Deccan Education Society's
FERGUSSON COLLEGE (AUTONOMOUS),
PUNE

Syllabus
for

S. Y. M. Sc. (Computer Applications)

[Pattern 2019]
(M.Sc. Semester-III and Semester-IV)

From Academic Year
2020-21

Deccan Education Society's
Fergusson College (Autonomous), Pune

S. Y. M.Sc. (Computer Applications) (Pattern 2019)

From academic year 2020-21

Particulars	Name of Paper	Paper Code	Title of Paper	No. of Credits
S.Y. M.Sc. Semester III	Theory Core Paper – 7	CSA5301	Advanced Java	4
	Theory Core Paper - 8	CSA5302	Software Engineering and UML	4
	Theory Departmental Elective Paper - 7	CSA5303	Advanced Web Technologies	4
	Theory Departmental Elective Paper - 8	CSA5304	Mobile Technology	4
	Theory MOOC Elective Paper – 3	CSA5305	MOOC – III	4
	Theory General Elective Paper – 3	CSA5306	Programming in C++ (General Elective – III)	4
	Theory Departmental Elective Paper - 9	CSA5307	Full Stack	4
	Theory Departmental Elective Paper - 10	CSA5308	Internet of Things	4
	Theory MOOC Elective Paper – 4	CSA5309	MOOC - IV	4
	Theory General Elective Paper – 4	CSA5310	Data Structures (General Elective – IV)	4
	Practical Core Paper-5	CSA5311	Computer Applications Practical – IV (Lab Based on Advanced Java)	4
	Practical Core Paper-6	CSA5312	Project	4
S.Y. M.Sc. Semester IV	Practical Core Paper-7	CSA5401	Industrial Training/Institutional Project	8

S. Y. M.Sc. Semester III		
Title of the Course and Course Code	**Advanced Java(CSA5301)**	**Number of Credits : 04**
Course Outcomes (COs) **On completion of the course, the students will be able to:**		
CO1	Identify the appropriate structure for a given programming problem from a knowledge base of Java collections.	
CO2	Illustrate access to the database through Java Database Connectivity (JDBC).	
CO3	Implement client-server connection using socket programming.	
CO4	Categorize different Mail Servers to send and receive emails.	
CO5	Review working of JMS for a sender/receiver application.	
CO6	Create dynamic web pages using servlets and JSP.	

Unit. No.	Title of Unit and Contents	No. of Lectures
I	**Database Programming** 1.1 The design of JDBC 1.2 JDBC configuration 1.3 Types of drivers 1.4 Executing SQL statements 1.5 Query execution 1.6 Batch execution 1.7 Scrollable and updatable result sets 1.8 Rowset, Metadata, transactions. (Databases: MySQL/ SQL Server/ PostgreSQL/Oracle/MS- Access)	**[10]**
II	**Collections** 2.1 Collections 2.2 Introduction to the Collection framework (Interfaces, Implementation and algorithms) 2.3 Interfaces 2.4 Collection classes: Set, List, Queue and Map 2.5 Set: HashSet, TreeSet, and LinkedHashSet 2.6 Interfaces such as Lists, Set, Vectors, Stack, LinkedList, Comparator, Iterator, Enumerators, Hash table 2.7 Working with Maps: Map Interface and Map Classes	**[6]**
III	**Networking** 3.1 The java.net package 3.2 Connection oriented transmission – Stream Socket Class 3.3 Internet Addressing 3.4 Inet Address 3.5 Factory methods 3.6 Instance methods 3.7 TCP/IP client socket 3.8 TCP/IP Server sockets	**[7]**

