### I-SEMESTER

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*Fulltime Project Work

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Grand Total: 73 650 1050 1700

*Fulltime Project Work
PREREQUISITE: A Course on "Computer Networks"

COURSE DESCRIPTION:
Computer networks and protocols; Data Link Layer, LAN and Network routing; Transport Layer and internet protocols; Wireless and Optical Networks; MANETS and wireless Sensor Networks.

COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1. Gain knowledge on principles of computers, network topologies, routing mechanisms.
CO2. Analyze the computer network with suitable network protocols and routing algorithms.
CO3. Apply algorithms for a given network to calculate least-cost and non-least cost paths.

UNIT I: REVIEW OF COMPUTER NETWORKS AND FOUNDATION OF NETWORKING PROTOCOLS
(Periods:11)
Review of Computer Networks and the Internet- The Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay and Loss in Packet, packet-Switched Networks.

UNIT II: DATA LINKS, TRANSMISSION AND ROUTING
(Periods:12)
The Link Layer and Local Area Networks- Link Layer Introduction and Services, Error-Detection and Error-Correction techniques, Multiple Access Protocols, Link Layer Addressing, Link Virtualization.

UNIT III: TRANSPORT LAYER PROTOCOLS AND NETWORK APPLICATIONS
(Periods:12)

UNIT IV: WIRELESS NETWORKS AND OPTICAL NETWORKS
(Periods:11)
**Optical Networks and WDM Systems**—Overview of Optical Networks, Basic Optical Networking Devices, Large-Scale Optical Switches, Optical Routers

**UNIT V: MANETS AND WIRELESS SENSOR NETWORKS**   (Periods:12)

**VPNs, Tunneling and Overlay Networks**—Virtual Private Networks (VPNs), Multiprotocol Label Switching (MPLS), Overlay Networks.


**Total Periods:58**

**TEXT BOOKS:**

**REFERENCE BOOKS:**
M. Tech. (CN&IS) I-Semester
(14MT20507) INFORMATION SECURITY

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PRE-REQUISITE: A Course on “Computer Networks”

COURSE DESCRIPTION:
Introduction to cryptography; message authentication and public key cryptography; Key distribution, user authentication and E-mail security; Internet security, intruders and firewalls

COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1. Gain advanced knowledge in
- Symmetric and asymmetric encryption algorithms
- Key distribution and message authentication in secure network environment
- Hash algorithms and digital signature techniques
- Multiple access techniques and networking
- Firewall basing and configuration

CO2. Apply the appropriate cryptography scheme & security mechanism for information systems.

UNIT-I: INTRODUCTION TO CRYPTOGRAPHY  (Periods:11)
Symmetric Block Encryption- Symmetric Block Encryption Algorithms-DES, Triple-DES, AES, Cipher Block Modes of Operation

UNIT-II: PUBLIC-KEY ENCRYPTION  (Periods:11)
Message Authentication-Approaches to Message Authentication, Simple hash function, Secure Hash Functions -SHA-1, SHA-512, Message Authentication Codes and HMAC

UNIT-III: NETWORK SECURITY APPLICATIONS  (Periods:12)
Key Distribution and User Authentication- Kerberos, Key Distribution Using Asymmetric Encryption, X.509 Certificates, Public Key Infrastructure
Electronic Mail Security-Pretty Good Privacy, Key Rings, Multipurpose Internet Mail Extensions, S/MIME - Functionality, Messages and certificate processing.

UNIT-IV: INTERNET SECURITY  (Periods:11)
IP Security- Overview, policy, Encapsulating Security Payload and IKE
Network management security- Concepts of SNMP, SNMPv1 and SNMPv3
UNIT-V: SYSTEM SECURITY (Periods: 12)  
Intruders- Intrusion Techniques, Intrusion Detection, Malicious Software - Types, Viruses, Virus Countermeasures, Worms  
Firewalls- Firewall Characteristics, Firewall Basing, Types of Firewalls, Firewall Location and Configurations.  

Total Periods: 57

TEXTBOOKS:

REFERENCE BOOKS:
M. Tech (CN&IS) I-Semester  
(14MT20508) MOBILE COMPUTING

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PRE-REQUISITE: A Course on “Computer Networks”.

COURSE DESCRIPTION
GSM architectures, Wireless MAC, and CDMA Systems; Mobile IP Layers; Databases, Data Dissemination and Broadcasting Systems; Synchronization in mobile Devices and mobile computing systems; Mobile application languages and operating systems.

COURSE OUTCOMES:  
On successful completion of this course the students will be able to:
CO1. Gain advanced knowledge in  
- GSM and CDMA Systems.  
- Mobile IP, and Mobile TCP  
- Databases and Data Dissemination  
- Mobile data Synchronization  
CO2. Analyze various methods in data dissemination and broadcasting systems  
CO3. Design Mobile File Systems for various Mobile Devices  
CO4. Apply appropriate techniques and tools to design and implement mobile applications.

UNIT- I: GSM AND SIMILAR ARCHITECTURES & WIRELESS MAC AND CDMA – BASED COMMUNICATION  (Periods:12)  

UNIT- II: MOBILE IP NETWORK LAYER & MOBILE TRANSPORT LAYER  (Periods:14)  

UNIT –III: DATABASES AND DATA DISSEMINATION AND BROADCASTING SYSTEMS  (Periods:14)  
DATA DISSEMINATION AND BROADCASTING SYSTEMS: Communication Asymmetry, Classification of Data-Delivery Mechanisms, Data Dissemination Broadcast Models, Selective Tuning and Indexing Techniques.

UNIT – IV: MOBILE SYNCHRONIZATION IN MOBILE COMPUTING SYSTEMS AND MOBILE DEVICES: SERVER AND MANAGEMENT (Periods:10)


UNIT-V MOBILE APPLICATION LANGUAGES- XML, JAVA, J2ME, AND JAVACARD AND MOBILE OPERATING SYSTEMS (Periods:10)


MOBILE OPERATING SYSTEMS: Operating System, Palm OS, Windows CE, Symbian OS, Linux for Mobile Devices

Total Periods:60

TEXT BOOKS:

REFERENCE BOOKS:
M. Tech (CN&IS) - I Semester  
(14MT16301) NETWORK MANAGEMENT

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PRE-REQUISITES: Courses on “Computer Networks” and “Network Security”

COURSE DESCRIPTION:
Principles of Network Management; SNMPv1, SNMPv2, SNMPv3 Network management and Communication; Remote Monitoring and Telecommunication management Network; Broadband and Web based Management

COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1. Gain Knowledge on SNMP, Telecommunications Networks and remote monitoring.
CO3. Apply NMS tools such as JMX Architectures, JIRO platforms in web based Enterprise Management.

