Scheme of Instruction and Syllabi
of
Choice Based Credit System (CBCS) of

V AND VI SEMESTERS
OF
THREE YEAR PG COURSE
IN

MASTER OF COMPUTER APPLICATIONS

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY
(An Autonomous Institution)
Affiliated to OU; All U.G. and 5 P.G. Programmes (Civil, CSE, ECE, Mech. & EEE)
Accredited by NBA; Accredited by NAAC - 'A' Grade (UGC); ISO Certified 9001:2015
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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A), HYD – 075

DEPARTMENT OF MCA

V-SEMESTER

S. No	Course Code	Title of Course	Scheme of Instruction		Scheme of Examination			Credits
			Hours per week		Duration of SEE in Hours	Maximum Marks		
			L/T	P/S		CIE	SEE	
THEORY								
1.	16MC C126	Object Oriented System Development(OOSD)	3/1	--	3	30	70	4
2.	16MC C127	Machine Learning	3/1	--	3	30	70	4
3.	16MC C128	Cryptography & Network Security	3/1	--	3	30	70	4
4.	16MC E109/ 110/ 111 /112	Elective-3	3	--	3	30	70	3
5.	16MC E113/ 114/ 115 /116	Elective-4	3	--	3	30	70	3
PRACTICALS								
6.	16MC C129	Object Oriented System Development Lab	--	3	3	25	50	2
7.	16MC C130	Machine Learning Lab using Python	--	3	3	25	50	2
8.	16MC C131	Seminar	--	3	--	50	--	2
Total			**18**	**9**		**250**	**450**	**24**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture T: Tutorial P: Practical S: Seminar

Elective – 3

Subject Code	Subject Title
16MC E109	Distributed Systems
16MC E110	Internet of Things
16MC E111	Business Intelligence and Analytics
16MC E112	Middleware Technologies

Elective – 4

Subject Code	Subject Title
16MC E113	Big Data Analytics
16MC E114	E-Commerce
16MC E115	Mobile Computing
16MC E116	Cyber Forensics

VI-SEMESTER

S. No	Course Code	Title of Course	Scheme of Examination		Credits
			Maximum Marks		
			CIE	SEE	
1.	16MC C132	Major Project Work	100	100	12
		Total	**100**	**100**	**12**

CIE: Continuous Internal Evaluation SEE: Semester End Examination
L: Lecture T: Tutorial P: Practical S: Seminar

16MC C126

OBJECT ORIENTED SYSTEM DEVELOPMENT

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
Continuous Internal Evaluation	30 Marks
Credits	4

Objectives:

Students will:

1. Learn the concepts of nine UML diagrams.
2. Use the concepts of things and relationships in UML.
3. Learn about the structural and dynamic modeling.
4. Apply the concepts of Architectural modeling.
5. Acquire the concept and structure of RUP and USDP.
6. Study about the various models of USDP and core workflows.

Outcomes:

After completion of the course the students would be able to:

1. Understand the basic building blocks of UML.
2. Use the knowledge and applications of nine UML diagrams.
3. Learn the knowledge of how to model the object oriented applications through UML.
4. Acquire the knowledge of Structural and Behavioral modeling.
5. Apply the knowledge of dynamic and architectural modeling.
6. Study the concepts of RUP, USDP and models.

Unit – I:

UML Introduction, Why we model, introducing the UML, Building blocks of UML.Basic Behavioral Modeling, Use Cases, Use Case Diagrams, Structural Modeling**,** Object diagrams, Class Diagrams, Relationships, Advanced Relationships in Class diagrams.

Unit – II:

Dynamic modeling**,** Interactions, Interaction Diagrams, Events and signals, State Machines, Processes and Threads, State Chart Diagrams, Activity Diagrams.

Unit – III:

Architectural Modeling**,** Interfaces, Packages, Components, Component Diagrams, Design Patterns and Frame works, Deployment diagrams, Systems and models.

Unit – IV:
Unified Software Development Process**,** The Unified Process, The Four Ps, Use-Case- Driven Process, Architecture – Centric Process, Iterative and Incremental Process.

Unit – V:
Core Workflows, Capturing Requirements as Use Cases, Analysis Model, Design Model, Implementation Model and Test Model.

Text Books:

1. Grady Booch, James Rumbaugh, Ivor Jacbson, "The Unified ModelingLanguage – User Guide", 2nd Edition, Pearson Education, India, 2007.
2. Ivor Jacbson, Grady Booch, James Rumbaugh, "The Unified Software Development Process", Pearson Education, India, 2008.

Suggested Reading:

1. Grady Booch, Rabert A. Maksimehuc and Three more, " Object Oriented Analysis and Design with Applications", 3rd Edition, Pearson Education, 1991.
2. Craig Larman, "Applying UML and Patterns: An Introduction to Object Oriented Analysis and Design and Iterative Development", 3rd Edition, Pearson Education, 2008.
3. Ali Bahrami, "Object Oriented System Development", Irwin/Mc Graw Hill, 1999.