	3.9 Creating a Socket to a remote host on a port (creating TCP client and server) 3.10 URL, URL Connection 3.11 Datagrams 3.12 Developing small application with sockets	
IV	**Servlets** 4.1 Introduction to Servlet (HTTP Servlet) 4.2 Life Cycle of servlet 4.3 GenericServlet Class 4.4 Handing get and post request (HTTP) 4.5 Data handling using Servlet 4.6 Creating cookies 4.7 Session tracking using HTTP servlet 4.8 Servlet – JDBC 4.9 Security Issues	**[10]**
V	**Web development using JSP** 5.1 Introduction to JSP 5.2 JSP Architecture 5.3 JSP Directives 5.4 JSP scripting elements 5.5 Default objects in JSP 5.6 JSP Actions 5.7 JSP with Database 5.8 Error handling in JSP 5.9 Session tracking techniques in JSP 5.10 Introduction to custom tags	**[8]**
VI	**Java Mail API and JMS** 6.1 Introduction 6.2 Sending Email 6.3 Receiving Email 6.4 Sending Attachment 6.5 Receiving Attachment 6.6 Sending HTML 6.7 Forwarding Email 6.8 Deleting Email 6.9 JMS introduction 6.10 JMS messaging domain 6.11 JMS programming model 6.12 JMS sender / receiver application	**[7]**

Books

1. Cay S. Horstmann, Gary Cornell, Core Java Volume-II-Advanced Features, Eighth Edition, Prentice Hall, Sun Microsystems Press, 2007.
2. Ivan Bayross, Commercial web development using java 2.0, BPB, 2007.
3. Steven Horlzner , Java 2 programming black books, 2006.
4. Herbert Schildt(5th edition), Complete reference Java, 2002.
5. Jason Hunter,O'Reilly, Java servlet Programming, 2001.

Web References

1. https://www.edureka.co/blog/advanced-java-tutorial
2. https://www.javatpoint.com/java
3. https://www.tutorialspoint.com/java
4. https://www.studytonight.com/java
5. https://www.w3schools.com/java

Title of the Course and Course Code	**Software Engineering and UML (CSA5302)**	**Number of Credits : 04**
Course Outcomes (COs) **On completion of the course, the students will be able to:**		
CO1	List and describe different life cycle models based on different factors.	
CO2	Illustrate the purpose, major components and key mechanisms of structural modelling.	
CO3	Examine different behavioural modelling diagrams of UML.	
CO4	Analyse SRS to develop use cases for the project.	
CO5	Evaluate the background and driving strengths for taking an Agile approach to Software Development.	
CO6	Design real time applications using Object Oriented Analysis and Design Methodology.	

Unit. No.	Title of Unit and Contents	No. of Lectures
I	**Introduction to Software development** 1.1 Overview of Software Development with SSAD 1.2 System Development Life Cycle, different types of users and their roles 1.3 Models for System Development: Waterfall Model, Spiral Model, Prototyping Model, RAD Model, Unified Process Model	**[6]**
II	**Requirement Engineering** 2.1 Types of Requirements: Functional and Non-functional 2.2 Four Phases of Requirement Engineering 2.3 Software requirement Specification (SRS): Structure and contents of SRS, IEEE standard format for SRS	**[5]**

III	**Use-case Driven Object-oriented Analysis** 3.1 Introduction to UML 3.2 Requirement Analysis - Use-case Diagram, Identify Actors, Identify Use cases, Develop use-case Model 3.3 Basic Structural Modeling: Class Diagram and Object diagram Advanced Structural Modeling: Associations and links, Aggregation, Composition and containment, Inheritance, Sub Types and IS-A Hierarchy Package Diagram	**[10]**
IV	**Basic Behavioral Modeling** 4.1 Interaction Diagram 4.2 Sequence Diagram 4.3 Activity Diagram 4.4 Collaboration Diagram 4.5 State Chart Diagram 4.6 State Transition Diagram	**[15]**
V	**Architectural Modeling** 5.1 Component Diagram 5.2 Deployment Diagram	**[6]**
VI	**Current Trends in Software Engineering** 6.1 Introduction to Web Engineering 6.2 Agile Process 6.3 Agile Process Models: Extreme Programming (XP), Adaptive Software Development (ASD), Dynamic Systems Development Method (DSDM) : Scrum, Crystal Feature Driven Development (FDD)	**[6]**

Books-

1. Object Oriented System Development - Ali Bahrami McGRAW-HILL International Edition, 2017.
2. UML in Nutshell, O'reilly Publication, 2015.
3. Software Engineering by Roger Pressman (6th edition), 2009.
4. The Unified Modeling Language user guide by Grady Booch, James Rumbaugh, Ivar Jacobson, 2005.
5. Object Oriented Modeling and Design with UML by James Rumbaugh, Michael Blaha, 2004.
6. UML 2 Bible by Tom Pender, 2002. Object-Oriented Software Engineering: A Use Case Driven Approach by Ivan Jacobson, 1992

