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Supporting Document for 1.1.3

# Courses having focus on

# Employability/ Entrepreneurship/ skill Development

**Program: M.Tech.- Computer Networks and Information Security**

**Regulations : SVEC-14**

The Courses (with course outcomes) under SVEC-14 Regulations which focus on *employability/ entrepreneurship/ skill development* are highlighted with the following colours.

| Skill |
|:---:|

| Employability |
|:---:|

| Entrepreneurship |
|:---:|

# SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
## M. Tech (CN&IS) - I Semester
## (14MT10501) ADVANCED COMPUTER NETWORKS

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 4 | -- | -- | 4 |

**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.
**Foundations of Networking Protocols**-5_layer TCP/IP Model, 7_Layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM.
**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.
**Routing and Internet Working-**Network Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Path algorithms, Intradomain Routing Protocols, Interdomain Routing Protocols
**UNIT III: TRANSPORT LAYER PROTOCOLS AND NETWORK APPLICATIONS** (Periods:12)
**Internet Protocol-**Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6
**Transport and End-to-End Protocols-**Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), TCP Congestion Control.
**UNIT IV: WIRELESS NETWORKS AND OPTICAL NETWORKS** (Periods:11)
**Wireless Networks and Mobile IP-**Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standards, Mobile IP, Wireless Mesh Networks (WMNs).

**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.

**Mobile Ad-Hoc Networks-**Overview of Wireless Ad–Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks- DSDV, DSR, AODV

**Wireless Sensor Networks-**Sensor Networks and Protocol Structures, Communication Energy Model, Clustering Protocols, Routing Protocols

**Total Periods:58**

**TEXT BOOKS:**

1. Nader F. Mir, *"Computer and Communication Networks,"* Pearson Education, 2007.
2. F. Kurose, Keith W.Ross, *"Computer Networking: A Top-Down Approach Featuring the Internet,"* Pearson Education, Third Edition, 2007.

**REFERENCE BOOKS:**

1. Behrouz A. Forouzan, *"Data Communications and Networking,"* Tata McGraw Hill, Fourth Edition, 2007
2. Andrew S. Tanenbaum, *"Computer Networks,"* Fourth Edition, Pearson Education, New Delhi, 1997
3. S. Keshav, *"An Engineering Approach to Computer Networking,"* Pearson Education, New Delhi, 2004.

# M. Tech. (CN&IS) I-Semester
# (14MT20507) INFORMATION SECURITY

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 4 | - | - | 4 |

**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)
Security Attacks, Security Services, Security Mechanisms, Model for Network Security.
**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
**Public-Key Cryptography-**Public-Key Cryptography Algorithms-RSA, Diffie-Hellman Key Exchange, Digital Signatures, Digital signature standard.
**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)
**Transport Level Security-** Secure Socket Layer and Transport Layer Security.
**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:**
1. William Stallings, "*Network Security Essentials: Applications and Standards,*" Fourth Edition, New Delhi, Pearson Education, 2011
2. Douglas R.Stinson, "*Cryptography – Theory and Practice,*" Third edition, CRC Press, 2005

**REFERENCE BOOKS:**
1. William Stallings, "*Cryptography and Network Security,*" Fifth edition, New Delhi, Pearson Education, 2011
2. Eric Maiwald, "*Fundamentals of Network Security*", First edition, McGraw-Hill, 2003
3. Charlie Kaufman, Radia Perlman, Mike Speciner, "*Network Security, Private communication in a public world,*" Second edition, PHI Learning, 2002

# M. Tech (CN&IS) I-Semester
## (14MT20508) MOBILE COMPUTING

| Int.<br>Marks | Ext.<br>Marks | Total<br>Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 4 | -- | -- | 4 |

**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)**
**GSM AND SIMILAR ARCHITECTURES**: GSM, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services.
**WIRELESS MAC AND CDMA – BASED COMMUNICATION:** Medium Access control, Introduction to CDMA-based Systems, Spread Spectrum in CDMA Systems, Coding Methods in CDMA

**UNIT- II: MOBILE IP NETWORK LAYER & MOBILE TRANSPORT LAYER** **(Periods:14)**
**MOBILE IP NETWORK LAYER:** IP and Mobile IP Network Layer, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, Dynamic Host Configuration Protocol.
**MOBILE TRANSPORT LAYER:** Conventional TCP/IP Transport Layer Protocols, Indirect TCP, Snooping TCP, Mobile TCP, WAP Architecture.