16MC C127

MACHINE LEARNING

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
Continuous Internal Evaluation	30 Marks
Credits	4

Objectives:
Student will:

1. Learn the concepts of Classification and Prediction.
2. Understand the mathematical concepts related to Multilayer perception.
3. Apply clustering techniques for unsupervised data.
4. Train classifiers and predictors on supervised data.
5. Find optimal models for decision making.
6. Design ensemble models for Classification.

Outcomes:
After completion of the course the students would be able to:

1. Acquire the basic knowledge of Machine Learning; identify algorithms, machine learning problems.
2. Classify data sets using classifiers.
3. Use prediction Techniques.
4. Recognize patterns using Machine Learning models.
5. Apply dimensionality reduction techniques on different datasets.
6. Design ensemble methods.

Unit-I
Introduction: Learning, Types of Machine Learning.
Concept learning: Introduction, Version Spaces and the Candidate Elimination Algorithm.
Learning with Trees: Constructing Decision Trees, CART, Classification Example.

Unit-II
Linear Discriminants: The Perceptron, Linear Separability.
Linear Regression Multilayer Perceptron (MLP): Going Forwards, Backwards, MLP in practices, Derivingback.
Propagation SUPPORT Vector Machines: Optimal Separation, Kernels.

Unit-III
Some Basic Statistics: Averages, Variance and Covariance, The Gaussian.
The Bias-Variance Tradeoff Bayesian learning: Introduction, Bayes theorem, Bayes Optimal Classifier, Naive Bayes Classifier.

Graphical Models: Bayesian networks, Approximate Inference, Making Bayesian Networks, Hidden Markov Models, The Forward Algorithm.

Unit-IV

Evolutionary Learning: Genetic Algorithms, Genetic Operators.
Genetic Programming Ensemble learning: Boosting, Bagging.
Dimensionality Reduction: Linear Discriminant Analysis, Principal Component Analysis.

Unit-V

Clustering: Introduction, Similarity and Distance Measures, Outliers, Hierarchical Methods, Partitional Algorithms, Clustering Large Databases, Clustering with Categorical Attributes, Comparison.

Text Books:

1. Tom M. Mitchell, "Machine Leaming ",MacGraw Hill, 1997
2. Stephen Marsland, "Machine Learning - An Algorithmic Perspective ", CRC Press, 2009.

Suggested Reading:

1. J F Khamber, Data Mning Concepts, Elsevier, 2007
2. Margaret H Dunham, "Data Mining", Pearson Edition, 2003.
3. GalitShmueli, Nitin R Patel, Peter C Bruce, "Data Mining for Business Intelligence", Wiley India Edition, 2007.
4. RajjallShinghal, "Pattern Recognition ", Oxford University Press, 2006.

16MC C128

CRYPTOGRAPHY & NETWORK SECURITY

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
Continuous Internal Evaluation	30 Marks
Credits	4

Objectives:

Students will:

1. Learn OSI Security architecture and classical Encryption techniques.
2. Acquire fundamental knowledge on the concepts of finite fields and number theory.
3. Understand various block cipher and stream cipher models.
4. Describe the principles of public key cryptosystems, hash functions and digital signatures.
5. Acquire the knowledge of Security practices and system security.
6. Gain the knowledge of e-mail, IP and Web security.

Outcomes:

After completion of the course the students would be able to:

1. Compare various cryptographic techniques.
2. Design secure applications.
3. Inject secure coding in developed applications.
4. Develop secure cipher models.
5. Generate secure e-mail, IP and Web security algorithms.
6. Build secure system.

Unit-I

Introduction & Number Theory : Services, Mechanisms and attacks-the OSI security architecture-Network security model-Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques, steganography).FINITE FIELDS AND NUMBER THEORY: Groups, Rings, Fields-Modular arithmetic-Euclid salgorithm-Finite fields- Polynomial Arithmetic –Prime numbers-FermatsandEulers theorem-Testing for primality The Chinese remainder theorem- Discrete logarithms.

Unit-II

Block Ciphers & Public Key Cryptography: Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm. Public key cryptography: Principles

of public key cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange-Elliptic curve arithmetic-Elliptic curve cryptography.

Unit-III

Hash Functions And Digital Signatures: Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 - SHA - HMAC – CMAC - Digital signature and authentication protocols – DSS – EI Gamal – Schnorr.

Unit-IV

Security Practice & System Security: Authentication applications – Kerberos – X.509 Authentication services - Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs- SET for E-Commerce Transactions. Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security.

Unit-V

E-Mail, IP& Web Security: E-mail Security: Security Services for E-mail-attacks possible through E-mail - establishing keys privacy-authentication of the source-Message Integrity-Non-repudiation-Pretty Good Privacy-S/MIME. IPSecurity: Overview of IPSec - IP and IPv6-Authentication Header-Encapsulation Security Payload (ESP)-Internet Key Exchange (Phases of IKE, ISAKMP/IKE Encoding). Web Security: SSL/TLS Basic Protocol-computing the keys- client authentication-PKI as deployed by SSLAttacks fixed in v3- Exportability-Encoding-Secure Electronic Transaction (SET).

