

**Proposed syllabus with teaching and evaluation scheme for  
1st year ( sem 1 and sem 2) study of M.Sc (Computer Application) programme  
Proposed to be effective from academic year 2020-21**

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**Master of Science (Computer Application)**

Name of Program	Master of Science (Computer Application)
Abbreviation	MSC(CA)
Duration	2 Years (Regular)
Eligibility	Candidate must have passed Bachelors Degree in Computer Science / Computer Application / Information Technology / Computer Engineering / equivalent degree in Computer / IT field.
Objective of Program	The Objective of the program is to impart knowledge of advanced and/or latest theories, concepts, methods, techniques and tools related to various areas of Computer Science, Applications and Information Technology and specifically in the area of Mobile based, cloud based, Web based Application Development, Software Engineering, Data Management and Intelligent Systems.
Program Outcome	At the successful completion of the program, students will be able to start their career in the Information Technology industry.
Program Structure	<b>Semester 1</b>

Course Code	Title	Teaching Hrs. per week		Course Credits	University Examination		Internal Marks	Total Marks
		Theory	Practical		Duration	Marks		
101	Advanced Software Engineering	4	0	4	3 Hrs	70	30	100
	Fundamentals of Artificial Intelligence							
102	Advance Database Management System	4	0	4	3 Hrs	70	30	100
103	Fundamentals of Web Client Technologies.	4	0	4	3 Hrs	70	30	100
104	Enterprise Data Management and ERP	4	0	4	3 Hrs	70	30	100
	Fundamentals of Big Data							
105	Web Programming Using Java	4	0	4	3 Hrs	70	30	100
106	Practical on Web Programming Using Java	0	4	4	2.5 Hrs	70	30	100
107	Practical on Web Client Technologies	0	3	3	2.5 Hrs	70	30	100
108	Practical on Advanced Database Management System	0	3	3	2.5Hrs.	70	30	100

		<b>Semester -2</b>						
<b>Course Code</b>	<b>Title</b>	<b>Teaching Hrs. per week</b>		<b>Course Credits</b>	<b>University Examination</b>		<b>Internal Marks</b>	<b>Total Marks</b>
		<b>Theory</b>	<b>Practical</b>		<b>Duration</b>	<b>Marks</b>		
201	Service Oriented Architecture and Cloud Computing	4	0	4	3 Hrs	70	30	100
202	Web Programming Using C#	4	0	4	3 Hrs	70	30	100
203	Advanced Scripting Languages	4	0	4	3 Hrs	70	30	100
204	Data Warehousing and Data Mining	4	0	4	3 Hrs	70	30	100
	Internet of Things							
205	Information Security	4	0	4	3 Hrs	70	30	100
206	Practical on Web Programming Using C#	0	3	3	2.5 Hrs	70	30	100
207	Practical on Advanced Scripting Languages	0	4	4	2.5 Hrs	70	30	100
208	Practical on IoT	0	3	3	2.5 Hrs	70	30	100
	Practical on Cryptography							

**Course: 101 - Advanced Software Engineering**

<b>Course Code</b>	<b>101</b>
<b>Course Title</b>	<b>Advanced Software Engineering</b>
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2020
Purpose of Course	The purpose of the course is to make students capable of understanding and implementing advanced software engineering concepts, approaches and methodologies.
Course Objective	To provide a comprehensive knowledge of advanced Software Engineering methodologies and approaches
Pr-requisite	Basic Concept of Software Engineering.
Course Out come	After completion of this course, the student will be capable of following object oriented; component based and/or web engineering practices and model the systems using UML.
Course Content	<p><b>1. Object Oriented and Component level Analysis and Design</b></p> <p>1.1 Object Oriented Analysis &amp; Design</p> <p>1.1.1 Use case model-identifying &amp; refining actors, scenarios and use cases</p> <p>1.1.2 Classification- Identifying Classes, Object relationships, attributes And Methods.</p> <p>1.1.3 Designing Classes &amp; Components- abstraction, encapsulation, reuse, cohesion, coupling</p> <p>1.2 Component-Based Process Model</p> <p>1.2.1 The CBSE Process</p> <p>1.2.2 Domain Engineering</p> <p>1.2.3 Component-based development</p> <p>1.2.4 Component classification, retrieval and reuse</p> <p><b>2. Web Engineering</b></p> <p>2.1 Attributes of web-based systems and applications, Web Engineering layers, Web Engineering Process</p> <p>2.2 Analysis Model for WebApps</p> <p>2.2.1 Content Model, Interaction Model, Functional Model, Configuration Model,</p> <p>2.2.2 Relationship Navigation Analysis</p> <p>2.3 Design for WebApps</p> <p>2.3.1 Design issues, WebE Design Pyramid,</p> <p>2.3.2 Interface, Asthetic and Content Design</p> <p>2.3.3 Architecture and Navigation Design</p> <p>2.3.4 Component Level Design</p> <p>2.4 Testing WebApps</p> <p>2.4.1 Testing concepts for webApps-quality concepts, Error characteristics, Test planning and Testing strategy, Testing Process</p>