**UNIT –III:DATABASES AND DATA DISSEMINATION AND BROADCASTING SYSTEMS** **(Periods:14)**
**DATABASES:** Database Hoarding Techniques, Data Caching, Client-Server Computing and Adaptation, Transaction Models, Query Processing, Data Recovery Process, Issues Relating to Quality Of Service.

**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)**

**MOBILE SYNCHRONIZATION IN MOBILE COMPUTING SYSTEMS:** Synchronization, Synchronization Software for Mobile Devices, Synchronization Protocols, SynML- Synchronization Language for Mobile Computing, Sync4J (Funambol), Synchronized Multimedia Markup Language (SMIL).

**MOBILE DEVICES: SERVER AND MANAGEMENT –**Mobile Agent, Application Server, Gateways, Portals, Service Discovery, Device Management, Mobile File Systems, Security.

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

**MOBILE APPLICATION LANGUAGES- XML, JAVA, J2ME, AND JAVACARD:** Introduction, XML, JAVA, Java 2 Micro Edition (J2ME), JavaCard.

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

**Total Periods:60**

**TEXT BOOKS:**

1. Raj Kamal, *"Mobile Computing,"* OXFORD University Press, Second Edition, 2007

**REFERENCE BOOKS:**

1. Jochen H. Schiller, *"Mobile Communications,"* Pearson Education, Second Edition, 2004
2. Asoke Talukder, Roopa Yavagal, *"Mobile Computing,"* Tata McGraw Hill, Second Edition, 2010

# M. Tech (CN&IS) - I Semester
# (14MT16301) NETWORK MANAGEMENT

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 4 | -- | -- | 4 |

**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.
CO2. Analyze Traffic Management Problems in Network through 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)**
**Network Management Overview-**Analogy of Telephone Network Management, Communication Protocols and standards, case histories of Networking and Management, Network Management functions, Network and System Management.
**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.

**Web-based Management-**Web Interface to SNMP Management, Embedded Web-based Management, Desktop Management Interface, Web-based Enterprise Management, Java Management extensions, JIRO platform.

**Total Periods:58**

**TEXT BOOKS:**

1. Mani Subramanian, *"Network Management: Principles and practice,"* Second Edition, New Delhi: Pearson Education, 2011
2. William Stallings, *"SNMP, SNMPv2, SNMPv3, RMON-1 and 2,"* Third Edition, New Delhi: Pearson Education, 2009

**REFERENCE BOOKS:**

1. Stephen B Morris, *"Network Management, MIB's and MPL's: Principles, Design and Implementation,"* New Delhi: Pearson Education 2008
2. Mark Burges, *"Principles of Network and System Administration,"* Second Edition, New Delhi: Wiley Dream tech, 2008.
3. Louis A Steinberg , *"Trouble is shooting with SNMP and Analyzing MIB's,"* New Delhi: Tata McGraw Hill, 2006.

# M. Tech. (CN & IS) I-Semester
# (14MT16302) WIRELESS NETWORKS

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 4 | -- | - | 4 |

**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)
**Introduction-**History, Characteristics and Fundamentals of cellular Systems, Cellular System Infrastructure, Satellite Systems, Network Protocols, Sensor Networks, Wireless LANs, MANs and PANs.
**Probability, Statistics, and Traffic Theories-**Introduction, Basic Probability and Statistics Theories, Traffic Theory, Basic Queuing Systems

## UNIT – II: MOBILE RADIO PROPAGATION, CHANNEL CODING AND ERROR CONTROL (Periods:11)
**Mobile Radio Propagation-**Introduction, Types of Radio Waves, Propagation Mechanisms, Free Space Propagation, Land Propagation, Path Loss, Slow Fading, Fast Fading, Doppler Effect, Delay Spread, Intersymbol Interference, Coherence Bandwidth, Cochannel Interference.
**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 Radio Access-** Introduction, Multiple Radio Access Protocols, Contention Based Protocols.
**Multiple Division Techniques for Traffic Channels-** Introduction, Concepts and Models for Multiple Divisions, Modulation Techniques

**Network Protocols-** Introduction, TCP/IP Protocol, TCP over Wireless, Internet Protocol Version (IPV6)

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

**Ad Hoc Networks-**Introduction, Characteristics of MANETs, Applications, Routing-Table Driven Routing Protocols, and Source Initiated Routing Protocols, Hybrid Protocols, Vehicular Area Network, Security Issues in Mobile Ad Hoc Networks, and Network Simulators.