Text Books:

1. William Stallings, "Cryptography and Network Security", 6th Edition, Pearson Education, 2013.
2. Charle Kaufman, Radha Perlman and Mike Speciner "Network Security", Prentice Hall of India, 2002.

Suggested Reading:

1. Behrouz A. Forouzan, "Cryptography and Network Security", Tata McGraw Hill, 2007.

16MC E109

DISTRIBUTED SYSTEMS

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
Continuous Internal Evaluation	30 Marks
Credits	3

Objectives:

Students will:

1. Learn the basic architecture of distributed systems.
2. Study role and application of middleware.
3. Use the structure of DNS, concepts of synchronizations and clocks.
4. Apply the principles of fault tolerance and security issues.
5. Gain the knowledge of standard middleware architectures like CORBA, D-COM and GLOBE.
6. Acquire the principles and issues pertaining to distributed shared memories.

Outcomes:

After completion of the course the students would be able to:

1. Apply the basic principles of distributed system layouts and purpose.
2. Study the utility and applications of middle ware in distributed system.
3. Use the topology of DNS, utility of synchronization principles of global clocks.
4. Gained the knowledge of fault tolerance principles, security issues.
5. Apply the knowledge of standard middleware architectures like CORBA, D-COM etc.
6. Acquire the principles and issues with regards to distributed shared memory concepts.

Unit-I

Introduction to Distributed Systems, Definition, Goals, Hardware and software Concepts and client/server model. Processes, Threads, Clients, Servers, Code Migration, Software agents.

Unit-II

Naming Entities, DNS, X.500, Locating Mobile entities, clock, logical clock, Global state, election algorithms. Mutual exclusion, distributed Transaction.

Unit-III

Introduction to Fault Tolerance, Introduction to Security, Security channels, Access control, Firewalls.

Unit-IV

Distributed Middleware Architectures: CORBA, D-COM and GLOBE. Distributed File System, SUN NFS, CODA.

Unit-V

Distributed Shared Memory concepts, Implementation algorithms, memory coherence. Issues in Load Distributing, Components of Load Distributing Algorithms, Load Distributing Algorithms.

Text Book:

1. Andrew S. Tanenbaum and Van Steen, "Distributed Systems", Pearson Education, 2002.
2. Singhal M, Shivaratri N.G, "Advanced concepts in operating systems". Mc-Graw-Hill, 2017.

Suggested Reading:

1. Dollimore, Kindberg Coulouris, "Distributed Systems. Concepts and Design", Pearson Edu/Asia, 2000.
2. Ajay D. Kshemkalyani, Mukesh Singhal, "Distributed Computing: Principles, Algorithms, and Systems", Cambridge University Press, edition 1, 2008.

16MC E110

INTERNET OF THINGS

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
Continuous Internal Evaluation	30 Marks
Credits	3

Objectives:

Students will:

1. Gain vision and Introduction to IoT.
2. Understand IoT Market perspective.
3. Acquire IoT standards and Business processes.
4. Learn data and knowledge Management and use of Devices in IoT Technology.
5. Understand State of the Art – IoT Architecture.
6. Have knowledge of Real World IoT Design Constraints, Industrial Automation and Commercial Building Automation in IoT.

Outcomes:

After completion of the course the students would be able to:

1. Gain vision of IoT from a global context.
2. Determine the Market perspective of IoT.
3. Use Devices, Gateways and Data Management in IoT.
4. Implement IoT standards and Business processes.
5. Build state of the art architecture in IoT.
6. Develop Applications of IoT in Industrial and Commercial Building Automation and Real World Design Constraints.

Unit-I

M2M to IoT-The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics.M2M to IoT – A Market Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies.

Unit-II

M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data Management.

Unit-III

M2M and IoT Technology Fundamentals - Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management. IoT Architecture-State of the Art – Introduction, State of the art, Architecture Reference Model-Introduction, Reference Model and Architecture, IoT Reference Model.

Unit-IV

IoT Reference Architecture-Introduction, Functional View, Information View, Deployment and operational View, Other Relevant architectural views. Real-World Design Constraints-Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control.

Unit-V

Industrial Automation- Service-oriented architecture-based device integration, SOCRADES: realizing the enterprise integrated Web of Things, IMC-AESOP: from the Web of Things to the Cloud of Things, Commercial Building Automation-Introduction, Case Study: phase one-commercial building automation today, Case study: phase two- commercial building automation in the future.

Text Book:

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.

Suggested Reading:

1. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1stEdition, VPT, 2014.
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.
HakimaChachi "Internet of Things (Connecting Objects)" Wiley – 2010.