UNIT-I: NETWORK MANAGEMENT OVERVIEW AND BASIC FOUNDATIONS  
(Periods:12)
Basic Foundations- Network Management Standards, Network Management Models, Organizational Model, Information Model, Communication Model, Functional Model, ASN.1, Encoding Structure

UNIT-II: SNMPv1 NETWORK MANAGEMENT AND COMMUNICATION MODEL  
(Periods:12)
SNMPv1- History of SNMP Management, internet organization and standard, SNMP Model, Organization and Information models, Communication and Functional models in SNMPv1

UNIT-III: SNMPv2 & SNMPv3 NETWORK MANAGEMENT  
(Periods:12)
SNMPv2- Major changes in SNMPv2, System Architecture, and SNMPv2 structure of Management Information, SNMPv2 Management Information Base, and SNMPv2 protocol.
SNMPv3- Key features, SNMPv3 architecture, applications, Management Information Based, User based security model, Access control

UNIT-IV: RMON AND TMN  
(Periods:10)
Remote Monitoring- Introduction to remote monitoring, RMON Structure of Management Information and Management Information Base, RMON1, RMON2, ATM Remote monitoring and Case study
Telecommunications Management Network-Introduction to TMN, Operations Systems, TMN conceptual model, TMN Architecture, TMN integrated view

UNIT-V: BROAD BAND AND WEB-BASED MANAGEMENT (Periods:12)

Broadband Management- Network and Services, ATM Technology, ATM Network Management, MPLS Network Technology.


Total Periods:58

TEXT BOOKS:

REFERENCE BOOKS:
**M. Tech. (CN & IS) I-Semester**  
**14MT16302 WIRELESS NETWORKS**

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**PRE-REQUISITE:** A Course on "Computer Networks".

**COURSE DESCRIPTION:**  
Cellular and satellite systems, Network Protocols, and traffic theories; Mobile Radio propagation, channel coding and error control; Multiple radio access and multiple division techniques; Adhoc and sensor networks, wireless LAN, Man and PAN

**COURSE OUTCOMES:**  
On successful completion of this course the students will be able to:

CO1. Gain knowledge in
- Different types of wireless Network Standards
- Radio wave propagation in wireless environment
- Multiple access techniques and networking
- Multicarrier modulation

CO2. Analyze the concepts of routing to design new routing protocols.

CO3. Apply concepts of queuing models to improve the performance of wireless network communication.

**UNIT – I: INTRODUCTION, PROBABILITY, STATISTICS, AND TRAFFIC THEORIES**  
(Periods:12)  


**UNIT – II: MOBILE RADIO PROPAGATION, CHANNEL CODING AND ERROR CONTROL**  
(Periods:11)  

Channel Coding and Error Control- Introduction, Liner Block Codes, Cyclic Codes, Cyclic Redundancy Check, Convolutional Codes, Interleaver, Turbo Codes, ARQ Techniques.

**UNIT –III: MULTIPLE RADIO ACCESS, MULTIPLE DIVISION TECHNIQUES FOR TRAFFIC CHANNELS**  
(Periods:13)  

Multiple Division Techniques for Traffic Channels- Introduction, Concepts and Models for Multiple Divisions, Modulation Techniques

UNIT – IV: AD HOC NETWORKS AND SENSOR NETWORKS  (Periods:12)


UNIT – V: WIRELESS LANS, MANS, AND PANS, RECENT ADVANCES  (Periods:12)

Wireless LANs, MANs, and PANS-Introduction, Wireless Local Area Networks (WLANs), Enhancement for IEEE 802.11 WLANs, Wireless Metropolitan Area Networks (WMANs) using WiMAX and Mesh Networks, Mesh Networks, Wireless Personal Area Networks (WPANs) and Zigbee, Cognitive Radio

Total Periods:60

TEXT BOOKS:

REFERENCE BOOKS:
M Tech (CN&IS) - I Semester  
(14MT20503) DATA WAREHOUSING AND DATA MINING  
(Elective-1)

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PRE-REQUISITE: A course on “Database Management systems”

COURSE DESCRIPTION:  
Introduction to Data Warehouse and data mining; Data preprocessing, mining and associations; Data Classification and prediction; Cluster Analysis; Mining Data streams – Time series, Spatial, Multimedia and text data

COURSE OUTCOMES:  
On successful completion of this course the students will be able to:  
CO1. Gain knowledge in:  
- Data warehousing and enterprise intelligence in industry and government.  
- Data mining algorithms.  
- Association Rules, Classification and Prediction and Cluster Analysis.  
CO2. Analyze the results generated from the constructed artifact to determine if patterns of clusters were detected in the Data sets.  
CO3. Develop solutions to problems related to frequent item sets.  
CO4. Apply data mining techniques in mining time series, spatial data, World Wide Web, text and multimedia data

UNIT-I: INTRODUCTION TO DATA WAREHOUSE AND DATA MINING  
(Periods:10)  
Data Warehouse- A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehouse to Data Mining.  
Data Mining – Kinds of Data, Data Mining Functionalities, Primitives, Major Issues in Data Mining

UNIT-II: DATA PREPROCESSING, MINING FREQUENT PATTERNS AND ASSOCIATIONS  
(Periods:10)  
Data Preprocessing - Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction.  
Mining Frequent Patterns and Associations - Efficient and Scalable Frequent Item set Mining Methods, Mining various kinds of Association Rules, Constraint based association mining.

UNIT-III: CLASSIFICATION AND PREDICTION  
(Periods:09)  
Issues regarding classification and prediction, classification by decision tree induction, Bayesian classification, Rule based classification, classification by Back propagation, Prediction, Accuracy and Error Measures.
UNIT-IV: CLUSTER ANALYSIS (Periods:13)
Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods- Partitioning Methods, Hierarchical Methods, Density based Methods, Grid based method, Model based clustering methods, Clustering high dimensional data and Outlier analysis.