**Sensor Networks-**Introduction, Fixed Wireless Sensor Networks, Wireless Sensor Networks, Sensor Deployment, Network Characteristics, Design Issues in Sensor Networks, Secured Communication.

**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:**

1. Dharma Prakash Agarwal, Qing-An Zeng, *"Introduction to Wireless & Mobile Systems,"* Cengage Learning, Third edition, 2011.

**REFERENCE BOOKS:**

1. Theodore S. Rappaport, *"Wireless Communications–Principles and Practice," Second Edition*, PHI, 2002.
2. DavidTse, Pramod Viswanath*, "Fundamentals of Wireless Communications,"* Cambridge University Press, 2006.
3. William Stallings, *"Wireless communications and Networks,"* Pearson education, 2005
4. C. Siva Rama Murthy, B.S. Manoj, *"Ad Hoc Wireless Networks – Architectures and Protocols,"* Pearson Education, Second Edition, 2004.

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

| Int Marks | Ext Marks | Total Marks | | L | T | P | C |
|-----------|-----------|-------------|---|---|---|---|---|
| 40 | 60 | 100 | | 4 | -- | -- | 4 |

**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:**

1. Jiawei Han and Micheline Kamber, "*Data Mining: Concepts and Techniques,*" Second Edition, Elsevier, 2009

**REFERENCE BOOKS:**

1. Margaret H Dunham, *Data Mining Introductory and Advanced Topics,*" Second Edition, Pearson Education, 2006
2. Amitesh Sinha, "*Data Warehousing,*" Thomson Learning, 2007
3. Xingdong Wu, Vipin Kumar, "*The Top Ten Algorithms in Data Mining,*" Taylor and Francis Group, 2009

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

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|:---:|:---:|:---:|---|:---:|:---:|:---:|:---:|
| 40 | 60 | 100 | | 4 | -- | -- | 4 |

**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)
**Security a software Issue-**Introduction, The problem, Software Assurance and Software Security, Threats to software security, Sources of software insecurity, Benefits of detecting software security defects early, managing secure software development.
**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 Software Architecture and Design-**Introduction, Software Security practices for Architecture and Design, architectural risk analysis, Software security knowledge for Architecture and Design-Security principles, Security guidelines and Attack patterns

**Secure coding and Testing-**Introduction, Code analysis, Software Security testing, Security testing considerations throughput 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:**
1. Julia H. Allen, Sean Barnum, Robert J. Ellison, Gary McGraw, and Nancy R. Mead, *"Security Engineering: A Guide for Project Managers,"* Pearson Education (India), 2009.

**REFERENCE BOOKS:**
1. Gary McGraw, *"Software Security: Building Security In,"* Addison-Wesley, 2006
2. Mark Dowd, John McDonald, Justin Schuh, *"The Art of Software Security Assessment: Identifying and Preventing Software Vulnerabilities,"* Addison-Wesley, First Edition, 2006.
3. John Viega, Gary McGraw, *"Building Secure Software: How to Avoid Security Problems the Right Way,"* Addison-Wesley, 2001.

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

| Int. Marks | Ext. Marks | Total Marks | L | T | P | C |
|---|---|---|---|---|---|---|
| 40 | 60 | 100 | 4 | -- | -- | 4 |

**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)**
**Security Architecture-**Introduction, Security, Information Systems, Database Management Systems, Information Security, Information Security Architecture, Database Security, Asset type and their Values, Security Methods.
**Operating System Security Fundamentals-**Operating System Security Environment, Components, Authentication methods, User administration, Password policies, Vulnerabilities.
**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.
**Profiles, Password Policies, Privileges, and Roles:**  Defining and Using Profiles, Designing and Implementing Password Policies, Granting and Revoking User Privileges Creating.
**UNIT-III: SECURITY MODELS AND VIRTUAL PRIVATE DATABASES                                        (Periods:11)**
**Database Application Security Models-**Introduction, Types of users, Security Models, Application Types, and Application security models.