16MC E111

BUSINESS INTELLIGENCE AND ANALYTICS

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
Continuous Internal Evaluation	30 Marks
Credits	3

Objectives:

Students will:

1. Learn data mining techniques and understand relationships between the underlying business process of an organization.
2. Understand the role of business analytics within an organization.
3. Acquire the knowledge on data warehousing concepts.
4. Provide in-depth knowledge of handling data and business analytics tools that is used for decision-making.
5. Acquire knowledge on prescriptive analytics.
6. Understand the various applications of business analytics on different domains.

Outcomes:

After completion of the course the students would be able to:

1. Get clear idea about the basic concepts of business analytics in an organization.
2. Demonstrate detailed knowledge about the role of business analytics in decision making.
3. Distinguish between descriptive, predictive and prescriptive analytics.
4. Gaining knowledge on data warehousing and data mining concepts.
5. Understand the usefulness of business analytics in various functional areas of an organization.
6. Understand the future directions for business analytics.

Unit- I:

Introduction: Introduction to Analytics, data science, Big data. Business analytics-challenges from outside and within, BASP (Business analytics success pillars) framework, Applications of Analytics to different domains, Data, Information, and Knowledge, Analyst's Role in the BA Model - Three Requirements the Analyst Must Meet , Required Competencies for the Analyst , Hypothesis-Driven Methods, Data Mining with Target Variables , Explorative Methods.

Unit- II:

Descriptive analytics : Descriptive analytics-Data warehousing-concepts, characteristics, Data marts, Meta data and process of data warehousing, Business

Reporting, Visual Analytics and Business performance measurement, Why a Data Warehouse, Architecture and Processes in a Data Warehouse, Tips and Techniques in Data Warehousing.

Unit- III:

Predictive analytics: Introduction, Data mining concepts and Applications, Data mining process, methods, classification techniques. Text mining-introduction, text analytics and sentiment analytics.Web mining-introduction, Web analytics and social analytics.

Unit- IV:

Prescriptive analytics : Introduction- categories of models- optimization, simulation, heuristics, predictive models, other models. Automated decision systems and Expert systems, Knowledge Management and collaborative systems.

Unit-V:

GIS : Nature of Geographic data, Spatial Objects and Data Models, Getting map on Computers, GIS standards and Standardization Process of GIS development, Implementation and Deployment phases, Big Data, Defining Big Data, Big Data Landscape, Business Implications of Big Data, Technology Implications of Big Data, Big Data Technologies, Management of Big Data.

Text Books:

1. Ramesh sharada, DursunDelen, Efraim Turban, "Business intelligence and analytics" Pearson, 2013.
2. Jean paulisson,jesse s.harriot,"Win with advanced Business analytics" wiley and sas, 2012.

Suggested Readings:

1. Gert H.N. Laursen, JesperThorlund "Business Analytics for Managers" JohnWiley& Sons, Inc.2010.

16MC E112

MIDDLEWARE TECHNOLOGIES

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
Continuous Internal Evaluation	30 Marks
Credits	3

Objectives:

Students will:

1. Learn the fundamentals of Client / Server.
2. Make a study of basics EJB, types of and applications.
3. Learn Service oriented Architecture.
4. Understand Extensible Markup Language.

Outcomes:

After completion of the course the students would be able to:

1. Various Middleware Technologies.
2. Acquire the knowledge of EJB and its types.
3. Learn Service Oriented Architecture.
4. Learn Extensible Markup Language.

Unit-I

Client/Server Concepts: Introduction to Client/Server, Various types of Servers, File Server, Database server, Group server, Object Server, Web server, Introduction to Middleware, Types of Middleware , General middleware –Service specific middleware, Client/Server Building blocks – Client, Server, Middleware, Client/Server Applications, Peer- to- Peer communication : Sockets; RPC Middleware : Communication Model using RPC, Web Services – SOA, SOAP, WSDL, REST Services.

Unit-II

EJB Architecture: Introduction to EJB ; EJB Software Architecture ; View of EJB Conversion; Building and Deploying EJBs; Role in EJB.

Unit-III

EJB Applications: Types of Enterprise Beans: Session Beans, Entity Beans and Message Driven Beans; Life Cycle of Enterprise Beans : Life Cycle of Session Beans, Life Cycle of Entity Beans, Life Cycle of Message Driven Beans; Steps in deploying an Application using Enterprise Beans Framework : Creation of Home Interface, Creation of Remote Interface, Creation of Primary Key Class, Creation of Bean Class.

Unit-IV

Service Oriented Architecture: SOA characteristics, SOA infrastructure, EAI, Enterprise Service Bus : ESB Architecture, Advantages , Disadvantages; SOA – A conceptual model, SOA : Architectural Elements, Architectural Styles, Architectural Layers; SOA Analysis and Design.

Unit-V

Web Services Technologies: XML Technologies: XML Validation; XML DTD: Content Rules, Structure Rules, DTD Attributes, DTD Entities, Drawbacks of DTD, Namespaces; XQUERY : XQuery Basic Syntax Rules, XQuery Path Expressions, XQuery Functions.

Text Book:

1. G. SudhaSadasivam, RadhaShankarmani "Middleware & Enterprise Integration Technologies" - , Wiley India Publishers, 2009.