Web References

1. https://www.tutorialspoint.com/software_engineering
2. https://www.javatpoint.com/software-engineering-tutorial
3. https://www.edx.org/course/uml-class-diagrams-for-software-engineering
4. https://www.tutorialspoint.com/uml
5. https://www.smartdraw.com/uml-diagram

Title of the Course and Course Code	**Advanced Web Technologies (CSA5303)**	**Number of Credits : 04**
Course Outcomes (COs) **On completion of the course, the students will be able to:**		
CO1	Outline different web extensions and web services standards.	
CO2	Explain the concepts of Drupal and its applications.	
CO3	Demonstrate the data representation using JSON.	
CO4	Analyse different concepts of XML and AJAX to design dynamic web pages.	
CO5	Evaluate user requirements and create Web applications using relevant Web Technologies.	
CO6	Design and develop Web Applications using advanced web technologies.	

Unit. No.	Title of Unit and Contents	No. of Lectures
I	**XML DOM** 1.1 XML DOM 1.2 XML XSLT 1.3 XML XQuery 1.4 XML XL ink 1.5 XML Validator 1.6 XML DTD 1.7 XML Schema 1.8 XML Server	**[8]**
II	**AJAX** 2.1 Introduction 2.1 AJAX from User's Perspective 2.2 AJAX from Developer's Perspective 2.3 How AJAX works? 2.4 Applications of AJAX 2.5 AJAX web application model 2.6 Performing AJAX validation 2.7 Handling XML data using PHP and AJAX 2.8 Connecting database using PHP and AJAX	**[9]**
III	**JSON** 3.1 What is JSON 3.1 JSON Syntax 3.2 JSON Data Types 3.3 JSON Objects 3.4 JSON Schema 3.5 JSON versus XML 3.6 JSON with PHP 3.7 JSON with AJAX	**[9]**
IV	**PHP Framework** 4.1 Introduction	**[12]**

	4.2 Features, Applications 4.3 Essential concepts of Drupal 4.4 User Interface 4.5 Storing and Retrieving Data 4.6 Essential APIs	
V	**Web Services** 5.1 Introduction 5.2 Characteristics of web services 5.3 Web services – Architecture 5.4 Web services - Components: XML-RPC, SOAP, WSDL, UDDI 5.5 Web services – Security 5.6 Web services – Standards, 5.7 Application of web services using PHP	**[10]**

Books-

1. Sai Srinivas Sriparsa, Javascript and JSON Essentials, ISBN: 9781783286034, packt publishing, 2013.
2. Head First Ajax By Rebecca M. Riordan (O"Reilly), 2008.
3. Sas Jacobs, Beginning XML with DOM and Ajax: From Novice to Professional Paperback, Apress, 2006.
4. Erban Cerami, Web services Essentials, O'Reilly, 2002.

Web References

1. www.php.net.in
2. www.w3schools.com
3. www.wrox.com
4. www.tutorialspoint.com
5. https://api.drupal.org

Title of the Course and Course Code	**Mobile Technology (CSA5304)**	**Number of Credits : 04**
Course Outcomes (COs) **On completion of the course, the students will be able to:**		
CO1	Define fundamentals of Wireless communication and transmission and describe different controlled access techniques.	
CO2	Explain mobility approach at different layers of simplified reference model.	
CO3	Examine different architectures of mobile technologies.	
CO4	Compare wireless LANs based on different infrastructure types.	
CO5	Determine different quality of services during mobility.	
CO6	Develop technical competence in the field of mobile technology.	