UNIT-V: MINING STREAM, TIME SERIES, SPATIAL DATA, MULTIMEDIA, TEXT AND WEB MINING (Periods:12)
Mining Data Streams, Mining Time Series Data, Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

Total Periods:54

TEXT BOOK:

REFERENCE BOOKS:
M. Tech (CN&IS) I-Semester
(14MT22504) SOFTWARE SECURITY ENGINEERING
(Elective-1)

### PRE-REQUISITES:
Courses on “Software Engineering,” and “Network Security”.

### COURSE DESCRIPTION:
Introduction to software security; requirement engineering for secure software; Security principles in Software development life cycle; security and complexity; governance and security

### COURSE OUTCOMES:
*On successful completion of this course the students will be able to:*

**CO1.** Gain knowledge on security issues in:
- Requirement Engineering
- Architecture and Design
- Coding, Testing and System Assembling

**CO2.** Analyze complex software projects to describe security risks and mitigation techniques.

**CO3.** Acquire skills to solve the different security risks arising at different levels of software development life cycle.

**CO4.** Contribute to research issues in software security by developing new methodologies.

**CO5.** Apply appropriate attack patterns and modern tools to analyze the secure software architecture and design

### UNIT-I: IMPORTANCE OF SECURITY IN SOFTWARE
(Periods:12)


**What Makes Software Secure**-Introduction, Properties of Secure Software, Influencing the security properties of software, Asserting and specifying desired security properties

### UNIT-II: REQUIREMENTS ENGINEERING
(Periods:10)

Requirements engineering for secure software-Introduction, Misuse and abuse cases, the SQUARE process Model, SQUARE sample outputs, Requirements elicitation, and Requirements prioritization.

### UNIT-III: SECURITY PRINCIPLES IN SDLC
(Periods:12)

Secure coding and Testing-Introduction, Code analysis, Software Security testing, Security testing considerations throughout the SDLC

UNIT-IV: SECURITY AND COMPLEXITY (Periods:10)
System Assembly Challenges-Introduction, Security failures, functional and attacker perspectives for security analysis in web services and identity management, system complexity drivers and security

UNIT-V: GOVERNANCE AND MANAGING (Periods:12)
Governance and Managing for More Secure Software: Introduction, Governance and security, adopting an enterprise software security framework, how much security is enough, Security and project management, Maturity of Practice.

Total Periods:56

TEXTBOOKS:

REFERENCE BOOKS:
M Tech (CN&IS) I-Semester
(14MT16303) DATABASE SECURITY (Elective-1)

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PRE-REQUISITE: A course on “Database Management Systems”

COURSE DESCRIPTION:
Database and information security architecture and operating systems security; User Administration; Database application security models and virtual private databases; auditing application data and database activities; case studies

COURSE OUTCOMES:
On successful completion of this course the students will be able to:

CO1. Gain knowledge in
- Information System Security
- Design of Secure Software
- Database System Models and Applications.
- Need for database security architecture.

CO2. Analyze fundamental database security threats, vulnerabilities and associated risks.

CO3. Implement secure User accounts, and VPDs using database management system technologies

CO4. Create database security architecture.

UNIT-I: SECURITY ARCHITECTURE AND OPERATING SYSTEM SECURITY FUNDAMENTALS (Periods:11)


UNIT-II: ADMINISTRATION OF USERS AND Profiles, PASSWORD POLICIES, PRIVILEGES, AND ROLES (Periods:11)

Administration of Users - Introduction, Documentation of user administration, Operating system authentication, Creating users, Creating SQL server users, Removing users, Modifying users, Default users, Remote users, Database links, Linked servers, Remote servers, Practices for administrators and Managers, Best practices.


UNIT-III: SECURITY MODELS AND VIRTUAL PRIVATE DATABASES (Periods:11)

Virtual Private Databases—Introduction, Overview of VPD, Implementing VPDs, Implementing oracle VPD, Viewing VPD policies, VPD application context using the Data Dictionary and Policy Manager, Implementing Row- and Column level Security with SQL Server and Database Auditing Models

UNIT-IV: DATA AUDITING AND AUDITING DATABASE ACTIVITIES

(Periods:12)

Application Data Auditing—Introduction, DML action auditing architecture, Oracle triggers, SQL server triggers, Fine-grained auditing with oracle, DML statement audit trail, auditing application errors with oracle.

Auditing Database Activities—Using oracle database activities, Creating DLL triggers with oracle, Auditing database activities with oracle, Auditing server activity with Microsoft SQL server 2000, Implementing AQL profiler, Security auditing with SQL server

UNIT-V: CASE STUDIES

(Periods:10)

Security and Auditing Project Cases: SQL Injection, Develop an Online Database, Taking Care of Payroll, Tracing Town Contracts and Database Changes, Developing a Secured Authorization Repository.

Total Periods:55

TEXTBOOKS:

REFERENCE BOOKS:
M. Tech (CN&IS) I-Semester
(14MT16304) SOFTWARE TESTING TECHNIQUES (Elective-1)

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PRE-REQUISITES: Courses on “Object Oriented Analysis and Design through UML” and “Software Engineering”

COURSE DESCRIPTION:
Testing fundamentals, flow graphs and path testing; transaction and data flow testing; Domain testing; Logic Based Testing, and graphs matrices; Testing Tools – QTP, JMeter, and LoadRunner

COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1. Gain knowledge on
   • Flow graphs and Path testing.
   • Paths and states.
   • Transaction Flow Testing and Domain Testing.
   • Software Testing Tools like Load runner and QTP.
CO2. Design and develop test cases for analyzing the software at different levels.
CO3. Test real time software applications using the automated testing tools like load runner, and QTP.
CO4. Apply the knowledge of modern testing tools for the real world environment.