	<p>2.4.2 Overview of Interface Testing, Content Testing, Component-level Testing</p> <p>2.4.3 Navigation Testing, Configuration Testing, Security Testing, Performance Testing</p> <p>2.5 Project Management for Web Engineering- Outsourcing, In-House Web Engineering.</p> <p><b>3. UML Class and Use-case Diagrams</b></p> <p>3.1 Class Diagram</p> <p>3.1.1 Class Notation-Static Structure</p> <p>3.1.2 Object Diagram</p> <p>3.1.3 Class Interface Notation</p> <p>3.1.4 Incorporating Associations, Association role, qualifier, multiplicity, Association class, Binary and N-ary Associations, aggregation and Composition Associations, Generalization</p> <p>3.2 Use case Diagrams</p> <p>3.2.1 Scope, Benefits and Elements</p> <p>3.2.2 Identifying Actors, Scenarios and Use cases</p> <p>3.3 A Case Study</p> <p><b>4. UML Interaction Diagrams</b></p> <p>4.1 Sequence Diagram - Elements and Guidelines</p> <p>4.2 Collaboration Diagram - Elements and Guidelines</p> <p>4.3 Activity Diagram - Elements and Guidelines</p> <p>4.4 State Chart Diagram - Elements and Guidelines</p> <p>4.5 A Case Study</p> <p><b>5. UML Implementation Diagrams</b></p> <p>5.1 Component Diagram –Elements &amp; Guidelines</p> <p>5.2 Deployment Diagram - Elements &amp; Guidelines</p> <p>5.3 A Case Study</p>
Reference Book	<ol style="list-style-type: none"> <li>1. Software Engineering: A Practitioner's Approach, 6/e, Roger S Pressman TataMcGrawHill</li> <li>2. Software Engineering: A Practitioner's Approach, 7/e, Roger S Pressman TataMcGrawHill</li> <li>3. Web Engineering: A Practitioner's Approach, 1/e, Roger Pressman, TataMcGrawHill David Lowe</li> <li>4. Software Engineering Ian Sommerville Pearson Education (Addison-Wesley)</li> <li>5. Web Engineering Emila Mendes, New Age Information Nile Mosley (Springer) Publication</li> <li>6. Object Oriented System Development AliBahrami McGraw Hill</li> <li>7. Object Oriented Modeling and Design withUML J. Rambaugh, PHI M. Blaha</li> <li>8. Oriented Software Engineering Ivar Jacobson AWL</li> <li>9. Applying UML &amp; Patterns: An Introduction to Larman Pearson Education Object Oriented Analysis and Design,</li> <li>10. Object Oriented Software Engineering using UML Bernd Bruegge, Pearson Education Patterns and Java.Allen H.Dutoit</li> <li>11. Object Oriented Modeling and Design J. Rambaugh, M. Blaha et</li> </ol>

	al, William Premerlani, Fredrick Eddy, William Lorensen, PHI
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 70% assessment is based on end semester written examination

**Course: 101 - Fundamentals of Artificial Intelligence**

<b>Course Code</b>	<b>101</b>
<b>Course Title</b>	<b>Fundamentals of Artificial Intelligence</b>
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2020
Purpose of Course	Artificial Intelligence spans a wide variety of topics at the forefront of computer science research, including areas like machine learning, robotics, planning, computer vision, natural language processing, and many others. This course serves as a broad introduction to many of these topics. It is the goal of this course to study Artificial Intelligence in today's environment and to instill an understanding of representations and external constraints with the idea of enabling a student to think creatively.
Course Objective	<p><b>The objectives are as follows:</b></p> <ol style="list-style-type: none"> <li>1) To give initial exposure of Artificial Intelligence to the students</li> <li>2) To make student understand AI problems and problem solving approach</li> <li>3) To make student learn fundamental AI techniques and their applications</li> </ol>
Pr-requisite	Students are expected to have substantial experience with programming, Data Structures and Information System
Course Out come	<p>After having completed the course the student will be able to:</p> <ol style="list-style-type: none"> <li>1) describe and apply concepts, methods, and theories of search, heuristics, games, knowledge representation, planning &amp; decision making</li> <li>2) describe and apply concepts, methods, and theories of logic and probability theory and to analyze the power and limitation of their use for knowledge representation and reasoning systems</li> <li>3) describe methods and theories of Bayesian networks, probabilistic reasoning under uncertainty</li> </ol>
Course Content	<p><b>Unit 1 Introduction to Artificial Intelligence</b></p> <ol style="list-style-type: none"> <li>1.1 Intelligence             <ol style="list-style-type: none"> <li>1.1.1 Types of Intelligence, Human Vs. Machine Intelligence,</li> <li>1.1.2 Composition of intelligence - Reasoning, Learning, Problem Solving, Perception, Linguistic Intelligence</li> </ol> </li> <li>1.2 Artificial Intelligence             <ol style="list-style-type: none"> <li>1.2.1 Philosophy and goals,</li> <li>1.2.2 AI Technique, Task Classification of AI, Applications of AI</li> </ol> </li> <li>1.3 AI Agents &amp; Environments -Human agent, robotic agent and software agent, ideal rational agent, structure of intelligent agents, Simple Turing test environment, environment properties</li> <li>1.4 AI-Issues : Threat to privacy, threat to human dignity, threat to safety.</li> </ol>