Unit. No.	Title of Unit and Contents	No. of Lectures
I	**Wireless communication** 1.1 Introduction 1.2 Types of wireless communication 1.3 Need and Application of wireless Communication 1.4 Wireless Data Technologies Market for mobile	[3]
II	**Wireless transmission** 2.1 Frequency for radio transmission signal antennas 2.1 Signal propagation 2.2 Multiplexing Modulation 2.3 Spread and Cellular system	[4]
III	**Medium Access Control** 3.1 Specialized MAC: Hidden and Exposed terminals, Near and Far terminals 3.2 SDMA 3.3 FDMA 3.4 TDMA: Fixed TDM, Classical ALOHA, Slotted ALOHA Carrier Sense Multiple Access, CDMA	[8]
IV	**Telecommunication Systems** 4.1 Introduction to GSM 4.1 GSM Architecture 4.2 DECT systems, Architecture and protocols 4.3 Tetra frame structure 4.4 UMTS basic architecture and UTRA modes	[5]
V	**Wireless LAN** 5.1 Introduction 5.2 Infrared v/s Radio transmission 5.3 Infrastructure and ad-hoc network 5.4 IEEE 802.11 5.5 HIPERLAN 5.6 Blue Tooth	[6]
VI	**Wireless ATM** 6.1 WATM services 6.2 Location Reference model function radio access layer handover Location management 6.3 Addressing 6.4 Mobile QoS 6.5 Access point control protocol	[6]
VII	**Mobile Network Layer** 7.1 Introduction 7.1 Mobile IP: IP Packet Delivery, Agent Discovery, Agent Advertisement, Registration 7.2 Mobile Ad-hoc Networks 7.2 DHCP	[5]

VIII	**Mobile Transport Layer** 8.1 TCP 8.2 Fast and selective retransmission and recovery 8.3 Transaction oriented TCP	**[3]**
IX	**Support for Mobility** 9.1 File systems 9.1 World Wide Web 9.2 Wireless Application Protocol with example Applications	**[3]**
X	**Wireless Telephony Applications** 10.1 Overview of the WTA Architecture 10.2 The WTA client Framework 10.3 The WTA Server and security 10.4 Design considerations 10.5 Application Creation Toolbox	**[5]**

Books-

1. Jachan Schiller, Mobile Communications, ISBN: 9788131724262, Pearson Education, 2003.
2. Sandeep Sighat Jari Alvinen and group, The Wireless Application Protocol, Addison Wesley, 2001.
3. Pater T. Davis Carig R. Mc.Guffin, Wireless Local Area Networks, McGraw-Hill, 1995.

Web references

1. https://er.yuvayana.org/wireless-telephony-objective-features-and-application
2. https://www.getkisi.com/blog/media-access-control
3. https://www.tutorialspoint.com/wireless_communication

Title of the Course and Course Code	**Full Stack (CSA5307)**	**Number of Credits : 04**
Course Outcomes (COs) **On completion of the course, the students will be able to:**		
CO1	Define basic terms and concepts related to web development.	
CO2	Explain the functionality of CSS3, HTML5, NoSQL.	
CO3	Apply programming skills using JavaScript and jQuery, a light-weight JavaScript library.	
CO4	Analyze the components of Bootstrap.	
CO5	Test and validate JavaScript code.	
CO6	Create, design and develop attractive user Interfaces for web applications.	

Unit. No.	Title of Unit and Contents	No. of Lectures
I	**HTML 5** 1.1 Understanding Basic Tags / Elements and Attributes 1.2 Working with Basic Tags and Font Formatting Tags 1.3 Understanding Block Level Tags, Inline Tags & Empty Tags 1.4 Heading Tags, Paragraph Tags & Multiple Columns 1.5 Adding Basic Styles using HTML Attributes and CSS Styles 1.6 Inserting Images & Image Attributes 1.7 Working with Links & Link Attributes / Link States	**[8]**
II	**CSS 3** 2.1 History of CSS 2.1 Browser Support 2.2 HTML5Selectors and Pseudo Classes 2.3 Fonts and Text Effects, Colours, Gradients, Background 2.4 Images, and Masks, Borders and Box Effects, Transitions, Transforms, and Animations 2.5 Layout: Columns and Flexible Box, Vendor Prefixes 2.6 Embedding Media	**[7]**
III	**JavaScript** 3.1 Introduction 3.2 Role as Client Scripting Language 3.3 Variables, Loops & Control Statements 3.4 Arrays / Array Sorting Methods 3.5 Creating Functions / Working with JavaScript Inbuilt Functions 3.6 Scope	**[5]**
IV	**Databases and Web Storage** 4.1 NoSQL 4.2 Database Connectivity 4.3 In-memory data stores 4.4 Web storage	**[8]**
V	**HTTP & REST** 5.1 What is REST? 5.2 RESTful API	**[5]**
VI	**Bootstrap** 6.1 Introduction 6.2 Grid 6.3 Components 6.4 Plugins	**[8]**
VII	**jQuery** 7.1 Introduction	**[7]**