UNIT-I: INTRODUCTION TO TESTING AND PATH TESTING (Periods:11)
   Introduction-Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs.
   Flow graphs and Path testing-Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT-II: TRANSACTION AND DATA FLOW TESTING (Periods:11)
   Transaction Flow Testing-Transaction flows, transaction flow testing techniques.
   Dataflow Testing-Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing

UNIT-III: DOMAIN TESTING, PATH PRODUCTS AND REGULAR EXPRESSIONS (Periods:12)
   Domain Testing-Domains and paths, Nice and ugly domains, domain testing, domains and interfaces testing, domains and testability
   Paths, Path products and Regular expressions-Path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.
UNIT-IV: LOGIC BASED TESTING, STATE GRAPHS, MATRICES AND TRANSITION TESTING  (Periods:12)
Logic Based Testing-Overview, decision tables, path expressions, kv charts, specifications, State, State Graphs and Transition testing, state graphs, good and bad state graphs, state testing, Testability tips.
Graph Matrices and Application-Motivational overview, matrix of graph relations, power of a matrix, node reduction algorithm
UNIT-V: TESTING TOOLS  (Periods:12)

Total Periods:58

TEXT BOOKS:

REFERENCE BOOKS:
M. Tech. (CN & IS) - I Semester
(14MT16321) WIRELESS NETWORKS & INFORMATION SECURITY LAB

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PRE-REQUISITES: Courses on “Wireless Networks” and “Information Security”

COURSE DESCRIPTION:
Develop programs for simulating wired and wireless computer network protocols and implement using network simulation tools.
Design and implement programs for Information security algorithms DES, RSA, AES, SHA and DSS using network simulators.

COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1. Design wireless networking models and validate new protocols.
CO2. Analyze the typical performance measures of network models.
CO3. Compare and contrast various performance measures of different network models.
CO4. Develop new simulation models of protocols and mechanisms

List of Exercises in Wireless Networks:
(Total no. of Lab exercises to be performed: 05)
1. Simulate TCP-SACK (Selective Acknowledgement Protocol) Protocol for Wireless Networks
4. Simulate Destination Sequenced Distance Vector (DSDV) Routing Algorithm for AdHoc Networks.
5. Simulate Ad Hoc on Demand Distance Vector (AODV) Routing Algorithm for AdHoc Networks.
**List of Exercises in Information Security:**
(Total no. of Laboratory exercises to be performed: 07)
1. Write a program to encrypt and decrypt given text using DES symmetric key algorithm.
2. Write a program to encrypt and decrypt given text in public key cryptographic system using RSA.
3. Write a program to encrypt and decrypt given text using AES algorithm with 128-bit key.
4. Write a program to implement port monitoring using NMAP.
5. Write a program to generate a Hash code for the given text using SHA-512 algorithm.
7. Configure Firewall filters to accept/reject URLs/web content.
M. Tech (CN & IS) – I Semester  
(14MT10310) RESEARCH METHODOLOGY  
(Common to all M. Tech. Programs)

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PRE-REQUISITES: --

COURSE DESCRIPTION:
Fundamentals of research work - research problem and design; Data collection, Analysis and hypothesis; Statistics in Research; Interpretation and Report Writing.

COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1. Gain knowledge on research approaches, research process and data collection.
CO2. Identify and analyze research problem.
CO3. Solve the research problems using statistical methods.
CO4. Carry out literature survey and apply good research methodologies for the development of scientific/technological knowledge in one or more domains of engineering.
CO5. Learn, select and apply modern engineering tools to complex engineering activities.
CO6. Write effective research reports.

DETAILED SYLLABUS:
UNIT-I: INTRODUCTION TO RESEARCH METHODOLOGY (Periods:07)
Objectives and Motivation of Research, Types of Research, Research Approaches, Research Process, Criteria of good Research.

UNIT-II: RESEARCH PROBLEM AND DESIGN (Periods:09)

UNIT-III: DATA COLLECTION, ANALYSIS, AND HYPOTHESIS (Periods:09)
Different Methods of Data Collection, Processing Operations, Types of Analysis, Basic Concepts of Testing of Hypothesis, Hypothesis Testing Procedure

UNIT-IV: STATISTICS IN RESEARCH (Periods:09)
Review of Statistical Techniques- Mean, Median, Mode, Geometric and Harmonic Mean, Standard Deviation, Measure of Asymmetry. Normal Distribution, Chi-Square Test as a Test of Goodness of Fit.

UNIT-V: INTERPRETATION AND REPORT WRITING (Periods:06)
Interpretation – Techniques and Precautions. Report Writing – Significance, Stages, Layout. Types of reports, Precautions in Writing Reports.

Total Periods: 40
TEXT BOOK:

REFERENCE BOOKS:
2. R. Panneerselvam, Research Methodology, PHI learning Pvt. Ltd., 2009
M. Tech (CN&IS) II-Semester
(14MT26301) AD HOC WIRELESS NETWORKS

PRE-REQUISITE: A Course on “Wireless Networks”

COURSE DESCRIPTION:
Ad Hoc Wireless Networks and MAC protocols; Routing Protocols and Multicast Routing in Adhoc wireless networks; Transport Layer and Security Protocols; Quality of Service and energy Management in Ad Hoc Wireless Networks.

COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1. Gain advanced knowledge in
- Issues in ad hoc wireless networks
- MAC Protocols
- Routing Protocols
- TCP over ad hoc wireless networks and Security Protocols

CO2. Analyze complex engineering problems critically for conducting research in ad hoc and sensor networks.


UNIT I: AD HOC WIRELESS NETWORKS & MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS
(Periods:14)
Ad Hoc Wireless Networks-Introduction, Issues in Ad hoc Wireless Networks, Ad hoc Wireless Internet,

UNIT II: ROUTING PROTOCOLS FOR AD HOC WIRELESS NETWORKS & MULTICAST ROUTING IN AD HOC WIRELESS NETWORKS  (Periods:12)

UNIT III: TRANSPORT LAYER AND SECURITY PROTOCOLS FOR AD HOC WIRELESS NETWORKS
(Periods:12)
Transport Layer for Ad Hoc Wireless Networks-Issues in Designing a Transport layer protocol for Ad hoc Wireless Networks, Design goals of a Transport layer protocol for Ad hoc Wireless Networks, Classification of
Transport layer solutions, TCP over Ad hoc Wireless Networks, Other Transport layer protocols for Ad hoc Wireless Networks.


**UNIT IV: QUALITY OF SERVICE IN AD HOC WIRELESS NETWORKS**

(Peiods: 10)


**UNIT-V: ENERGY MANAGEMENT IN AD HOC WIRELESS NETWORKS**

(Peiods: 10)

Energy Management in Ad Hoc Wireless Networks—Introduction, Need for energy management in Ad Hoc Wireless Networks, classification of energy management schemes, Battery Management Schemes, Transmission power management schemes, System power management schemes.