Suggested Reading:

1. Robert Orfali, Dan Harkey and Jeri Edwards, "The Essential Client / Server Survival Guide", Galgotia Publications Pvt.Ltd, 2002.
2. Tom Valesky, "Enterprise Java Beans", Pearson Education, 2002.

16MC E113

BIG DATA ANALYTICS

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
Continuous Internal Evaluation	30 Marks
Credits	3

Objectives:
Students will:

1. Introduce the concepts and challenges of big data, role of HDFS in handling big data and MapReduce Architecture.
2. Explore mapper and reducer to solve real world problems.
3. Introduce the features of NoSQL and study the working mechanisms of MongoDB.
4. Impart knowledge to work with semi structured and unstructured data using Pig.
5. Familiarize with features of Hive to process and query big data.
6. Process and query the big data in HDFS environment.

Outcomes:
After completion of the course the students would be able to:

1. Develop framework for handling Big Data using Hadoop
2. Acquire, Store and analyse big data in business environments using HDFS
3. Develop programs in MapReduce to solve real world problems
4. Model data using MongoDB
5. Handle semi structured and unstructured big data using Pig
6. Process and query big data in HDFS environment using Hive

Unit - I:
Introduction to Big data and its importance, Considering a Big data solution, Big Data use cases: IT for IT Log Analytics, The Fraud Detection Pattern, Social Media Pattern. The Hadoop Distributed Files system: The Design of HDFS, HDFS Concepts, Blocks, Name nodes and Data nodes, Block Caching, HDFS Federation, HDFS High Availability, The Command-Line Interface, Basic File system Operations, Hadoop File systems, Interfaces, The Java Interface, Reading Data from a Hadoop URL, Reading Data Using the File System API, Writing Data, Directories, Querying the File system, Deleting Data, Data Flow, Anatomy of a File Read, Anatomy of a File Write, Coherency Model, Parallel Copying with distcp, Keeping an HDFS Cluster Balanced.

Unit - II:

MapReduce: A Weather Dataset, Data Format, Analyzing the Data with Hadoop, Map and Reduce, Java MapReduce, Scaling Out, Data Flow, Combiner Functions, Running a Distributed MapReduce Job Developing a MapReduce Application: Writing a Unit Test with MRUnit, Mapper,Reducer, Running Locally on Test Data, Running a Job in a Local Job Runner, Testing the Driver, Running on a Cluster, Packaging a Job, Launching a Job, The MapReduce Web.

Unit – III:

How MapReduce Works: Anatomy of a MapReduce Job Run, Job Submission, Job Initialization, Task Assignment, Task Execution, Progress and Status Updates, Job Completion, Failures, Task Failure, Application Master Failure, Node Manager Failure, Resource Manager Failure, Shuffle and Sort, The Map Side, The Reduce Side, MapReduce Types and Formats: MapReduce Types, The Default MapReduce Job, Input Formats, Input Splits and Records, Text Input, Output Formats, Text Output.

Unit – IV:

No SQL Databases: Review of traditional Databases, Need for NoSQL Databases, Columnar Databases, Failover and reliability principles, CAP Theorem, Differences between SQL and NoSQL databases, Working mechanisms of Mongo DB: Overview, Advantages, Environment, Data Modelling, Create Database, Drop Database, Create collection, Drop collection, Data types, Insert, Query, Update and Delete operations, Limiting and Sorting records, Indexing, Aggregation.

Unit – V:

Pig: Installing and Running Pig, an Example, Generating Examples, Comparison with Databases, Pig Latin, User-Defined Functions, Data Processing Operators, Pig in Practice. Hive: Installing Hive, The Hive Shell, An Example, Running Hive, Comparison with Traditional Databases, HiveQL, Tables, Querying Data, User-Defined Functions, Writing a User Defined Functions, Writing a User Defined Aggregate Function.

Text Books:

1. Tom White, "Hadoop: The Definitive Guide", 4th Edition, O'Reilly Media Inc, 2015.
2. Paul C. Zikopoulos, Chris Eaton, Dirk DeRoos, Thomas Deutsch, George Lapis, "Understanding Big Data - Analytics for Enterprise class Hadoop and Streaming Data", McGrawHill, 2012.
3. Kristina Chodorow, "MongoDB: The Definitive Guide-Powerful and Scalable Data Storage", 2nd Edition, O'Reilly Media, 2013.

Suggested Reading:

1. Chuck Lam, Mark Davis, AjitGaddam, "Hadoop in Action", Manning Publications Company, 2016.
2. Alex Holmes," Hadoop in Practice", Manning Publications Company, 2012.
3. Alan Gates, "Programming Pig", O'Reilly Media Inc, 2011.
4. Edward Capriolo, Dean Wampler, and Jason Rutherglen, "Programming Hive", O'Reilly Media Inc, October 2012.
   VigneshPrajapati, "Big data Analytics with R and Hadoop", Packt Publishing, November 2013.