**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:**
1. Hassan A. Afyouni, *"Database Security and Auditing: Protecting Data Integrity and Accessibility,"* Cengage Learning, New Delhi, 2006.
2. S. Castano, M. Fugini, G. Martella, P. Samarati, *"Database Security,"* Addison-Wesley, New York, 1994

**REFERENCE BOOKS:**
1. Ron Ben Natan, *"Implementing Database Security and Auditing,"* U.S.A: Elsevier Digital Press, 2005.
2. Michael Gertz, SushilJajodia, *"Handbook of Database Security: Applications and Trends,"* New York: Springer, 2008.

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

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 4 | -- | -- | 4 |

**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)**
**Introductio**n-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)

**QTP-** Overview, Testing an Application, Synchronizing test cases, check pointing, Testing Database Application. **JMeter**-Overview, HTTP Test. **Load Runner**-Overview, Creating VUser Script using Virtual User Generator and using LoadRunner Controller.

**Total Periods:58**

**TEXT BOOKS:**

1. Boris Beizer *"Software Testing techniques,"* Dreamtech, Second Edition, 2008.
2. Dr. K. V. K. K. Prasad *"Software Testing Tools,"* Dreamtech, 2007.

**REFERENCE BOOKS:**

1. Naresh Chauhan, *"Software Testing – Principles and Practices,"* Oxford University Press, India, 2010.
2. Willaim, E, Perry, *"Effective methods of Software Testing,"* third Edition, Wiley India, 2009.

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

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 25 | 50 | 75 | | -- | -- | 4 | 2 |

**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

2. Simulate Pure ALOHA Protocol and Slotted ALOHA Protocol.

3. Simulate Carrier Sense Multiple Access (CSMA) Protocol.

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.

6. Create a digital signature for the given doc/pdf file using DSS algorithm.

7. Configure Firewall filters to accept/reject URLs/web content.

## (14MT10310) RESEARCH METHODOLOGY
### (Common to all M. Tech. Programs)

| Int. Marks | Ext. Marks | Total Marks |
|:---:|:---:|:---:|
| 40 | 60 | 100 |

| L | T | P | C |
|:---:|:---:|:---:|:---:|
| 3 | -- | -- | 3 |

**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. Carryout 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)**
Defining and Formulating the Research Problem, Problem Selection, Necessity of Defining the Problem, Techniques involved in Defining a Problem.  Features of Good Design, Research Design Concepts, Different Research Designs
**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:**
1. C.R. Kothari, *Research Methodology: Methods and Techniques*, New Age International Publishers, New Delhi, 2$^{nd}$ Revised Edition, 2004.

**REFERENCE BOOKS:**
1. Ranjit Kumar, *Research Methodology: A step-by-step guide for beginners*, Sage South Asia, 3$^{rd}$ ed., 2011.
2. R. Panneerselvam, Research Methodology, PHI learning Pvt. Ltd., 2009

# M. Tech (CN&IS) II-Semester
# (14MT26301) AD HOC WIRELESS NETWORKS

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|------------|------------|-------------|--|---|---|---|---|
| 40 | 60 | 100 | | 4 | -- | -- | 4 |

**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.

CO3. Solve engineering problems with wide range of solutions in ad hoc wireless 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,
**MAC protocols for Ad hoc Wireless Networks-**Issues in Designing a MAC Protocol for Ad hoc Wireless Networks, Design Goals for a MAC Protocol for Ad hoc Wireless Networks, Classifications of MAC Protocols, Other MAC Protocols.

**UNIT II: ROUTING PROTOCOLS FOR AD HOC WIRELESS NETWORKS & MULTICAST ROUTING IN AD HOC WIRELESS NETWORKS** **(Periods:12)**
**Routing Protocols for Ad Hoc Wireless Networks-** Issues in Designing a Routing Protocol for Ad hoc Wireless Networks, Classifications of Routing Protocols. Table –Driven Routing Protocols, Destination Sequenced Distance Vector Routing Protocol, On-Demand routing protocols, Dynamic Source routing protocol, Ad Hoc On-Demand Distance Vector Routing Protocol.
**Multicast Routing in Ad Hoc Wireless Networks-**Introduction, Issues in designing a multicast protocol, operation of multicast routing protocols, classification of multicast routing protocols.