	7.2 jQuery Syntax 7.3 jQuery Selectors 7.4 jQuery Events 7.5 jQuery Effects 7.6 jQuery HTML 7.7 jQuery Traversing 7.8 jQuery AJAX	

Books-

1. Beginning JQuery By Jack Franklin (APress), 2017.
2. Bootstrap by Jake Spurlock (O‟Reilly), 2013.
3. Head First HTML5 Programming, Building Web Apps with JavaScript By Eric Freeman, Elisabeth Robson (O'Reilly), 2011.
4. Beginning JavaScript By Jeremy McPeak and Paul Wilton(Wrox), 2009.
5. Head First Ajax By Rebecca M. Riordan (O‟Reilly), 2008

Web references

1. https://www.w3schools.com/whatis/whatis_fullstack_js.asp
2. https://www.tutorialspoint.com/the_full_stack_web.../index.asp
3. https://www.w3schools.com/html/html5_intro.asp
4. https://jquery.com/
5. https://getbootstrap.com/

Title of the Course and Course Code	**Internet of Things (CSA5308)**	**Number of Credits : 04**
Course Outcomes (COs) **On completion of the course, the students will be able to:**		
CO1	Define the Internet of Things and its applications.	
CO2	Explain principles and components of RFID.	
CO3	Implement security features to protect data.	
CO4	Analyze different identity management models.	
CO5	Determine fundamental IoT Mechanisms and Key Technologies.	
CO6	Design and develop solutions using IoT.	

Unit. No.	Title of Unit and Contents	No. of Lectures
I	**Introduction** 1.1 What is the Internet of Things? 1.2 History of IoT 1.3 About IoT 1.4 Overview and Motivations 1.5 Examples of Applications	**[8]**

	1.6 Internet of Things Definitions and Frameworks: IoT Definitions, IoT Architecture, General Observations, ITU-T Views, Working Definition, IoT Frameworks, Basic Nodal Capabilities	
II	**Fundamental IoT Mechanisms and Key Technologies** 2.1 Identification of IoT Objects and Services 2.2 Structural aspects of IoT 2.3 Environment Characteristics 2.4 Traffic Characteristics: Scalability, Interoperability, Security and Privacy 2.5 Open Architecture 2.6 Key IoT Technologies 2.7 Device Intelligence 2.8 Communication Capabilities 2.9 Mobility Support 2.10 Device Power 2.11 Sensor Technology 2.12 RFID Technology 2.13 Satellite Technology	**[8]**
III	**Radio Frequency Identification Technology (RFID)** 3.13 Introduction 3.14 Principle of RFID 3.15 Components of an RFID system 3.16 Issues: EPC Global Architecture Framework: EPCIS & ONS, Design issues, Technological challenges, Security Challenges 3.17 IP for IoT 3.18 Web of Things 3.19 Wireless Sensor Networks 3.20 History and context 3.21 WSN Architecture: The node, Connecting nodes, Networking Nodes, Securing Communication, WSN specific IoT applications challenges: Security, QoS, Configuration, Various integration approaches, Data link layer protocols, Routing protocols and infrastructure Establishment	**[8]**
IV	**Resource Management in Internet of Things** 4.1 Clustering 4.2 Software Agents 4.3 Clustering Principles in an Internet of Things Architecture 4.4 Design Guidelines 4.5 Software Agents for Object Representation 4.6 Data Synchronization 4.7 Identity portrayal 4.8 Identity management 4.9 Various identity management models: Local, Network,	**[8]**