	<p><b>Unit 2 : Problem Solving By Search</b></p> <p>2.1 Problem Formulation and State Space Representation of 8-Puzzle, 8-Queens, missionaries and cannibals problem, Traveling Salesman Problem, Robot Navigation Problem, Water Jug Problem</p> <p>2.2 Search techniques for Solution Search</p> <p>2.2.1. Uninformed search strategies, Informed search strategies,</p> <p>2.2.2 Game Playing Algorithms</p> <p>2.3 Planning</p> <p>2.3.1 Planning Problem - Air cargo Transport, spare tire problem, the blocks world</p> <p>2.3.2 Planning with state space search, Goal stack planning, Plan Space Planning</p> <p><b>Unit 3 : Knowledge Representation &amp; Reasoning</b></p> <p>3.1 Knowledge-Based agents, systems &amp; Machine Intelligence</p> <p>3.2 Overview of Logical and Procedural Representation Schemes and Inference</p> <p>3.3 Structured Representation Schemes - Semantic Network, Description Logic, Ontology, Conceptual Graphs</p> <p>3.4 Knowledge based Reasoning</p> <p>3.4.1 Forward and Backward Chaining</p> <p>3.4.2 Reasoning systems for Categories</p> <p>3.4.2 Case base Reasoning</p> <p><b>Unit 4 : Decision-Making &amp; Learning</b></p> <p>4.1 Decision-Making</p> <p>4.1.1 Basics of utility theory, Utility Functions</p> <p>4.1.2 Decision Network, Value of Information</p> <p>4.2 Learning</p> <p>4.2.1 Forms of Learning, Inductive Learning, Learning , Ensemble learning</p> <p>4.2.2 Explanation based Learning, Relevance-based learning, Knowledge-based Inductive Learning</p> <p>4.2.3 Statistical Learning</p> <p><b>Unit 5 : Real Life Application Areas of AI</b></p> <p>5.1 Expert Systems - Characteristics, Importance, Applications, Examples, Rule based system architecture</p> <p>5.2 Artificial Neural Network - Network Structures, Limitations, Perceptrons, Multi-layer Perceptrons, learning ANN structures</p> <p>5.3 Machine Learning- Naive Bayes classifier, Decision Trees, Concept Learning, K-means Clustering</p> <p>5.4 Robotics-Sensors and Effectors, Applications, Robotic Perception, Movement Planning</p>
Reference Book	<p>1. A First Course in Artificial Intelligence by Deepak Khemani, McGrawHill, ISBN : 978-1-25-902998-1</p> <p>2. Introduction to Artificial Intelligence and Expert System by Dan W. Patterson, PHI,</p>

	<p>ISBN : 978-93-325-5194-7</p> <p>3. Artificial Intelligence –A Modern Approach (2nd Edition 2004) by Stuart J. Russell and Peter Norvig, Pearson Education, ISBN: 978-81-775-8367-0</p> <p>4. Introduction to Artificial Intelligence by Rajendra Akerkar, PHI, ISBN : 978-81-203-2864-8</p> <p>3. Artificial Intelligence -Structures and Strategies for Complex Problem Solving (4th Edition 2004) by George F. Luger, Pearson Education</p> <p>4. Foundation of Artificial Intelligence and Expert Systems by V.S. Janakiraman, K. Sarukesi, P. Gopalakrishnan, Mc Millan (2002)</p> <p>6. Artificial Intelligence: The Basics (Paperback) by Kevin Warwick, Publisher: Routledge;</p> <p>7. The Essence of Artificial Intelligence (Paperback) by Alison Cawsey Publisher: Prentice Hall</p> <p>8. “Artificial Intelligence” -By Elaine Rich And Kevin Knight (2nd Edition) Tata Mcgraw Hill</p>
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	<p>30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc.</p> <p>70% assessment is based on end semester written examination</p>



**Course : 102 - Advanced Database Management System**

<b>Course Code</b>	<b>102</b>
<b>Course Title</b>	<b>Advanced Database Management system</b>
Credit	4 credit
Teaching per Week	4 Hrs
Minimum weeks per Semester	15(Including Classwork, examination, preparation, holidays etc.)
Review / Revision	June 2020
Purpose of Course	The purpose of the course is to make student capable of understand internal of database system and its architecture
Course Objective	To Provide Comprehensive knowledge of Database Architecture and Administration
Pr-requisite	Basics of Database Design, SQL and PL/SQL
Course Out come	After completion of this course, the student will gain comprehensive knowledge Database architecture and database administration
Course Content	<p><b>Unit -1 SQL/PL/SQL</b></p> <ul style="list-style-type: none"> <li>1.1 Various SQL statements, Various typed of joins, Nested Subqueries and Complex queries</li> <li>1.2 Views, Integrity Constraints, Cursors</li> <li>1.3 SQL Functions, Procedures and Triggers</li> <li>1.4 Package</li> <li>1.5 Collections &amp; Objects</li> <li>1.6 Indexes - Simple Index, Composite Index, Bitmap Index, Function Based Index, Key Compressed Index</li> <li>1.7 Sequences &amp; Pseudo columns - CURRVAL &amp; NEXTVAL, LEVEL, ROWID, ROWNUM</li> <li>1.8 Transaction Control Statements - Commit, Savepoint Rollback</li> </ul> <p><b>Unit-2 Transaction Management</b></p> <ul style="list-style-type: none"> <li>2.1 Transaction Concept &amp; State</li> <li>2.2 Implementation of Atomicity and Durability</li> <li>2.3 Concurrent Executions</li> </ul> <p><b>Unit- 3 Overview of Database Server Architecture</b></p> <ul style="list-style-type: none"> <li>3.1 Architecture of Database and Database Instance</li> <li>3.2 Overview of Physical and Logical Structures</li> <li>3.3 Dedicated and Shared Server Configuration</li> <li>3.4 Server Startup and Shutdown</li> <li>3.5 Database Instance Creation and Management <ul style="list-style-type: none"> <li>3.5.1 Oracle Instance</li> <li>3.5.2. Installing Oracle</li> <li>3.5.3 Oracle Optimal Flexible Architecture (OFA)</li> <li>3.5.4 Locating initialization, listener.ora &amp; sqlnet.orafiles</li> <li>3.5.5 Finding the alert log</li> <li>3.5.6 Common environment variables</li> <li>3.5.7 Structures in an Oracle Instance</li> </ul> </li> </ul>