**Total Periods: 58**

**TEXT BOOKS:**


**REFERENCE BOOKS:**

M. Tech (CN&IS) II-Semester
(14MT26302) COMPUTER FORENSICS

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PRE-REQUISITES: Courses on “Computer Networks” and “Information Security”

COURSE DESCRIPTION:
Overview of Computer forensics and cyber crime; Evidence collection and data seizure; Data Analysis and validation; Mobile device forensics; Cyber crime, cyber laws and forensic report generation

COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1. Gain advanced knowledge in
   - Computer Forensic Fundamentals and Technologies
   - Evidence and Data Capture and Computer Forensic Analysis
   - Application of forensics in various areas and Cybercrime and Cyber Laws
CO2. Analyze the strengths and weaknesses of cyber laws in terms of global and Indian context.
CO3. Develop skills to invent forensic tools and to analyze the crime.

UNIT – I: OVERVIEW OF COMPUTER FORENSICS TECHNOLOGY AND CYBERCRIME
(Periods:11)
Computer Forensics Fundamentals- Introduction to computer forensics, Use of computer forensics in Law Enforcement, Benefits of professional forensics methodology, Steps taken by computer forensics specialists.
Types of Computer Forensics Technologies- Types of Military computer forensic technology, Types of law enforcement, Computer forensic Technology, Types of Business Computer Forensic Technology
Introduction to Cybercrime: Introduction to Cybercrime, Cybercrime and Information Security, Cybercriminals, Classification of Cybercrimes.

UNIT – II: COMPUTER FORENSICS EVIDENCE AND CAPTURE
(Periods:12)
UNIT -III: COMPUTER FORENSIC ANALYSIS (Periods:12)
Data Analysis and Validation: Determining what data to collect and analyze, Validating forensic data, Addressing data, hiding techniques, performing remote acquisitions.
Processing Crime and Incident Scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, Mobile Forensic Unit, Processing law enforcement crime, Preparing for a search, Seizing Digital Evidence at the Scene, Storing Digital Evidence

UNIT – IV: FORENSICS IN VARIOUS AREAS (Periods:12)

UNIT – V: CYBERCRIME IN LEGAL PERSPECTIVE AND FORENSIC REPORT GENERATION (Periods:11)
Importance of Cyber Security- Roles and Responsibilities of Engineers in offering Cybersecurity, Cybercrime Investigation and Litigation, Assurance and Compliance Security Audit.

Total Periods:58

TEXT BOOKS:

REFERENCE BOOKS:
M. Tech (CN&IS) II-Semester  
(14MT26303) INTRUSION DETECTION SYSTEMS

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PRE-REQUISITES: Courses on “Computer Networks” and “Network security”

COURSE DESCRIPTION:
Network security monitoring and intrusion detection systems; Enterprise network Instrumentation; Traffic threat assessment and Network incident response; Network forensics; Intrusion prevention

COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1. Gain Knowledge on Intrusion detection systems, security monitoring, Network Forensics principles and Intrusion Prevention system (IPS).
CO2. Analyze, detect, identify and mitigate the security attacks from the network traffic.

UNIT-I: NETWORK SECURITY MONITORING REVISITED AND EXTRUSION DETECTION ILLUSTRATED  
(Periods:12)
Extrusion Detection Illustrated: Intrusion detection defined, Extrusion detection defined, History of Extrusion detection and Extrusion detection through NSM.

UNIT-II: ENTERPRISE NETWORK INSTRUMENTATION AND LAYER-3 NETWORK ACCESS CONTROL  
(Periods:10)
Enterprise Network Instrumentation: Common Packet Capture Methods, PCI Tap, Dual port aggregator Tap, Regenerations and SPAN regeneration taps, Matrix switch, Link Aggregator Tap, Distributed traffic collection with PF Dup-To.
Layer 3 Network Access Control: Internal network Design, ISP sink holes, Enterprise sink holes and Internal intrusion containment.

UNIT-III: TRAFFIC THREAT ASSESSMENT  
(Periods:12)
Traffic Threat Assessment: Assumptions, First cuts, looking for odd traffic, Inspecting individual services through NTP, ISAKMP, ICMP, Secure shell, WhoIs, LDAP, other ports.
UNIT-IV: NETWORK FORENSICS  
(Periods:10)
Collecting network traffic as evidence, protecting and preserving network based evidence, Analyzing network based evidence, presenting and defending conclusions.
Traffic Threat Assessment Case Study, Malicious Bots: IRC bots, communication and identification, server and control channels, exploitation and bot admin.

UNIT-V: INTRUSION PREVENTION OVERVIEW  
(Periods:12)
Intrusion Prevention Overview, Signatures and Actions: Types, Triggers and actions, Operational Tasks: deploying & configuring IPS devices and applications, Monitoring IPS activities, Securing IPS communications, Security in Depth: Defense in depth, internal attack against a Management server and the future of IPS.

Total Periods: 56

TEXT BOOKS:

REFERENCE BOOKS:
M. Tech (CN&IS) II-Semester
(14MT20509) VIRTUALIZATION AND CLOUD COMPUTING

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PRE-REQUISITES: Courses on “Distributed Computing” and “Computer Networks”

COURSE DESCRIPTION:
Introduction to Cloud Computing and virtualization; Map reduce programming; Cloud technologies – Amazon web services, Google App Engine, and Microsoft Azure; Scientific and business applications of Cloud

COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1. Gain Knowledge on the technical foundations of Cloud technology.
CO2. Analyze the Cloud Architectures while developing the internet web applications.
CO3. Solve security issues in cloud applications.
CO4. Get exposure to cloud tools like Microsoft Azure, Google App Engine, and Amazon Web Services.

UNIT- I: VIRTUALIZATION (Periods:13)
VIRTUALIZATION-Introduction to virtualization, Objectives of virtualization, history of virtualization, benefits of virtualized technology, the virtual service desk, related forms of computing, Understanding Hypervisors, Load balancing & Virtualization. Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples-Xen, Para virtualization, VMware, Full Virtualization, Microsoft Hyper-V.

UNIT-II: CLOUD COMPUTING OVERVIEW (Periods:12)
CLOUD COMPUTING ARCHITECTURE-Cloud Reference Model, Types of Clouds, Economics of the Cloud, Open Challenges.

UNIT- III: DATA INTENSIVE COMPUTING: MAP-REDUCE PROGRAMMING (Periods:10)

UNIT-IV: CLOUD TECHNOLOGIES (Periods:10)
UNIT-V: CLOUD APPLICATIONS
(Periods:13)
Scientific Applications, Business and Consumer Applications
ADVANCED TOPICS IN CLOUD COMPUTING—Energy Efficiency in Clouds, Market Based Management of Clouds, InterCloud.