16MC E114

E-COMMERCE

Instruction	3 L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
Continuous Internal Evaluation	30 Marks
Credits	3

Objectives:

Students will:

1. Learn basics of E-Commerce.
2. Design the E-Commerce Network Infrastructure.
3. Study and the E-Commerce Security Issues and its solutions.
4. Learn the Various electronic Payment options.
5. Apply the various Electronic Advertisements.
6. Use the basics of M Commerce.

Outcomes:

After completion of the course the students would be able to:

1. Apply knowledge of Basics on E-Commerce and its Applications.
2. Obtain knowledge on E-Commerce Network Infrastructure.
3. Get Knowledge on E-Commerce Security Issues and its solutions.
4. Apply exposure on various electronic Payment systems.
5. Use the obtain knowledge on various Electronic Advertisements.
6. Gets Exposure on the basics of M Commerce.

Unit-I

Electronic Commerce: Introduction, definition, benefits, impact, classifications, Applications, Business models.

Electronic Data Interchange: Building blocks of EDI, Value added networks, Benefits of EDI, Applications of EDI.

Unit-II

Architecture: Introduction to Architecture and Frameworks. **Network Infrastructure**: LAN, Ethernet, WAN, Internet, TCP/IP Reference Models, Domain Name Servers (DNS), Internet and Industry Structure.

Information Distribution and Messaging: FTP and its Applications, e-mail, WWW Server, HTTP, Web Server Implementation.

Unit-III

Information Publishing Technology: Publishing, Web Browsing, HTML, CGI, Multimedia and its Objects, Virtual Reality Modelling Language (VRML). **Securing Business on Internet**: Vulnerable, Security policy and Procedures. Site Security, Protecting the Network, Firewalls, Securing the Web (HTTP) Service.

Securing the Network Transactions : Transaction Security, Cryptology, Cryptographic Algorithm, Public-Key Algorithm, Authentication Protocols, Digital Signature.

Unit-IV

Electronic Payment Systems: Introduction, Online-Payment Systems, Pre-Paid, Post Paid, Requirements Metrics of a Payment System. Search Engine and Directory services.

Internet Advertising: Introduction, Competitive advertising media, Models of Internet Advertising, Banner, Sponsoring, Screen saver, Push Broadcasting, Corporate Web Sites.

Unit-V

Mobile Commerce : Introduction, Benefits, Frameworks, Agents in Electronic Commerce, Types, Agent Technologies, Agent Standards and Protocols, Agent Applications.

Text Book:

1. Bharat Bhasker "Electronic Commerce: Framework, Technologies and Applications", Tata McGraw-Hill Education, 2006.

Suggested Reading:

1. Ravi Kalakota& AB.B. Whinston – "Frontiers of Electronic Commerce ", Pearson Education, India 1999.
2. Daniel Minoli, Emma Minoli : "Web Commence Technology Handbook", Tata McGraw Hill, 2007.

16MC E115

MOBILE COMPUTING

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
Continuous Internal Evaluation	30 Marks
Credits	3

Objectives:

Students will:

1. Learn the basic concepts of Data Communications.
2. Study about the telecommunications and broadcasting systems.
3. Use the concepts of Wireless LANs.
4. Have knowledge of Mobile Technologies.
5. Learn Various wireless standards.
6. Apply the features of different mobile OS and Mobile Applications.

Outcomes:

After completion of the course the students would be able to:

1. Gain Good Knowledge on Data Communications.
2. Have knowledge of telecommunications and broadcasting systems.
3. Awareof Wireless Transmissions and Protocols.
4. Acquire the knowledge of Mobile Technologies.
5. Implement Various wireless standards.
6. Develop mobile applications.

Unit-I

Introduction and applications of mobile computing, Wireless transmission: Frequencies, Signals, Antennas, Signal Propagation, Multiplexing, Modulation, Spread spectrum, Cellular systems. Medium Access Control, SDMA, FDMA, TDMA, CDMA, Comparisons.

Unit-II

Telecommunication system: GSM, DECT, TDMA, TETRA, UMTS & IMT-2000.
Satellite systems: Applications, Basics, routing, localization, Handover.
Broadcast systems: Cyclic representation of data, Digital audio Broad casting, Digital video Broadcasting, Convergence of Broadcasting and mobile communication.

Unit-III

Wireless LAN: Infrared Vs Radio Transmission, Infrastructure and Ad hoc Networks, IEEE 802.11, HIPERLAN, Bluetooth.

Unit-IV

Mobile IP, Dynamic Host Configuration Protocol, Mobile Adhoc Networks, Mobile Transport Layer, Traditional TCP, Classical TCP improvements, TCP over 2.5/3G Wireless Networks, Performance Enhancing Proxies.

Unit-V

File systems, WWW, Wireless Application Protocol.
Introduction to Android and IOS, Mobile Applications: PhoneGap, Monotouch, Mono and Derby.