	<p>3.5.8 Memory Structures, SGA and PGA</p> <p>3.5.9 Processes and their purposes</p> <p>3.5.10 Startup nomount, mount and open database commands</p> <p>3.6 Database Architecture</p> <p>3.7.Database management framework</p> <p>3.7.1 Using the Database Creation Assistant</p> <p>3.7.2 Creating and dropping a database</p> <p>3.7.3 Tablespaces</p> <p>3.7.4 Tables and Indexes</p> <p>3.7.5 Clusters</p> <p><b>Unit 4 Database Administration and Database User Management</b></p> <p>4.1 User Authentication Methods</p> <p>4.1.1 Password Authentication</p> <p>4.1.2 O.S Authentication</p> <p>4.2 User Configuration Setup</p> <p>4.2.1 Profiles</p> <p>4.2.2 Default Table space</p> <p>4.2.3 Temporary Table space</p> <p>4.3 Resource Management, Quotas</p> <p>4.4 Working with user database account</p> <p>4.4.1 Creating, Modifying and deleting user account</p> <p>4.4.2 Changing password</p> <p><b>Unit 5 Database Backup Recovery and security</b></p> <p>5.1 Backup &amp; Recovery</p> <p>5.1.1 Types of Backup -Control file, Redo log file, cold and hot backup</p> <p>5.1.2 Types of Database failures</p> <p>5.1.3 Recovery Methods- Cold Restore, full Database Recovery, Time based recovery</p> <p>5.2 Database Security</p> <p>5.2.1 Authentication</p> <p>5.2.2 Privileged Accounts &amp; Privileges</p> <p>5.2.3 Introduction to Object Security and System security</p> <p>5.2.4 Database Roles</p> <p>5.2.5 Introduction to Database Auditing</p>
Reference Book	<ol style="list-style-type: none"> <li>1. Database System Concepts, Silberschatz Henry F. Korth and S. Sudarshan McGraw-Hill</li> <li>2. Oracle DBA Fundamentals-I - Oracle Press</li> <li>3. Effective PL/SQL – Apress</li> <li>4. Expert Oracle Database Architecture 9i and 10g, Tom Kyte Apress</li> <li>5. Effective Oracle By Design Tom Kyte Oracle Press</li> <li>6 Expert Oracle Database 11g Administration, Alpati, Wiley Student Edition</li> <li>7. SQL &amp; PL/SQL for Oracle 11g Black Book, Deshpande, Wiley Student Edition</li> <li>8. Beginning Oracle Database 11g Administration from novice to professional, Iggy Fernandez, Apress/Springer</li> <li>9. Oracle PL/SQL Example, Rosenweig &amp; Silvestrova 4/e, Pearson Pub</li> <li>10. Database Systems Using Oracle: A simplified guide to SQL &amp; PL/SQL, Shah Nilesh PHI</li> </ol>

	11. Learning Oracle SQL & PL/SQL: A Simplified Guide Chatterjee, Rajeeb C PHI
Teaching Methodology	Discussion, Independent Study, Seminars / Assignment
Evaluation Method	30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 70% assessment is based on end semester written examination

**Course: 103 - Fundamentals of Web Client Technologies**

<b>Course Code</b>	<b>103</b>
<b>Course Title</b>	<b>Fundamentals of Web Client Technologies</b>
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2020
Purpose of Course	The purpose of course is to make students capable of developing effective and interactive web client part of web applications.
Course Objective	To provide Fundamental knowledge of Web client development technologies
Pr-requisite	Basic understanding of Web, HTTP, HTML, JavaScript and Object Oriented Concepts.
Course Out come	After completion of this course, the student will be capable of developing effective and interactive web client part of web applications.
Course Content	<p><b>Unit 1 HTML5</b></p> <p>1.1 Features, Syntax, New tags, standard and custom attributes, events  1.2 Web Form 2.0, Web storage, Web SQL,  1.3 SVG, Canvas, Embedding and Playing Audio &amp; Video, Geo-location</p> <p><b>Unit 2 JavaScript</b></p> <p>2.1 JavaScript Language constructs &amp; functions  2.2 Working with Browser Objects-Date, Math, String  2.3 Handling events in JavaScript-Windows event, Event object, Event simulation  2.4 Working with Forms &amp; User Actions  2.5 Working with Windows &amp; Screen objects,  2.6 Working with Document and Navigator Object</p> <p><b>Unit 3. Fundamentals of AJAX, JSON and JQuery</b></p> <p>3.1 AJAX Web Application Model, AJAX -need, Advantages and Disadvantages, AJAX Components, AJAX component lifecycle, XMLHttpRequest object, Client Callbacks, The Script Libraries  3.2 Introduction to JSON-Datatypes, Objects, Schema, JSON with Javascript  3.3 Introduction to JQuery- Language Basics, JQuery &amp; DOM - Selectors, Attribute processing , Traversing. JQuery Events, JQuery AJAX , JQuery Utilities, Overview of JQuery UI widgets.</p> <p><b>Unit 4. Bootstrap</b></p> <p>4.1 Introduction to Bootstrap, Need, Advantages and Disadvantages  4.2 Grid System, Tables, Forms, Buttons, Images, Helper classes, Responsive Utilities  4.3 Bootstrap Layout Components-Dropdowns, Button Groups, Dropdown Button Groups, Input Groups, Navigation Elements, NavBar, Thumbnails, Pagination, Alerts, Progress bar, List Groups</p>