Total Periods: 58

TEXT BOOKS:

REFERENCE BOOKS:
M Tech (CN&IS) II- Semester
(14MT20505) WEB PROGRAMMING

Pre-Requisites: Courses on “Programming in C” and “JAVA”

Course Description:
Introduction to HTML, Cascaded Style sheets and Java Scripting; Dynamic HTML and XML; PHP and Web Forms; Web Applications using PHP and MYSQL

Course Outcomes:
On successful completion of this course the students will be able to:
CO1. Gain knowledge in
  • HTML, CSS styling
  • Dynamic HTML with Java Script and XML
  • PHP dynamic programming and interaction with databases
CO2. Analyze the design problems in HTML Web pages with CSS
CO3. Design a dynamic webpage with HTML, CSS, Java Script, PHP concepts
CO4. Assess the HTML Website using XML Parsers
CO5. Create website of societal context for awareness on social and environmental issues

Unit – I: Introduction to HTML and CSS (Periods:11)
Hyper Text Markup Language- Basic HTML, the Document Body, Text, Hyper Links, Adding More Formatting, Lists Using Color and Images, Images
Cascading Style Sheets- Introduction, Using Styles, Defining Styles, Properties and Values in Style Sheets, Formatting Blocks of Information, Layers

Unit – II: Java Scripting (Periods:11)
Objects in Java Script- Data and Objects in Java Script, Regular Expressions, Exception Handling, Built in Objects, Cookies, and Events.

Unit – III: Advanced Javascripting and XML (Periods:12)
Dynamic HTML With JavaScripit: Data Validation, Opening in a new window, Messages and Confirmations, The Status Bar, Writing to a different frame, Rollover Buttons, Moving Images, A Text Only Menu System, Floating Logos.
UNIT – IV: PREPROCESSOR HYPERTEXT PROGRAMMING (Periods:14)

An Introduction To PHP: Introducing PHP, Including PHP in a HTML Page, Data Types, Program Control Structures, Arrays, User Defined Functions, Built-in Functions, Regular Expressions, Using files.


UNIT – V: BUILDING WEB APPLICATIONS WITH PHP AND MYSQL (Periods:07)

Building Web Applications With PHP And MYSQL-Handling Installation Prerequisites, Using the mysqli Extension - Setting Up and Tearing down the Connection, Handling Connection Errors, Retrieving Error Information, Storing Connection Information in a Separate File, Securing Your Connection Information.

Interacting with the Database - Sending a Query to the Database, Parsing Query Results, Determining the Rows Selected and Rows Affected, Working with Prepared Statements, Executing Database Transactions, and Enabling Auto commit Mode, Committing a Transaction, Rolling Back a Transaction.

Total Periods: 56

TEXT BOOKS:

REFERENCE BOOKS:
M. Tech (CN&IS) II-Semester  
(14MT20506) BIG DATA ANALYTICS (Elective-II)

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**PRE-REQUISITE:** A Course on “Data warehousing and Mining”.

**COURSE DESCRIPTION:**
Data Science and Analytics; unsupervised learning; big data from business perspective; Hadoop Technology and application development, Management, InfoSphere big insights and InfoSphere streams

**COURSE OUTCOMES:**
*On successful completion of this course the students will be able to:*

- **CO1.** To gain knowledge about the
  - Data Science and Unsupervised Learning.
  - Big data Characteristics and Methods.
  - InfoSphere Big insights and Streams.

- **CO2.** To analyze the need for database systems for storing the large data

- **CO3.** To design and model an effective and sustainable database for better performance using big data tools.

- **CO4.** To use Hadoop tools and Methodologies for modeling large databases and real time applications

**UNIT I - INTRODUCTION TO DATA SCIENCE**  (Periods:11)

- **Introduction**- Introduction of Data Science, Getting started with R-Exploratory Data Analysis, Review of probability and probability distributions, Bayes Rule Supervised Learning, Regression, polynomial regression, local regression and k-nearest neighbors

**UNIT II - UNSUPERVISED LEARNING**  (Periods:12)

- **Unsupervised Learning**- Kernel density estimation, k-means, Naive Bayes, Data and Data Scraping Classification, ranking, logistic regression, Ethics, time series advanced regression, Decision trees, Best practices and feature selection.

**UNIT III - BIG DATA FROM DIFFERENT PERSPECTIVES**  (Periods:11)

- **Big data from business Perspective**-Introduction of big data, Characteristics of big data, Data in the warehouse and data in Hadoop, Importance of Big data, Big data Use cases, Patterns for Big data deployment, Big data from Technology Perspective, History of Hadoop, Components of Hadoop, Application Development in Hadoop, Getting your data in Hadoop, other Hadoop Component

**UNIT IV - INFOSPHERE BIG INSIGHTS**  (Periods:11)

- **InfoSphere Big Insights**-Analytics for Big data at rest, A Hadoop ready Enterprise, Quality file system, Compression, Administrative tooling, Security Enterprise Integration, Improved workload scheduling, Adaptive map reduce, Data discovery and visualization and Machine Analytics.
UNIT V- INFOSPHERE STREAMS

InfoSphere Streams- Analytics for Big data in motion, InfoSphere Streams Basics working of InfoSphere Streams, Stream processing language, Operators, Stream toolkit, Enterprise class.

Total Periods: 55

TEXT BOOKS:

REFERENCE BOOKS:
M. Tech (CN&IS) II-Semester  
(14MT26304) DESIGN OF SECURE PROTOCOLS  
(ELECTIVE –II)

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PRE-REQUISITES: A Course on “Cryptography and Network Security”.

COURSE DESCRIPTION:
Pseudorandom Bit generation and algorithm modes; Symmetric and asymmetric cryptography; Authentication protocols and Hash functions; Security implementations

COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1. Gain advanced knowledge in
- Pseudorandom Bits and Algorithm Modes.
- Basic Cryptography Techniques.
- Authentication Protocols.
- One-way Hash Functions and Security Implementations in Real World.
CO2. Analyze vulnerabilities in any computing system of the real world and identify the cryptographic solutions.
CO3. Design and Develop Cryptographic protocol solutions for various Security Problems in real world
CO4. Create and Select appropriate protocol solution for possible security threats in complex real time systems.