	Federated and global web identity, User-centric identity management, Device centric identity management, Hybrid-identity management, Identity and trust	
V	**Internet of Things Privacy, Security and Governance** 5.1 Vulnerabilities of IoT 5.2 Security requirements 5.3 Threat analysis 5.4 Use cases and misuse cases 5.5 IoT security tomography and layered attacker model 5.6 Identity establishment 5.7 Access control 5.8 Message integrity 5.9 Non-repudiation and availability 5.10 Security model for IoT	**[8]**
VI	**Business Models for Internet of Things** 6.1 Business Models and Business Model Innovation 6.2 Value Creation in the Internet of Things 6.3 Business Model Scenarios for the Internet of Things 6.4 Internet of Things Applications: Smart Metering Advanced Metering Infrastructure, e-Health Body Area Networks, City Automation, Automotive Applications, Home Automation, Smart Cards	**[8]**

Books:

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things –A hands-on approach", Universities Press, 2015.
2. Parikshit N. Mahalle & Poonam N. Railkar, "Identity Management for Internet of Things", River Publishers, ISBN: 978-87-93102-90-3 (Hard Copy), 978-87-93102-91-0 (ebook), 2015.
3. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications, 2013.
4. Daniel Kellmereit, Daniel Obodovski, "The Silent Intelligence: The Internet of Things",. Publisher: Lightning Source Inc; 1 edition (15 April 2014). ISBN-10: 0989973700, ISBN-13: 978-0989973700, 2013.
5. Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things: Key Applications and Protocols, ISBN: 978-1-119-99435-0, 2nd Edition, Willy Publications, 2012.
6. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer, 2011.
7. HakimaChaouchi, "The Internet of Things Connecting Objects to the Web" ISBN : 978-1-84821-140-7, Willy Publications, 2010.

Web References:

1. https://www.ibm.com/blogs/internet-of-things/what-is-the-iot
2. https://www.businessinsider.com/internet-of-things-definition

Title of the Course and Course Code	**Computer Applications Practical – IV (Lab Based on Advanced Java) (CSA5311)**	**Number of Credits : 04**
Course Outcomes (COs) On completion of the course, the students will be able to:		
CO1	Identify different Mail Servers to send and receive emails.	
CO2	Discuss programs using Java collection API and Java standard class library.	
CO3	Apply JDBC to provide a program level interface for communicating with databases using Java programming.	
CO4	Explain client and server programs in Java using classes.	
CO5	Evaluate flexible and powerful open source, multi-protocol, java-based messaging server for JMS.	
CO6	Create dynamic web pages using Java servlets and JSP.	

Sr. No.	Details
I	JDBC and Database for DDL
II	JDBC and Database for DML
III	Collections
IV	Networking - stream
V	Networking - TCP
VI	Servlets
VII	JSP
VIII	JSP and Database
IX	Sending email
X	Case Study

Books:

1. Cay S. Horstmann, Gary Cornell, Core Java Volume-II-Advanced Features, Eighth Edition, Prentice Hall, Sun Microsystems Press, 2007.
2. Ivan Bayross, Commercial web development using java 2.0, BPB, 2007.
3. Steven Horlzner , Java 2 programming black books, 2006.
4. Herbert Schildt(5th edition), Complete reference Java, 2002.
5. Jason Hunter,O'Reilly, Java servlet Programming, 2001.

Web References:

1. https://www.edureka.co/blog/advanced-java-tutorial
2. https://www.javatpoint.com/java
3. https://www.tutorialspoint.com/java
4. https://www.studytonight.com/java
5. https://www.w3schools.com/java

Title of the Course and Course Code	**Computer Applications Project – II (CSA5312)**	**Number of Credits : 04**
Course Outcomes (COs) On completion of the course, the students will be able to:		
CO1	List and define different problem statements.	
CO2	Explain different software development life cycle models and approaches to solve the problem of a project.	
CO3	Apply resource management skills for the project.	
CO4	Integrate the modules using different techniques and tools.	
CO5	Decide and draw relevant diagrams related to the concerned problem.	
CO6	Prepare the solutions through presentations and technical reports for the concerned problem.	

