction Methods
- 4.3 Classification by Decision Tree Induction
  - 4.3.1 Decision Tree Induction
  - 4.3.2 Attribute Selection Measures
  - 4.3.3 Tree Pruning

- 4.3.4 Scalability and Decision Tree Induction
- 4.4 Bayesian Classification
  - 4.4.1 Bayes' Theorem
  - 4.4.2 Naïve Bayesian Classification
  - 4.4.3 Bayesian Belief Networks
  - 4.4.4 Training Bayesian Belief Networks
- 4.5 Prediction
  - 4.5.1 Linear regression
  - 4.5.2 Non-linear regression

**Unit V: Clustering****(06)**

- 5.1. What is mean by Clustering?
- 5.2. K-means Clustering
- 5.3. Expectation Maximization (EM) algorithm
- 5.4. Hierarchical clustering,
- 5.5. Correlation clustering
- 5.6. Software for data mining and applications of data mining
  - 5.6.1 Introduction to R tool

**Suggested Readings:**

1. Data Mining: Concepts and Techniques Second Edition, Jiawei Han ,Micheline Kamber, Jian pei, Morgan Kaufmann.
2. Data Mining and DataWarehousing Principles and Practical Techniques, Parteek Bhatia, Cambridge University press.
3. Data Warehousing, Data Mining & OLAP, Alex Berson and Stephen J.Smith, Tata McGraw – Hill Edition.
4. The Book of R first course in programming and statistics, Tilman M. Davis

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<b>Semester – IV</b>	<b>Paper – I</b>
<b>Course Code: MSC-CA 411 I</b>	<b>Title of the Course: Industrial Internship</b>
<b>Credits: 16</b>	

### Course Outcomes (COs):

- a. Become updated with all the latest changes in technological world.
- b. Ability to communicate efficiently.
- c. Ability to be a multi-skilled engineer with good technical knowledge, management, leadership and entrepreneurship skills.
- d. To increase self-confidence of students and helps in finding their own proficiency.
- e. To cultivate student's leadership ability and responsibility to perform or execute the given task.
- f. To provide learners hands on practice within a real job situation.

### Industrial Training

**16 Credits**

#### Guidelines:

- Each student must individually complete minimum **5 months** full time Industrial training /Institutional project in the 4th semester.
- College should assign a student mentor to every student. The mentor will monitor the progress of the student throughout the semester for continuous assessment.
- Student should submit a valid offer letter and synopsis within two weeks of starting the internship.
- There will be continuous assessment of the work done by the student during the internship period.

#### Continuous assessment guidelines:

1. Student should submit a weekly report in the college to the mentor.
2. The report should contain the following details: Name of student, project title, company name, company mentor, daily activities and results/output, proposed work for next week.

3. The weekly report should be duly signed by the student and company mentor/ institute guide (CM).
4. Student Mentor should maintain weekly attendance record for every student.
5. Two presentations should be conducted for each student (first presentation after first month and second presentation after 3rd month)
6. Student Mentor should take feedback from the Company mentor regarding overall performance of the student.
7. At the end of the internship period, each student should prepare a report which should conform to international academic standards.
8. The report should follow the style in academic journals and books, with contents such as: abstract, background, aim, design and implementation, testing, conclusion and full references, Tables and figures should be numbered and referenced to in the report.

**The final presentation and documentation will be evaluated by three examiners:**

1. Student mentor (appointed by respective college)
2. External examiner (appointed by the University)
3. IT expert (appointed by respective college)

**Internal Evaluation :100 marks**

Weekly Attendance	Weekly Reports	First Presentation	Second Presentation	Documentation
20	20	20	20	20

**External Evaluation : 300 marks**

Mentor	IT Expert	External Examiner
50	100	150

**Recommended Documentation contents:**

1. Title page
2. Company / Institute certificate
3. Internship completion certificate
4. Abstract Introduction



- -motivation
- -problem statement
- -purpose/objective and goals
- -literature survey
- -project scope and limitations

#### 5. System analysis

- Comparative study of Existing systems
- scope and limitations of existing systems
- project perspective, features and stakeholders
- Requirement analysis
  - Functional requirements, performance requirements, security requirements etc.

#### 6. System Design

- Design constraints
- System Model: UML diagrams
- Data Model
- User interfaces

#### 7. Implementation details

- Software/hardware specifications, etc.

#### 8. Reports Testing

- Test Plan, Black Box Testing or Data Validation Test Cases, White Box Testing Functional Validation Test cases and results

#### 9. Conclusion and Recommendations & Future Scope

#### 10. Bibliography and Reference

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<b>Semester – IV</b>	<b>Paper – II</b>
<b>Course Code: MSC-CA 412 P</b>	<b>Title of the Course: Course Work</b>
<b>Credits: 06</b>	

### Course Outcomes (COs):

- Capability to acquire and apply fundamental principles of engineering.
- Become master in specialized technology
- Become updated with all the latest changes in technological world.
- Ability to communicate efficiently.
- Ability to be a multi-skilled engineer with good technical knowledge, management, leadership and entrepreneurship skills.
- Ability to identify, formulate and model problems and find engineering solution based on a systems approach.

### Course Work

**6 Credits**

#### Internal Evaluation :150 marks

Continuous Assesment Total : 30			Internal Examination	Paper Presentation	Paper Publication	Total
Weekly Reports 10	Group Discussion 10	Paper Presentation 10	70	20	30	150

### Reading Course with Guide

For active participation and academic development final year students must prepared himself/herself by reading reference books/suggested readings by respective guide.

Guide will assign topic/ subject to the learner. The topic suggested is related with technology and related with full time industrial project work or learner contribution in collecting reference material, Understanding the topic of the reading course and accordingly prepare the topic or the subject through self-learning mode.

30% weightage should be given to punctuality, enthusiasm and aptitude of the students. Remaining, 70 % weightage for written examination conducted for this subject by respective guide.

During IT period & completing reading course, the student should present paper either in reputed national or international journal or in any national or international conference.

An exclusive weightage of two credits is given for this research paper publication.

To earn the credit in this course is compulsory to complete the degree.