Text Book:

1. JochenM.Schiller, "Mobile Communications", 2nd Edition, Pearson Education, India 2003. (Unit I – V)(Unit-V: Chapter 10: File systems, WWW, WAP).
2. Jeff McWheter, Scott Gowell, "Professional Mobile Application Development", Wiley India Pvt. Ltd. – 2013 (Unit – V: Chapter 6, 7, 11 and 12).

Suggested Reading:

1. Dharma P. Agarwal, Qing An Zeng, "Introduction to wireless and Mobile systems", 2nd Edition, Thomas India, 2007.
2. Frank Adelstien, Sandeep K.S.Gupta, "Fundamentals of Mobile and Pervasive Computing", Tata McGraw Hill, 2005.
3. Ivan Stojmenovic, "Handbook of Wireless and Mobile Computing", Wiley India, 2006.

16MC E 116

CYBER FORENSICS

Instruction	3 L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
Continuous Internal Evaluation	30 Marks
Credits	3

Objectives:

Student will:

1. Understand the cyberspace.
2. Understand the forensics fundamentals.
3. Understand the evidence capturing process.
4. Understand the preservation of digital evidence.

Outcomes:

After completion of the course the students would be able to:

1. Get the Cyberspace concepts.
2. Use fundamentals of forensics.
3. Apply evidence capturing process.
4. Preserve the digital evidence.

Unit - I:

Computer Forensics Fundamentals: Introduction to Computer Forensics, Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps Taken by Computer Forensics Specialists, Who Can Use Computer Forensic Evidence? Types of Computer Forensics Technology : Types of Military Computer Forensic Technology, Types of Law Enforcement Computer Forensic Technology, Types of Business Computer Forensics Technology.

Unit- II:

Computer Forensics Evidence and Capture: Data Recovery: Data Recovery Defined, Data Backup and Recovery, The Role of Backup in Data Recovery, The Data-Recovery Solution, Case Histories. Evidence Collection and Data Seizure: Why Collect Evidence?, Collection Options, Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collecting and Archiving, Methods of Collection, Artifacts, Collection Steps, Controlling Contamination: The Chain of Custody.

Unit - III:

Duplication and Preservation of Digital Evidence: Preserving the Digital Crime Scene, Computer Evidence Processing Steps, Legal Aspects of Collecting And

Preserving Computer Forensic Evidence. Computer Image Verification and Authentication : Special Needs of Evidential Authentication, Practical Considerations, Practical Implementation.

Unit - IV:

Computer Forensics Analysis: Discovery of Electronic Evidence: Electronic Document Discovery: A Powerful New Litigation Tool, Identification of Data: Timekeeping, Time Matters,Forensic Identification and Analysis of Technical Surveillance Devices. Reconstructing Past Events: How to Become a Digital Detective, Useable File Formats, Unusable File Formats, Converting Files. Networks: Network Forensics Scenario, A Technical Approach, Destruction of Email, Damaging Computer Evidence, International Principles Against Damaging of Computer Evidence, Tools Needed for Intrusion Response to the Destruction of Data, Incident Reporting and Contact Forms.

Unit - V:

Current Computer Forensics Tools: Evaluating Computer Forensics Tool Needs, Computer Forensics Software Tools, Computer Forensics Hardware Tools, Validating and Testing Forensics Software.

Text Books:

1. JOHN R. VACCA "Computer Forensics: Computer Crime Scene Investigation", Firewall Media.
2. Nelson, Phillips Enfinger, Steuart "Guide to Computer Forensics and Investigations", 4e, Cengage Learning.

Suggested Reading:

1. Marjie T Britz "Computer Forensics and Cyber Crime", Pearson Education,3rd edition, 2013
2. David Cowen "Computer Forensics", Mc Graw Hill, 2nd edition, 2009
3. Brian Carrier, "File System Forensic Analysis", Addison Wesley, 2005
4. Dan Farmer &WietseVenema ,"Forensic Discovery", Addison Wesley, 2005.

16MC C129

OBJECT ORIENTED SYSTEM DEVELOPMENT LAB

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation	25 Marks
Credits	2

Objectives:

Students will:

1. Learn basic operations of Rational Rose case tool .
2. View and browse the four sections of Rational Rose case tool.
3. Depict and model the diagrams of UML in Rational Rose case tool.
4. Know about the representation of Structural and Dynamic modeling.
5. Understanding the concepts of Architectural modeling and its representation.
6. Submit a technical report of the case study in IEEE format.

Outcomes:

After completion of the course the students would be able to:

1. Understood the browsing and viewing sections of Rational Rose case tool.
2. Gained the knowledge of selecting a case study and converting it to be suitable to model in UML.
3. Gained the knowledge to draw and model the UML diagrams.
4. Gained the practical knowledge of **st**ructural modeling of Object Oriented Applications through UML.
5. Gained the practical knowledge of dynamic modeling of Object Oriented Applications through UML.
6. Gained the knowledge of technical writing and documentation of the case study in IEEE format.

List of Experiments:

1. Use case Diagram
2. Class Diagram
3. Object Diagram
4. Sequence Diagram
5. Collaboration Diagram
6. State chart Diagram
7. Activity Diagram
8. Component Diagram
9. Deployment Diagram

The students should finally submit a technical report on their case study in IEEE format.