	<p>4.4 Bootstrap plugins-Transition, Modal, Dropdown, ScrollSpy, Tab, Popover, Collapse, Carousel, Affix</p> <p><b>Unit 5: Introduction to AngularJS</b></p> <p>5.1 Advantages of Angular JS, Overview of AngularJS lifecycle</p> <p>5.2 Angular JS Concepts &amp; Features -Modules, Scopes, Templates, Directives, Expressions, Controllers, Data Binding, Services, Dependency Injection, Compiler</p> <p>5.3 Integrating AngularJS with existing HTML5, JavaScript and JQuery</p> <p>5.4 Using Global APIs</p>
Reference Book	<ol style="list-style-type: none"> <li>1. HTML5 Black Book: Covers CSS3, Javascript, XML, XHTML, Ajax, PHP and JQuery, Dreamtech Press</li> <li>2. WEB TECHNOLOGIES: HTML, JAVASCRIPT, PHP, JAVA, JSP, ASP.NET, XML AND AJAX, BLACK BOOK: HTML, Javascript, PHP, Java, Jsp, XML and Ajax, Black Book, Dreamtech Press</li> <li>3. HTML5 and CSS3 made Simple, Ivan Byross, BPB</li> <li>4. Pro HTML5 and CSS3 Design Patterns, Dionysios Synodinos, Michael Bowers and Victor Sumner, Pearson</li> <li>5. HTML5 In easy steps, Mike McGrath, McGrawHill</li> <li>6. Programming in HTML5 with JavaScript and CSS3 Training Guide, Johnson G, PHI</li> <li>7. JavaScript in easy Steps, Mike McGrath, McGrawHill.</li> <li>8. AJAX for beginners, Ivan Byros, Sharanam Shah, SPD.</li> <li>9. AJAX Bible, Steven Holzner, Wiley India</li> <li>10. AJAX: Creating Web pages, edmond Woychowsky, Pearson</li> <li>11. jQuery, jQuery UI and jQuery Mobile, Adriaan de Jonge, Pearson</li> <li>12. JQuery and JQuery UI, Jay Balchand, Pearson</li> <li>13. JQuery in Action, Dreamtech Press</li> <li>14. JavaScript and JSON Essentials, Sai Srinivas Sriparasa, Packt Publishing Limited</li> <li>15. Introduction to JavaScript Object Notation: A To-the-Point Guide to JSON, Lindsay Bassett, SPD</li> <li>16. Jumpstart Bootstrap, Syed Fazle Rehman, SPD</li> <li>17. Extending Bootstrap, Christoffer Niska, Packt Publishing</li> <li>18. AngularJS, JavaScript and JQuery - All in One, Dayley and Dayley, SAMS-Pearson</li> <li>19. AngularJS, Green and Seshadri, SPD-O'Reilly</li> <li>20. Professional AngularJS, Karpov and Netto, WROX Publication</li> </ol>
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	<p>30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc.</p> <p>70% assessment is based on end semester written examination</p>

**Course : 104 - Enterprise Data Management and ERP**

<b>Course Code</b>	<b>104</b>
<b>Course Title</b>	<b>Enterprise Data Management and ERP</b>
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2020
Purpose of Course	The course gives students an idea about Enterprise Data Management and ERP
Course Objective	To provide a comprehensive knowledge of the concepts related to Information Systems and modeling of data in these systems.
Pr-requisite	Concept of Information System
Course Out come	After completion of this course, the student will be capable of
Course Content	<p><b>Unit 1 Data Management and Information System</b></p> <p>1.1 Data Management</p> <p>    1.1.1 Hierarchy of Data</p> <p>    1.1.2 Data Modeling</p> <p>    1.1.3 Data Integrity and Data Quality</p> <p>    1.1.5 Metadata</p> <p>    1.1.6 Legacy System and Data Migration</p> <p>1.2 Information System</p> <p>    1.2.1 Overview of Information System</p> <p>    1.2.2 Overview of different types of information systems: MIS,DSS, GDSS,ESS , GIS KSS</p> <p>    1.2.3 Impact of Information System on an organisation</p> <p>    1.2.4 An Introduction to Electronic Commerce and Mobile Commerce</p> <p>    1.2.5 Threats and security to e-commerce and m-commerce</p> <p><b>Unit 2 Introduction to ERP</b></p> <p>2.1 Evolution of ERP and Reasons for the growth of ERP</p> <p>2.2 Scenario and Justification of ERP in India</p> <p>2.3 Various Modules Of ERP</p> <p>2.4 Advantage of ERP.</p> <p>2.5 ERP for Small Business</p> <p>2.6 ERP for make to order companies</p> <p>2.7 Business Process Mapping for ERP Module Design</p> <p>2.8 Hardware Environment and its Selection for ERP Implementation</p> <p><b>Unit 3 ERP Products and Modules</b></p> <p>3.1. Introduction to ERP Products and modules</p> <p>3.2 Finance Module</p> <p>3.3 Plant Maintenance Module</p> <p>3.4 Quality Management Module</p> <p>3.5 Material Management Module</p>

