

SYLLABUS FOR M.C.A. 3rd SEMESTER

PAPER : IT 31 : INTERNET AND WEB TECHNOLOGY.

Full marks: 75, Pass Marks: 30, Time : 3 Hrs. Credits: 3

12 Questions will be set two from each module and students will be required to answer six (06) question one from each module.

Course Objectives

This course enables the students:

1.	This Subject is useful for Making own Web page and how to host own web site on internet.
2.	Along with that Students will also learn about the protocols involved in internet technology.

Course Outcomes

After the completion of this course, students are expected to

A.	Identify about the technologies used in internet.
B.	students would have capability to make own web site and host their own web site on internet

Module 01 (Lecture 03)

Introduction to WWW: History, Protocols and programs, secure connections, application and development tools, the web browser, what is server, choices, setting up UNIX and Linux web servers, Logging users, dynamic IP

Module 02(Lecture 08)

Introduction to HTML: The development process, Html tags and simple HTML forms, web site structure
Introduction to XHTML: XML, Move to XHTML, Meta tags, Character entities, frames and frame sets, inside browser. Style sheets: Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, border sand boxes, margins, padding lists, positioning using CSS

Module 03 (Lectures 06)

Javascript: Client-side scripting, what is Javascript, how to develop Javascript, simple Javascript, variables, functions, conditions, loops and repetition

Module 04 (Lecture 07)

Advance script, Javascript and objects, Javascript own objects, the DOM and web browser environments, forms and validations

DHTML: Combining HTML, CSS and Javascript, events and buttons, controlling your browser

Module 05 (Lecture 07)

XML: Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Well formed, using XML with application.XML, XSL and XSLT.

Introduction to XSL, XML transformed simple example, XSL elements, transforming with XSLT

Module 06 (Lecture 07)

PHP : Starting to script on server side, Arrays, function and forms, advance PHP

Databases : Basic command with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs.

Text books:

2. Steven Holzner Title : “Web Technologies, black book”. Jan, 2009, 5th edition, Dreamtech Press
3. P.J. Deitel & H.M. Deitel Pearson. “Web Applications : Concepts and Real World Design”, 2006 Wiley-India

Reference books:

1. Lynn Beighley & Michael Morrison, “Head First PHP & MySQL” - 2009 5th edition Pearson Education
2. Laura Lemay, “Mastering HTML, CSS & Javascript Web Publishing “ - 2016 First edition BPB Publications

PAPER : IT 32 : SOFTWARE ENGINEERING

Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits: 3

12 Questions will be set two from each module and students will be required to answer six (06) questions one from each module.

Course Objectives

This course enables the students:

1.	To understand principles, concepts, methods, and techniques of the software engineering approach to producing quality software (particularly for large, complex systems).
2.	To organize and manage a medium-sized software development project, including project plans and documentation, schedule and cost estimates, and quality assurance activities.
3.	To make effective technical oral and written presentations.
4.	To function effectively as a member of a team engaged in technical work.
5.	To think critically about ethical and social issues in software engineering.

Course Outcomes

After the completion of this course, students are expected to

A.	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
B.	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
C.	An ability to communicate effectively with a range of audiences
D.	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
E.	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Module 01(Lecture 06)

Introduction: Software Crisis, Software Processes, Software life cycle models: Waterfall, Prototype, Evolutionary, Spiral, V- shaped, Agile

Module 02(Lecture 06)

Software Requirement Analysis and Specifications: Problem Analysis, Data Flow Diagrams, Data Dictionaries, Entity-Relationship diagrams, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping.

Module 03(Lecture08)

Software Design: Project Scheduling, Staffing, Software Configuration Management, Cohesion& Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design,UML.

Module 04(Lecture08)

Software Testing: Validation &Verification, Software process, Functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Structural testing: Path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools & Standards.

Module 05(Lecture 08)

Software Project Planning: Software Project Metrics: Size Metrics like LOC, Token Count, Function Count, Cost estimation, static, Single and multivariate models, COCOMOModel, Risk management.

Module 06(Lecture 06)

Software Reliability: Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Calendar time Component, Reliability Allocation. Overview of Quality Standards like ISO 9001
CASE Tools: Concepts, use and application.

Text books: -

3. Roger S. Pressman, “Software Engineering: A practitioner’s Approach”, 7th Edition, TMH,2017.
4. Rajib Mall, Fundamentals of Software Engineering”, 5th Edition, PHI,2018.