Sr. No.	Details
I	Selection of Problem Statement
II	Collection of Synopsis
III	Design the problem solution
IV	Implementation of design and refinement if needed
V	Working Progress Report – I
VI	Working Progress Report – II
VII	Working Progress Report – III
VIII	Final report writing and presentation

Books:

1. Object Oriented System Development - Ali Bahrami McGRAW-HILL International Edition, 2017.
2. UML in Nutshell, O'reilly Publication, 2015.
3. Software Engineering by Roger Pressman (6th edition), 2009.
4. The Unified Modeling Language user guide by Grady Booch, James Rumbaugh, Ivar Jacobson, 2005.
5. Object Oriented Modeling and Design with UML by James Rumbaugh, Michael Blaha, 2004.
6. UML 2 Bible by Tom Pender, 2002.
7. Object-Oriented Software Engineering: A Use Case Driven Approach by Ivan Jacobson, 1992.

Web References:

1. https://www.tutorialspoint.com/software_engineering
2. https://www.javatpoint.com/software-engineering-tutorial
3. https://www.edx.org/course/uml-class-diagrams-for-software-engineering
4. https://www.tutorialspoint.com/uml
5. https://www.smartdraw.com/uml-diagram

S.Y. M.Sc. Semester IV		
Title of the Course and Course Code	**Industrial Training/Institutional Project (CSA5401)**	**Number of Credits : 08**
Course Outcomes (COs) **On completion of the course, the students will be able to:**		
CO1	Describe the different skills, attitude and knowledge to understand the professionalism in the IT industry.	
CO2	Discuss the working culture of the Industry in view to maintain quality standards.	
CO3	Implement the confidence, presentation skills and logical thinking in developing the system.	
CO4	Differentiate between the academics and professional work culture in timely delivery of projects.	
CO5	Compare and contrast the professional development of the programs and project.	
CO6	Combine the techniques to enhance oneself as a thorough software professional.	

Duration: Minimum 3 months

A student can complete Industrial Training Project (ITP) in any I.T. industry / academic institute / with a research project of a teacher / an expert funded by any funding agency for a minimum period of three months.

1. There will be a teacher coordinator for a group of 10 students. A teacher coordinator is responsible to:

- Maintain a weekly status / progress report of the student.
- Keep in touch with the reporting authorities from industry for each student.
- Help the students to solve their difficulties.
- Arrange the meeting and presentations as per requirement.
- Guide each student for preparing final project report.
- Keep complete documentation record for each student separately.
- Internal assessment of each student for 100 marks

The workload for this teacher coordinator is proposed as four hours per week.
The workload for a teacher coordinator who is guiding 3 students doing their ITP in Fergusson College (Autonomous) Pune (no mentor from industry) is proposed as four hours per week.

2. Guidelines for submitting the final project report

The student must include the project completion certificate issued by the respective industry/research institute/educational institute in the report. A student will submit two hard bound copies and one CD: Student Copy, Department copy, CoE copy of the work carried out during ITP (CD to be given by students).

3. Scheme of Assessment:

- **Continuous Internal Assessment**

Evaluation for internal 100 Marks will be done by the Internal Teacher Coordinator.

Description	**Marks**
Weekly Reports (Minimum 12)	40
Project Report writing	20
Internal Presentation Demo	30
Weekly Attendance	10

- **End Semester Assessment**

Evaluation for external 100 Marks will be done by a panel of three consisting of One Industrial Expert, One Academic Expert (External from other college) and One Internal Examiner. Each examiner is expected to assess each student for 100 marks independently and average of the three scores is to be considered as the final ESE score (out of 100).

Description	**Marks**
Knowledge and Execution of the System	20
Final Project Report	20
Presentation	30
Viva	30

➢The internal examiner(s) will be responsible for submitting the total marks out of 200 to examination section.

➢The final grade (to be printed on the mark list) is to be calculated on the basis of UGC 10 point scale.

Marks	Grade	Grade Point
180 – 200	**O: Outstanding**	**10**
160 – 179	**A+: Excellent**	**9**
141 – 159	**A: Very Good**	**8**
131 – 140	**B+: Good**	**7**
121 – 130	**B: Above Average**	**6**
111 – 120	**C+: Average**	**5**
101 – 110	**C: Below Average**	**4**
91 – 100	**D: Satisfactory**	**3**
80 – 90	**E: Pass**	**2**
0 – 79	**F: Fail**	**0**
	Absent	**0**

Note :- A student who has obtained Grade F will have to carry out this project once again for a complete semester (minimum three months).