	<p><b>Unit 4 ERP implementation lifecycle</b></p> <p>4.1 Issues in implementing ERP packages</p> <p>4.2 Pre-evaluation screening</p> <p>4.3 Package evaluation</p> <p>4.4 Project planning phase, gap analysis, reengineering,</p> <p>4.5 End-user training, post implementation (Maintenance mode).</p> <p>4.6 Vendors, Consultants and users, In-House Implementation - pros and cons</p> <p><b>UNIT 5 Business Intelligence</b></p> <p>5.1 Introduction to BI</p> <p>5.2 Types of Business Rule</p> <p>5.3 Implementing Business Rule</p> <p>5.4 Business Re-engineering</p> <p>5.5 Overview of Data Warehousing and Data Mining</p> <p>5.6 Business Intelligence using Data Warehousing and Data Mining</p> <p>5.7 Business Intelligence Applications: Customer Relationship Management, Supply Chain Management.</p>
Reference Book	<p>1.Enterprise Resource Planning By Alexis Leon, TMH</p> <p>2.Principles of Information Systems Managerial Approach By Ralph stair and George Reynolds, Thomson Course Technology</p> <p>3.Management Information Systems Managing the Digital Firm by Kenneth Laudon and Jane Laudon by PHI</p> <p>4.Content Management Bible By Bob Boiko, Wiley Publishing House</p> <p>5.Management Information System Text &amp; Application by C.V.S Murthy by Himalaya Publishing House</p> <p>6.Management Information System by W.S Jawadekar, TMH</p> <p>7.Information System for Modern Management by Murdick Ross and Claget, Prentice Hill</p> <p>8.Maximizing your ERP System a Practical guide for Manager by Scott Hamilton, Macgraw Hill</p> <p>9.ERP: Make it Happen By Thomas wakace, Willey Publication</p> <p>10.ERP : Tools ,Technioques and applications for Integrating the Supply Chain Second Edition by Carl a Ptak, Schragenheim, Wiley</p> <p>11.Enterprise Sales and Operations Planning by E.Palmatier Coleen H,Ross Publishing</p> <p>12. SAP MM Questions and answers by Learning Solutions and Publication Jones Barllet Learning</p> <p>13 ERP 100 Sucess secrets By Godfrey</p> <p>14 Management Information Systems By Davis and H Olson TMH</p> <p>15 Management Information System by Sadopan PHI</p>
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	<p>30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc.</p> <p>70% assessment is based on end semester written examination</p>

**Course: 104 - Fundamentals of BIG DATA**

<b>Course Code</b>	<b>104</b>
<b>Course Title</b>	<b>Fundamentals of BIG DATA</b>
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2020
Purpose of Course	To provide comprehensive knowledge about data science and big data
Course Objective	To provide the student sufficient knowledge about fundamental concepts of big data, data analysis and processing.
Pr-requisite	Knowledge about database system and processing concepts
Course Out come	After having completed the course the student will gain: ✓ Understanding of BIG DATA Fundamentals and Principals ✓ Knowledge of Big Data Analysis Process ✓ Technical know-hows about big data processing ✓ Learning of Big Data Technology stack
Course Content	<p><b>Unit 1 Understanding Big Data</b></p> <p>1.1 Concepts and Terminology -Datasets, Data Analysis &amp; Data Analytics - Descriptive, Diagnostic, Predictive, Perspective</p> <p>1.2 Big Data Characteristics - Volume, Velocity, Variety, Veracity, Value</p> <p>1.3 Different Types of Data- Structured, Semi-Structured, Unstructured, Metadata</p> <p>1.4 Big Data Application and Case Studies</p> <p>1.5 Big Data vs Traditional Data Mining</p> <p><b>Unit 2 Big Data Adoption and Planning</b></p> <p>2.1 Big Data Concerns - Procurement, Privacy, Security, Provenance</p> <p>2.2 Big Data Analytics Lifecycle</p> <p>2.2.1 Business case evaluation</p> <p>2.2.2 Data Acquisition and Filtering</p> <p>2.2.3 ETL Process</p> <p>2.3.4 Data Analysis</p> <p>2.3.5 Data Visualization</p> <p><b>Unit 3 Big Data Analysis Techniques</b></p> <p>3.1 Quantitative Analysis</p> <p>3.2 Qualitative Analysis</p> <p>3.3 Statistical Analysis - A/B Testing, Simple and multiple Corelation, Linear Regression</p> <p>3.4 Machine Learning- Supervised and Unsupervised learning</p> <p>3.5 Semantic Analysis – NLP, Text Analysis, Sentiment Analysis</p> <p>3.6 Visual Analysis – HeatMaps, Time Series Plots, Network Graphs, Spatial Data Mapping</p>