UNIT-I: PSEUDORANDOM BITS AND ALGORITHM MODES  (Periods:12)

Algorithm Modes-Block Replay, Stream Ciphers, Self Synchronizing Stream Ciphers, Synchronous Stream Ciphers and Other Block Cipher, Choosing a Cipher Mode, Interleaving, Block Ciphers Versus Stream Ciphers.

UNIT-II: BASIC CRYPTOGRAPHY TECHNIQUES  (Periods:12)
Symmetric Techniques-Definition, Substitution Ciphers, Transposition Ciphers, Classical Ciphers, AES, DES, Confidentiality Modes of Operation

UNIT-III: AUTHENTICATION PROTOCOLS  (Periods:14)
Basic Authentication Techniques, Password based Authentication; Authenticated Key Exchange Based on Asymmetric Cryptography, Typical Attacks on Authentication Protocols, SSH, Kerberos Protocol, SSL and TLS.
UNIT-IV: ONE-WAY HASH FUNCTIONS  
(Periods:12)  

UNIT-V: SECURITY IMPLEMENTAIONS  
(No. of Periods: 08)  

Total Periods:58

TEXTBOOKS:

REFERENCE BOOKS:
M. Tech (CN&IS) II-Semester
(14MT26305) HIGH SPEED NETWORKS (Elective-II)

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PRE-REQUISITE: A Course on “Computer Networks”

COURSE DESCRIPTION:
High-speed networking technologies - (Asynchronous Transfer Mode) ATM, and High speed LANs; Congestion and traffic management; TCP and ATM congestion control; Internet routing; integrated services architecture; QoS in IP networks

COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1. Gain knowledge in:
   • ATM, Frame Relay Network architecture.
   • Congestion and Traffic management.
   • Internet Routing.
   • Quality of service in high speed networks.
CO3. Design and configure high speed networks.

UNIT-I: HIGH SPEED NETWORKS (Periods:11)
Introduction to TCP/IP suite, Internet protocols, Frame Relay Networks, Asynchronous transfer mode (ATM) – ATM Protocol Architecture, ATM logical Connection, ATM Cell , ATM Service Categories and AAL. High Speed LANs-Fast Ethernet, Gigabit Ethernet, Fiber Channel, Wireless LANs, applications, requirements, Architecture of 802.11.

UNIT-II: CONGESTION AND TRAFFIC MANAGEMENT (Periods:11)
Queuing Analysis, Queuing Models, Single Server Queues, Effects of Congestion, Congestion Control, Traffic Management, Congestion Control in Packet Switching Networks, Frame Relay Congestion Control

UNIT III: TCP AND ATM CONGESTION CONTROL (Periods:12)
TCP Flow control, TCP Congestion Control, Retransmission, Timer Management, Exponential RTO backoff, KARN’s Algorithm, Window management, Performance of TCP over ATM
Traffic and Congestion control in ATM–Requirements, Attributes, Traffic Management Frame work, Traffic Control, ABR traffic Management, ABR rate control, RM cell formats, ABR Capacity allocations, GFR traffic management.

UNIT IV: INTERNET ROUTING (Periods:10)
UNIT V: QUALITY OF SERVICE IN IP NETWORKS INTEGRATED AND DIFFERENTIATED SERVICES  (Periods:13)

Integrated Services Architecture—Approach, Components, Services, Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ, Random Early Detection, Differentiated Services


Total Periods:57

TEXT BOOK:

REFERENCES:
M. Tech (CN&IS) II-Semester
(14MT26306) TCP/IP PROTOCOLS (Elective-II)

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PRE-REQUISITE: A Course on “Computer Networks”

COURSE DESCRIPTION:
Protocol standards and architectural models; IP Addressing, Routing, ARP and RARP; Network Layer Protocols - ICMP and IGMP; Unicast and Multicast Routing Protocols; Transport Layer Protocols- TCP and UDP; Host Configuration and Domain Name System; Remote Login and File Transfer

COURSE OUTCOMES:
On successful completion of this course the students will be able to:

CO1. Gain knowledge in:
- Protocol standards and architecture and IP Addressing, Routing.
- Network and Transport layer protocols and DNS, TELNET, FTP, E-Mail, NMP.

CO2. Analyze IP Addressing, subnet and masking.

CO3. Develop solutions to IP conflicts and spoofing problems.

UNIT-I: PROTOCOL STANDARDS AND ARCHITECTURAL MODELS AND IP ADDRESSING, ROUTING, ARP AND RARP

Protocol Standards and Architectural Models-Internet standards, Administration, LANs, Point-to-Point WANs, Switched WANs, Connecting devices, The OSI model, Layers in OSI model, TCP IP model.

IP Addressing, Routing, ARP and RARP-IP versions, IPV4, Classful addressing, other issues, Subnetting, Superinternet, Classless addressing, IPV6, IPV6 addressing, IPV6 protocol, ARP (Address Resolution Protocol), ARP Package, RARP (Reverse Address Resolution Protocol)

UNIT-II: NETWORK LAYER PROTOCOLS

Internet protocol (IP) - Datagram, Fragmentation, Options, Checksum, IP package. Internet Control Message Protocol (ICMP) - Type, Format, Error reporting, Query, Checksum, ICMP package. Internet Group Management Protocol (IGMP)-Group Management, Messages, Encapsulation, IGMP package.

UNIT-III: UNICAST AND MULTICAST ROUTING PROTOCOLS

Intra-and-Inter Domain Routing, Distance Vector Routing, RIP (Routing Information Protocol), Link State Routing, OSPF (Open Shortest Path First) protocol, BGP (Border Gateway Protocol), Difference between unicast, multicast and broadcast, Multicast Applications, Multicast Routing, Multicast Link State Routing (MOSPF), Multicast Distance Vector (DVMRP).

UNIT-IV: TRANSPORT LAYER PROTOCOLS

User datagram protocol (UDP)-Process-to-Process communication, User datagram, Checksum, UDP operation, Use of UDP, Package.
Transmission Control Protocol (TCP) - TCP services, Features, Segment, Connection, Flow and Error Control, Congestion Control, TCP timers, Options, TCP package, Stream Control Transmission Protocol (SCTP) Services, Features, Packet format

UNIT-V: HOST CONFIGURATION, DNS, REMOTE LOGIN, FTP, E-MAIL, NMP (Periods:11)

Host Configuration and Domain Name System - BOOTP (Bootstrap Protocol), DHCP (Dynamic Host Configuration Protocol), Domain Name System (DNS) - Namespace, DNS in the Internet, Resolution, DNS Messages, Types of Records, DDNS, Encapsulation.