Text Book:

1. Ivor Jacbson, Grady Booch, James Rumbaugh, “The Unified Software Development Process”, Pearson Education, India, 2008.

16MC C130

MACHINE LEARNING LAB USING PYTHON

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation	25 Marks
Credits	2

Objectives:

Students will:

1. Learn the basic concepts and techniques of Machine Learning.
2. Develop the skills in using recent machine learning software for solving practical problems.
3. Be familiar with a set of well-known supervised semi-supervised and unsupervised learning algorithms.
4. Do experiments on real-time data for decision making.

Outcomes:

After completion of "**Machine Learning Lab**", the student is expected to:

1. Understand complexity of Machine Learning algorithms and their limitations;
2. Understand modern notions in data analysis oriented computing;
3. Be capable of confidently applying common Machine Learning algorithms in practice and implementing their own.
4. Be capable of performing experiments in Machine Learning using real-world data.

Experiments:

1. Python Datatypes, Variables, Recursive Functions.
2. Strings, Lists, User defined functions, Tuples, Dictionaries.
3. Packages, Libraries of Python.
4. Demonstrating the Data preprocessing techniques.
5. Demonstration on How to get different datasets
6. Write a simple program on Simple Linear Regression
7. Multiple Linear Regression Backward Elimination – Preparation & Automatic Backward Elimination.

Use Decision Tree functions on real time data for

8. C4.5,
9. CART,
10. CHAID
11. Logistic Regression
12. K-Nearest Neighbors
13. Support Vector Machine with different kernals
14. Random Forest Classification

Use clustering functions on real time data for

15. K-Means.
16. Hierarchical Clustering.

Use Association mining functions for

17. Apriori.

Apply Data compression techniques for real time data

18. Linear Discriminant Analysis (LDA).
19. Principal Component Analysis (PCA).

Text Book:

1. **Andreas C. Müller, Sarah Guido,** "ntroduction to Machine Learning with Python: A Guide for Data Scientists**"** O'Reilly Media, edition 1, 2016.

16MC C131

SEMINAR

Instruction	3 Hours per week
Continuous Internal Evaluation	50 Marks
Credits	2

Objectives:

Students will:

1. Prepare a systematic and independent study of the state of the art technological topic in the broad area of his/her specialization.
2. Prepare PPT slides with the write-up and block diagrams of the selected area of study.
3. Present the selected topic and deliver a speech in front of the class and evaluating faculties.

Outcomes:

After completion of the course the students would be able to:

1. Conduct a independent technical study and survey on the selected topic.
2. Prepare a PPT slides presentation.
3. Deliver a speech and presentation of the study topic in front of the class and evaluating faculties.

Oral presentation is an important aspect of technical education. The objective of the seminar is to prepare the student for a systematic and independent study of the state of the art topics in a broad area of his/her specialization.

Seminar topics may be chosen by the students with advice from the faculty members. Students are to be exposed to the following aspects of the seminar presentation.

- Literature Survey.
- Organization of the material.
- Presentation of PPTs.
- Technical writing.

Each student is required to submit one page of synopsis of the seminar talk two days before for display on the notice board. Give a 15 minutes presentation followed by 5 minutes discussions. Submit a report on the seminar topic with a list of references and slides used within a week. Seminars are to be scheduled in the 5th week of the semester. The sessional marks will be awarded to the students by at least two faculty members on the basis of an oral and written presentation as well as their involvement in the discussion.

16MC C132

MAJOR PROJECT WORK

Instruction	6 Hours per week
Semester End Examination	Viva Voce
Continuous Internal Evaluation	100 Marks
Semester End Examination	100 Marks
Credits	12

Objectives:

Students will:

1. Understand the client /user project requirements.
2. Develop a software life cycle mechanism for the given problem scenario
3. Convert the project requirements in a implementable format.
4. Develop test cases and testing scenario to the code generated.
5. Document the entire project work in a IEEE format.

Outcomes:

After completion of the course the students would be able to:

1. Understand to capture project requirements from the client/end users.
2. Understand and implement software life cycle for the given requirements.
3. Design a real time solution for the given software requirement specifications
4. Understand how to develop test cases and design test case scenarios.
5. Document the entire project work in IEEE standards and format.

Sixth (Final) Semester of the MCA course is exclusively meant for Major Project work. Major Project Work has to be carried out by each student individually in a period of 15 weeks of duration. Students should submit a synopsis at the end of 2nd week in consultation with the Project Guide. The synopsis should consist of definition of the problem, scope of the problem and plan of action. After completion of eight weeks students are required to present a Project Seminar on the topic covering the aspects of analysis, design and implementation of the project work to the committee consisting of two faculty members of MCA department in the college along with a guide will evaluate the project and award internal marks.

At the end of the semester the students are required to present their project work before the External Committee for Vive-Voce examination, in which each student will be awarded with marks.