	<p><b>Unit 4 Big Data Storage related concepts and technologies - 1</b></p> <p>4.1 Clusters</p> <p>4.2 File Systems and Distributed File Systems</p> <p>4.3 Sharding and Replication</p> <p>    4.3.1 Master-Slave Replication</p> <p>    4.3.2 Peer-to-Peer Replication</p> <p>4.4 CAP Theorem and ACID vs BASE</p> <p>4.5 NoSQL Databases</p> <p>    4.5.1 Characteristics and Rationale</p> <p>    4.5.2 Types : Key-Value, Document, Column Family, Graph</p> <p>4.6 NewSQL Databases</p> <p>4.7 In-Memory Databases and Storage Devices</p> <p><b>Unit 5 Big Data Storage related concepts and technologies - 2</b></p> <p>5.1 Distributed Data Processing : Hadoop</p> <p>5.2 Parallel Data Processing : MapReduce</p> <p>5.3 Processing in Batch Mode</p> <p>    5.3.1 Batch Processing with MapReduce</p> <p>    5.3.2 Map and Reduce Tasks - Map, Combine, Partition, Shuffle and Sort, Reduce</p> <p>    5.3.3 A simple Map Reduce Example</p> <p>5.4 Understanding MapReduce Algorithms</p> <p>5.5 Processing in Real-time Mode</p>
Reference Book:	<p>1. Big Data Fundamentals : Concepts, Drivers &amp; Techniques ,by Thomas Erl, Wajid Khattak, Paul Buhler Publisher :Pearson</p> <p>2. Big Data : Principles and Practice of scalable real time data systems by Nathan Marz, James Warren Publisher : Dreamtech Press</p> <p>3. Hadoop The Definitive Guide by Tom White Publisher : O'Reilly</p> <p>4. BIG DATA by Viktor Mayer Schonberger and Kenneth Cukier Publisher : John Murray</p>
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	<p>30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc.</p> <p>70% assessment is based on end semester written examination</p>

**Course : 105 Web Programming Using JAVA**

<b>Course Code</b>	<b>105</b>
<b>Course Title</b>	<b>Web Programming Using JAVA</b>
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2020
Purpose of Course	The course gives students an idea about How to use Java in Web Programming
Course Objective	The aim of this course is to provide indepth knowledge about Java Programming Technology
Pr-requisite	Basic Understanding of Web , HTTP, HTML, Programming in Core Java, OOPS concept, DBMS.
Course Out come	After completion of this course, the student will able use JAVA in Web Programming
Course Content	<p><b>Unit 1 JAVA WEB ARCHITECTURE</b></p> <p>1.1 The Java Advantage for Web, 1.2 Java EE Web Architecture, 1.3 Java Web Application Servers,</p> <p><b>Unit 2 JAVA DATABASE PROGRAMMING</b></p> <p>2.1 The 2-Tier Client Server Architecture 2.2 Java Database Connectivity (JDBC) – API for Accessing Databases 2.3 Database Drivers, Loading a Driver Class 2.4 Connecting the Database Server, 2.5 CRUD operations with Statement Object, PreparedStatement Object, callable statement object 2.6 The ResultSet Object 2.7 Data about Data - The ResultSetMetaData Object 2.8 Handling Database Transactions, Batching the Operations</p> <p><b>Unit 3 JAVA SERVLETS</b></p> <p>3.1 Introduction to Java Servlets 3.2 The Java Servlet API 3.3 The Servlet Life Cycle, CGI and Servlets 3.4 Request and Response 3.5 Getting Values from Forms and QueryStrings, 3.6 Working with Databases, Working with HTTP Headers 3.7 Using Hidden Fields 3.9 State Management using cookies and session 3.10 ServletContext and ServletConfig, 3.11 Initalization Parameters, Inter-Servlet Communication with Request 3.12 Dispatching and Forwarding, Filters, Web Listeners 3.13 Writingd deployment Descriptor</p> <p><b>Unit 4 JAVA SERVER PAGES</b></p> <p>4.1 Overview of Java Server Pages (JSP) &amp; JSP lifecycle,</p>