Reference books: -

3. Ian Sommerville , “Software Engineering”, 9th Edition, Pearson,2010
4. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, “Fundamental of Software Engineering “2nd Edition, Pearson,2015.

PAPER : IT 33 : WSN& INTERNET OF THINGS

Fullmarks: 75, Pass Marks: 30, Time: 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from each module.

Course Objectives

This course enables the students:

1.	Understand various sources of IoT & M2M communication protocols.
2.	Describe Cloud computing and design principles of IoT.
3.	Become aware of MQTT clients, MQTT server and its programming.
4.	Understand the architecture and design principles of WSNs.
5.	Enrich the knowledge about MAC and routing protocols in WSNs.

After the completion of this course, students are expected to

A.	Describe the OSI Model for the IoT/M2M Systems.
B.	Understand the architecture and design principles for IoT.
C.	Learn the programming for IoT Applications.
D.	Identify the communication protocols which best suits the WSNs

Module 01 (Lecture 07)

IoT Conceptual Framework, IoT Architectural View, Technology Behind IoT, Sources of IoT/M2M communication, Examples of IoT. Modified OSI Model for the IoT/M2M Systems, data enrichment, data consolidation and device management at IoT/M2M Gateway, web communication protocols used by connected IoT/M2M devices, Message communication protocols (CoAP-SMS, CoAP-MQ, MQTT, XMPP) for IoT/M2M devices.

Module 02 (Lecture 06)

Internet connectivity, Internet-based communication, IPv4, IPv6, 6LoWPAN protocol, IP Addressing in the IoT, Application layer protocols: HTTP, HTTPS, FTP, TELNET and ports.

Module 03 (Lecture 08)

Introduction, Cloud computing paradigm for data collection, storage and computing, Cloud service models, IoT Cloud-based data collection, storage and computing services using Nimbits.

Module 04 (Lecture 07)

Introduction, Prototyping Embedded device software, Programming Embedded Device Arduino Platform using IDE, Reading data from sensors and devices, Devices, Gateways, Internet and Web/Cloud services software development.

Module 05 (Lecture 08)

Programming MQTT clients and MQTT server. Introduction to IoT privacy and security. Vulnerabilities, security requirements and threat analysis, IoT Security Topography and layered attacker model.

Module 06 (Lecture 06)

Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks. Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture-Sensor Network Scenarios, Optimization Goals and Figures of Merit, Design principles for WSNs, Service interfaces of WSNs Gateway Concepts.

Text books:

1. RajKamal, "Internet of Things-Architecture and design principles", McGraw Hill Education.
2. Holger Karl & Andreas Willig, "Protocols And Architectures for Wireless Sensor Networks", John Wiley, 2005.

Reference books:

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, —Wireless Sensor Networks Technology, Protocols, And Applications, John Wiley, 2007.
2. Anna Hac, —Wireless Sensor Network Designs, John Wiley, 2003.

PAPER : IT 34 : DATA MINING

Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) questions one from each module.

Course Objectives

This course enables the students:

1.	To learn the overview of data mining principles and approaches.
2.	This course will introduce the concepts of data warehouse and data mining, which gives a complete description about the principles.
3.	To describe the strengths and limitations of various clustering algorithms and to choose the appropriate algorithm.
4.	Student will be able to understand architectures, applications, design and implementation of data mining and data warehousing concepts.
5.	To learn the concepts of data mining, with illustrations of current state of the art research and applications.

Course Outcomes

After the completion of this course, students are expected to

A.	Understand the functionality of the various data mining and data warehousing component.
B.	Learn the strengths and limitations of various data mining and data warehousing Models.
C.	Explain the analyzing techniques of various data.
D.	Describe different methodologies used in data mining and data warehousing.
E.	Compare different approaches of data warehousing and data mining with various Technologies.

Module 01 (Lecture 08)

Data Mining- Introduction, Data, Types of Data, Data Mining Functionalities, Interestingness of Patterns, Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Data Warehouse, Issues, Data Preprocessing.

Module 02 (Lecture 06)

Data Warehousing- Data warehousing Components, building a Data warehouse, Mapping the Data Warehouse to a Multiprocessor Architecture, DBMS Schemas for Decision Support, Data Extraction, Cleanup and Transformation Tools, Metadata.