Remote Login and File Transfer: TELNET (Terminal Network) , Concept, Network Virtual Terminal (NVT), NVT character set, Embedding, Options, Mode of operation, User Interface, File Transfer protocol (FTP), Trivial File Transfer Protocol (TFTP).

Total Periods:56

TEXTBOOK:

REFERENCE BOOKS:
M.Tech. (CN&IS) – II Semester (14MT26321) SEMINAR

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PRE-REQUISITES: --

COURSE DESCRIPTION:
Identification of seminar topic; Literature survey; Preparation of technical report and Presentation

COURSE OUTCOMES:
On successful completion of this course the students will be able to:

CO1. Acquire in-depth knowledge in core and allied areas of interest.
CO2. Analyze and synthesize information related to the areas.
CO3. Conceptualize and construct research problems.
CO4. Extract information pertinent to a specific area through literature survey to conduct research.
CO5. Identify the applicability of modern software and tools.
CO6. Contribute positively to multidisciplinary groups in emerging areas with objectivity and rational analysis.
CO7. Plan, organize, prepare and present effective written and oral technical reports.
CO8. Engage in lifelong learning to improve competence.
CO9. Acquire awareness on professional code of conduct in the chosen area.
CO10. Develop independent and reflective learning.
### M. Tech (CN&IS) II-Semester
**14MT26322**  **WEB PROGRAMMING AND CLOUD COMPUTING**
**LABORATORY**

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**PRE-REQUISITES:** Courses on “Web Programming” and “Cloud Computing”

**COURSE DESCRIPTION:**

Develop and implement dynamic web applications on contemporary and social issues using HTML, CSS, JS and PHP technologies.

Hands on practice in using Visual Modeling Tools and design real time case studies such as Automated Teller Machine (ATM), Online Ticket Reservation for Railways, A Point-of-Sale (POS) System, A Multi-Threaded Airport Simulation, Hospital Management System, Unified Library Application, and Online Shopping.

**COURSE OUTCOMES:**

*On successful completion of this course the students will be able to:*

**CO1.** Gain Knowledge on the real time applications of Cloud computing and to design web pages using HTML, CSS and JS.

**CO2.** Analyze XML files using DTD parser.

**CO3.** Use Dreamweaver and Notepad++ for designing web pages and generating dynamic content. And Cloud Computing tools Windows Azure, Sales Force, and VMware

**CO4.** Recognize the need of Cloud Computing, Software Testing and can engage in lifelong learning by incorporating best practices of them

**CO5.** Develop websites for self-development and for promoting awareness among the community in societal and environmental issues.

**Laboratory Exercises:**

**Web Programming:**

1. Create an HTML web page with at least the following features:
   - Keywords & description meta tags, title, Page formatting, including a background color *and* picture, a non-default text color, and non-default text and link colors, A horizontal rule, At least three levels of headers, Text formatting, including specifying a non-default font as well as centered, bold, italics, subscript, superscript, and strikeout, A three-level bulleted list and a two-level numbered list, At least two external links, with one a text link and one an image link, Three internal “bookmark” links – that is, a link to further down on the current page, A relative link to an image in a different directory than the directory in which your current HTML page resides, An image with a non-standard-width border in a non-standard color. The image should appear off to the right side of the page, An image map with at least three links, A table that includes at least three rows, two cells in each row, two colspan attributes, and one rowspan attribute. Put a background color on the entire table, a different
background color on one cell, and a background image on one entire row of the table.

2. Create an HTML web page with JavaScript for the following problem:
Get two input numbers from an HTML form. On submit, call a function to edit them to make sure that they are within the range of 1-100. If not, display an error message and set focus to the field in error. If the entered numbers are valid, add the two numbers together and display the total in an alert box. Pop up a prompt box to get a third number and edit it to make sure it’s in the range of 1 to 5. Multiply the original total (from the two input boxes) by this third number. Store the result in a cookie and then automatically open a second page to display the cookie that you saved on the prior page.

3. 
   a. Write an XML file which will display the Book information which includes the following:
      1) Title of the book 2) Author Name 3) ISBN number 4) Publisher name 5) Edition 6) Price
   b. Write a Document Type Definition (DTD) to validate the above XML file. Display the XML file as follows:
      The contents should be displayed in a table. The header of the table should be in color GREY. And the Author names column should be displayed in one color and should be capitalized and in bold. Use your own colors for remaining columns. Use XML schemas XSL and CSS for the above purpose. Note: Give at least for 4 books. It should be valid syntactically. Hint: You can use some xml editors like XML-spy

4. Write PHP Script to demonstrate
   a. String processing in PHP
   b. File uploading
   c. Sessions and Cookies

5. Write PHP Script that takes user input data(Personal Information like registration to a website) in a form and validates it and write the data into the database

Sales Force:

6. Using SalesForce CRM,
   a. Create a Warehouse Application.
   b. Add Relationships to it.
   c. Apply formulas and Validation Rules on the records of a data.
   d. Creation of Dash Boards.
   e. Create an approval process for it and generate reports.

MS-Azure:

8. Create and configure SQL server in an Azure VM

VMware:

10. Illustrate forms of virtualization on VMware.
PRE-REQUISITES: --

COURSE DESCRIPTION:

Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Writing of thesis and presentation.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

CO1. Acquire in-depth knowledge in the areas of interest.
CO2. Analyze critically chosen project topic for conducting research.
CO3. Apply knowledge gained through Program, self learning and experience for solution of a given problem efficiently.
CO4. Undertake research confidently in the project domain.
CO5. Use the techniques, skills and modern engineering tools necessary for project work.
CO6. Perform harmonically in multi-disciplinary, multi-cultural groups, and develop a high level of interpersonal skills.
CO7. Manage projects in respective disciplines and multidisciplinary environments with due consideration to cost and time efficiency.
CO8. Develop communication skills, both oral and written for preparing and presenting reports.
CO9. Engage in lifelong learning to improve knowledge and competence continuously.
CO10. Understand professional and ethical responsibility for sustainable development of society.
CO11. Develop independent and reflective learning.