	<p>4.2 Directives - Page Directive, Include Directive, Taglib Directive</p> <p>4.3 Scripting Elements-Comment Element, Declaration Element, Scriptlets , Expression Element</p> <p>4.4 Standard Actions – include, forward, plugins, useBean</p> <p>4.5 The Implicit Objects, Handling the HTML Form Submission</p> <p>4.6 The Form Validation with Java Bean,</p> <p>4.7 State Management, Working with databases</p> <p><b>Unit 5 Enterprise Java Beans and Java Application Framework</b></p> <p>5.1 Stateless Session Bean , Statefull Session Bean,</p> <p>5.2 Binding and looking up objects ,</p> <p>5.3 Singleton Beans, Overview of Message Driven Beans</p> <p>5.4 Local and Remote Lookups,</p> <p>5.5 Asynchronous EJB Methods</p> <p>5.6 WEB SERVICES</p> <p>5.6.1 Types of Web Services</p> <p>5.6.2 Creating, Publishing and consuming RESTful Web Service</p> <p>5.7 Java Web Application Frameworks</p> <p>5.7.1 Action Based Framework – Overview of SPRING</p> <p>5.7.2 Component Based Framework - JAVA SERVER FACES</p>
Reference Book	<p>1. Head First Servlets and JSP By: Bryan Basham, Kathy Sierra, Bert Bates Publisher: 'Reilly Media   ISBN 10: 0-596-00540-7   ISBN 10: 0-596-55633-0</p> <p>2. Core Servlets and JSP, by Hall and Brown , Sun Micro Sys</p> <p>3. Java Servlet &amp; JSP Cookbook by Bruce W. Perry O;reilly</p> <p>4. Beginning JSP™, JSF™ and Tomcat™ Web Development: From Novice to Professional by Giulio Zamboni and Michael Sekler</p> <p>5. Mastering Enterprise JavaBeans and the Java 2 Platform, Enterprise Edition, by Ed Roman</p> <p>6. Java 7 EE Tutorial Basic Concepts by Oracle Corporation</p> <p>7 Beginning Java™ EE 7 Platform with GlassFish™ 3: From Novice to Professional byAntonio Goncalves</p> <p>8 . Beginning EJB 3 Application Development From Novice to Professional by Raghu R.Kodali , Jonathan Wetherbee and Peter Zdrozny, Apress Pub.</p> <p>9. Pro JPA 2: Mastering the Java™ Persistence API (Expert's Voice)</p> <p>10 Java Technology,by Keith and Schincariol, Apress Pub.</p>
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	<p>30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc.</p> <p>70% assessment is based on end semester written examination</p>

### Course: 106 - Practical on Web Programming Using Java

Course Code	106
Course Title	Practical on Web Programming Using Java
Credit	4
Teaching per Week	4 hours
Minimum weeks per Semester	15 (including Labwork, Self-Study, examination, preparation, holidays etc.)
Last Review / Revision	June 2020
Purpose of Course	The purpose of the course is to make students capable of implementing concepts, methods and tools learnt in course/paper 105 Web Programming using JAVA.
Course Objective	The Objective of these course is to enable students to develop Full-Stack web application.
Pr-requisite	Programming Skill in Structured and Object Oriented Programming and Core JAVA, Scripting Skills in HTML, Concepts of Networks, Web, HTTP etc.
Course Out come	After completion of this course, the student will be capable of Developing web application in JAVA.
Course Content	<p>The students will be required to carry out practical in Client and Server-side Web Application Development on the topics covered in course/paper 105 Web Programming using JAVA and using the methods and tools discussed there in.</p> <p>A Journal must be prepared for the practical work done.</p>
Reference Book	As per course/Paper:105
Teaching Methodology	Lab Work
Evaluation Method	<p>30% Internal assessment is based on project presentation and/or demonstration and viva-voice examination.</p> <p>70% assessment is based Project Presentation and/or demonstration and viva-voice examination at the end of semester.</p>

**Course : 107 - Practical on Web Client Technologies**

<b>Course Code</b>	<b>107</b>
<b>Course Title</b>	<b>Practical on Web Client Technologies</b>
Credit	3
Teaching per Week	3Hrs
Minimum weeks per Semester	15 (Including Labwork,examination,preparation,holidays etc.)
Last Review / Revision	June 2020
Purpose of Course	The purpose of the course is to make students capable of implementing concepts, methods and tools learnt in course/paper 103 Fundamental of Web Client Technologies .
Course Objective	The Objective of these course is to enable students to develop Client-side web application.
Pr-requisite	Programming Skill in Structured and Object Oriented Programming and Core JAVA, Scripting Skills in HTML, Concepts of Networks, Web, HTTP etc.
Course Out come	After completion of this course, the student will be capable of Developing Full-Stack web application.
Course Content	The students will be required to carry out practical in Client -side Web Application Development on the topics covered in Course/Paper103 Fundamental of Web Client Technologies using the methods and tools discussed there in.  A Journal must be prepared for the practical work done.
Reference Book	As Per course/paper 103
Teaching Methodology	Lab Work
Evaluation Method	30% Internal assessment is based on Practical attendance, Problem Solving , internal examination etc. 70% assessment is based practical examination at the end of semester.

**Course : 108 - Practical on Advance Database Management System**

<b>Course Code</b>	<b>108</b>
<b>Course Title</b>	<b>Practical on Advance Database Management System</b>
Credit	3
Teaching per Week	3Hrs
Minimum weeks per Semester	15(Including Labwork, examination, preparation, holidays etc.)
Last Review / Revision	June 2020
Purpose of Course	The purpose of the course is to make students capable of performing DBA related tasks.
Course Objective	The Objective of these course is to enable students to writing Advance SQL queries and PL/SQL blocks , create database instance and carry out basic Data Administration in RDBMS
Pr-requisite	Basic understanding of RDBMS, SQL and PL/SQL
Course Out come	After completion of this course, the student will be able to write Advance SQL queries and PL/SQL blocks , create database instance and carry out basic Data Administration in RDBMS
Course Content	The students will be required to carry out practical on Software Testing on the topics covered in Course/Paper 102: "Advance Relational Database System " using the methods and tools discussed there in. A Journal must be prepared for the practical work done.
Reference Book	.As per course/paper 102
Teaching Methodology	Lab Work
Evaluation Method	30% Internal assessment is based on Practical attendance, Problem Solving , internal examination etc. 70% assessment is based practical examination at the end of semester.