Module 03 (Lecture 06)

Business Analysis- Reporting and Query tools and Applications, Tool Categories, The Need for Applications, Online Analytical Processing (OLAP), Multidimensional Data Model, OLAP Guidelines, Multidimensional versus Metarelational OLAP, Categories of Tools, OLAP Tools and the Internet.

Module 04 (Lecture 06)

Association Rule Mining - Mining Frequent Patterns, Associations and Correlations, Mining Methods, Mining various Kinds of Association Rules, Correlation Analysis, Constraint Based Association Mining

Module 05 (Lecture 06)

Classification - Classification and Prediction, Basic Concepts, Decision Tree Induction, Bayesian Classification, Rule Based Classification, Classification by Back propagation, Support Vector Machines Associative Classification, Lazy Learners, Other Classification Methods, Prediction.

Module 06 (Lecture 08)

Clustering and Trends in Data Mining- Cluster Analysis, Types of Data, Categorization of Major Clustering Methods, K-means, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid Based Methods, Model-Based Clustering Methods, Clustering High Dimensional Data Constraint-Based Cluster Analysis, Outlier Analysis, Data Mining Applications.

Text book:

1. Alex Berson and Stephen J. Smith, “Data Warehousing, Data Mining and OLAP”, Tata McGraw – Hill Edition, Thirteenth Reprint 2008.
2. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Third Edition, Elsevier, 2012.

Reference books:

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, “Introduction to Data Mining”, Pearson Education 2007.
2. K. P. Soman, Shyam Diwakar and V. Aja, “Insight into Data Mining Theory and Practice”, Eastern Economy Edition, Prentice Hall of India, 2006.

SYLLABUS FOR M.C.A. ELECTIVE - 2

PAPER :EC-21 : MACHINE LEARNING

Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from each module.

Course Objectives

This course enables the students:

1.	To introduce students to the basic concepts and techniques of Machine Learning.
2.	To have a thorough understanding of the Supervised and Unsupervised learning techniques.
3.	To study the various probabilities-based learning techniques.
4.	To understand graphical models of machine learning algorithms.

Course Outcomes

After the completion of this course, students are expected to:

A.	Distinguish between, supervised, unsupervised and semi-supervised learning.
B.	Apply the apt machine learning strategy for any given problem.
C.	Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem.
D.	Design systems that use the appropriate graph models of machine learning
E.	Modify existing machine learning algorithms to improve classification efficiency.

Module 01(Lectures 10)

Introduction: Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants – Perceptron – Linear Separability – Linear Regression.

Module 02(Lectures 10)

Linear Models: Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines.

Module 03 (Lectures 10)

Tree and Probabilistic Models: Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – Nearest Neighbour Methods – Unsupervised Learning – K means Algorithms – Vector Quantization – Self Organizing Feature Map.

Module 04 (Lectures 03)

Dimensionality Reduction: Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization.

Module 05 (Lectures 03)

Evolutionary Models: Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting Lost Example – Markov Decision Process

Module 06 (Lectures 06)

Graphical Models: Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods.

Text Books: -

1. Stephen Marsland, “Machine Learning – An Algorithmic Perspective”, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2015.
2. Tom M Mitchell, “Machine Learning”, First Edition, McGraw Hill Education, 2017.

Reference Books:-

1. Peter Flach, “Machine Learning: The Art and Science of Algorithms that Make Sense of Data”, First Edition, Cambridge University Press, 2012.
2. Jason Bell, “Machine learning – Hands on for Developers and Technical Professionals”, First Edition, Wiley, 2014.

PAPER :EC-22 : DIGITAL FORENSIC.

Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from each module.

Course Objectives

This course enables the students:

1.	Understand the fundamental of forensics
2.	Have in depth knowledge of relationship between IT and Forensics
3.	Study different aspects of digital evidences

Course Outcomes

After the completion of this course, students are expected to

A.	Develop computer forensic awareness
B.	Utilizing the knowledge for investigations in order to solve computer crime
C.	Perform best practices for incidence response
D.	Apply computer forensic tools for investigation

Module 03(Lecture 06)

Mining Data Streams: Stream Data Model – Sampling Data in the Stream – Filtering Streams – Counting Distance Elements in a Stream – Estimating Moments – Counting Ones in Window – Decaying Windows

Module 04(Lecture 06)

Link Analysis and Frequent Item sets: Page Rank –Efficient Computation - Topic Sensitive Page Rank – Link Spam – Market Basket Model – A-priori algorithm – Handling Larger Datasets in Main Memory – Limited Pass Algorithm – Counting Frequent Item sets.

Module 05(Lecture 08)

Clustering: Introduction to Clustering Techniques – Hierarchical Clustering –Algorithms – K-Means – Cure – Clustering in Non – Euclidean Spaces – Streams and Parallelism.

Module 06 (Lecture 04)

Case Study: Advertising on the Web – Recommendation Systems.

Text Books:

1. Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, 3rd Edition,2020.
2. Jiawei Han, Micheline Kamber, Jian Pei, “Data Mining Concepts and Techniques”, Morgan Kaufman Publications, Third Edition,2011.

Reference Books:

1. Ian H.Witten, Eibe Frank “Data Mining – Practical Machine Learning Tools and Techniques”, Morgan Kaufman Publications, 4thEdition,
2. David Hand, HeikkiMannila and Padhraic Smyth, “Principles of Data Mining”, MIT PRESS,2001

PAPER : EC- 35 : CYBER SECURITY.

Fullmarks: 75, Pass Marks: 30, Time : 3 Hrs. Credits:3

12 Questions will be set two from each module and students will be required to answer six (06) question one from eachmodule.

CourseObjectives

This course enables the students:

1.	To understand the knowledge about cyber security.
2.	To define difference between threat, risk, attack and vulnerability.
3.	To provide the concepts of how threats materialize into attacks.
4.	To provide the information that where to find information about threats, vulnerabilities and attacks.
5.	To provide the brief concepts of typical threats, attacks and exploits and the motivations behind them.

Course Outcomes

After the completion of this course, students are expected to

A.	Develop and improve the analytical skills.
B.	Establish the security in computer, network and applications.
C.	Improve the innovation or creativity skills.

D.	Develop problem solving techniques.
E.	Help to protect from cyber-Crime.

Module 01 (Lecture 07)

Introduction to Cyber Security: Introduction -Computer Security - Threats –Harm-Vulnerabilities - Controls - Authentication -Access Control and Cryptography - Web—User Side - Browser Attacks - Web Attacks Targeting Users - Obtaining User or Website Data - Email Attacks

Module 02 (Lecture 07)

Security In Operating System & Networks: Security in Operating Systems - Security in the Design of Operating Systems -Rootkit - Network security attack- Threats to Network Communications - Wireless Network Security - Denial of Service - Distributed Denial-of-Service.

Module 03 (Lecture 06)

Defenses - Security Countermeasures: Cryptography in Network Security - Firewalls - Intrusion Detection and Prevention Systems - Network Management - Databases - Security Requirements of Databases - Reliability and Integrity - Database Disclosure - Data Mining and Big Data.

Module 04 (Lecture 08)

Privacy in Cyberspace: Privacy Concepts -Privacy Principles and Policies -Authentication and Privacy - Data Mining -Privacy on the Web - Email Security - Privacy Impacts of Emerging Technologies - Where the Field IsHeaded.

Module 05 (Lecture 06)

Management and Incidents: Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis - Dealing with Disaster - Emerging Technologies - The Internet of Things - Economics - Electronic Voting - Cyber Warfare- Cyberspace and the Law - International Laws - Cybercrime - Cyber Warfare and Home LandSecurity.

Module 06 (Lecture 08)

Cybercrime and Forensics: Introduction to Cybercrime, Classifications of Cyber Crimes, Local and Global perspectives on Cybercrime, Cyber offences, Cyberstalking, Cybercrime and cloud computing, cybercrimes through hand held devices., Tools and Methods used in Cybercrime, phishing, steganography, attacks on wireless network. Understanding Digital forensic, Forensics science, computer forensics, and digital forensics.

Text Books: -

1. Godbole Nina, BelapureSunit, “Cyber Security”, Wiley Indian Print,2014.
- 2.Michael E Whitman and Herbert J Mattord, Principles of Information Security, Vikas Publishing House, New Delhi,2003

Reference Books: -

- 1.Deva Vasu, “Cyber Crimes and Law Enforcement”, Commonwealth Publishers, New Delhi, 2003.
- 2.Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, “Security in Computing”, 5th Edition , Pearson Education ,2015