**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.

**Security protocols for Ad hoc Wireless Networks-**Security in Ad hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, and Secure Routing in Ad hoc Wireless Networks.

## UNIT IV: QUALITY OF SERVICE INAD HOC WIRELESS NETWORKS
**(Periods:10)**

**Quality of Service in Ad Hoc Wireless Networks-**Introduction, Issues and challenges in providing QOS in Ad Hoc Wireless Networks, Classification of QoS solutions, MAC Layer solutions, Network layer solutions.

## UNIT-V: ENERGY MANAGEMENT IN AD HOC WIRELESS NETWORKS
**(Periods: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:**
1. C. Siva Ram Murthy, B. S. Manoj, "*Ad hoc Wireless Networks-Architectures and Protocols*," Pearson Education, Second Edition, 2011.
2. *Carlos Corderio, Dharma P.Aggarwal, "Ad Hoc and Sensor Networks – Theory and Applications,"* World Scientific Publications, Cambridge University Press, Second Edition March 2013

**REFERENCE BOOKS:**
1. C.K.Toh, "*Ad hoc Mobile Wireless Networks*," Pearson Education, New Delhi, 2002.
2. Charles E. Perkins, "*Ad hoc Networking,*" Pearson Education, New Delhi, 2011.

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

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 4 | -- | -- | 4 |

**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)
**Evidence Collection and Data Seizure:** Collect Evidence, Collection Options, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure – Collection and Archiving, Methods of Collection, Controlling Contamination: The Chain of Custody, Evidence Handling and Presentation in Court of Law, Incident and Incident Response, Initial Response and Forensic Duplication, E–Mail Investigations- Exploring the Role of E-Mail in Investigations, Investigating E-Mail Crimes and Violations, Live Data Collection from Systems (Windows &Unix)

**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)**
**Cell Phone & Mobile Device Forensics :** Understanding Mobile Device Forensics, Acquisition Procedures for Cell Phones and Mobile Devices, Toolkits for Hand-Held device Forensics like EnCase, Device Seizure and PDA Seizure, Forensic Card Reader, Cell Seizure, MOBILedit!, Forensic SIM.
**Network Forensics:** Overview, Performing Live Acquisitions, Developing Standard Procedure for Network Forensics, Investigating Routers, Network Tools.
**UNIT – V: CYBERCRIME IN LEGAL PERSPECTIVE AND FORENSIC REPORT GENERATION**                    **(Periods:11)**
**Cyber Law Basics:** Need for Cyber laws, The Indian Context, Cybercrime and the Indian ITA 2000, A Broad View on cybercrime Law scenario in the Asia-Pacific Region.
**Importance of Cyber Security**- Roles and Responsibilities of Engineers in offering Cybersecurity, Cybercrime Investigation and Litigation, Assurance and Compliance Security Audit.
**Report Writing for Investigations:** Guidelines for writing Report, Generating Report Findings with Forensics Software Tools.

                                                            **Total Periods:58**
**TEXT BOOKS:**
1. John R.Vacca, *"Computer Forensics, Computer Crime Investigation,"* First Edition, New Delhi, Firewall Media, 2009
2. Nelson, Amelia Phillips, Christopher Steuart, *"Computer Forensics and Investigations,"* Fourth Edition, Cengage Learning, 2009.

**REFERENCE BOOKS:**
1. Sunit Belapure, Nina Godbole, "*Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives,"*First Edition, Wiley India Pvt Ltd*,* 2011.
2. Kevin Mandia, Chris Prosise, *"Incident Response and Computer Forensics,"*Second Edition, McGraw-Hill Osborne Media, 2003
3. Eoghan Casey*, "Handbook Computer Crime Investigation's Forensic Tools and Technology,"*First Edition, Academic Press, 2001
4. Peter Stephenson, Keith Gilbert, *"Investigating Computer Related Crime,"*Second Edition, CRC Press, 2004

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

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 4 | -- | -- | 4 |

**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.
CO3. Get exposure to IDS and IPS security tools in network security devices.

**UNIT-I: NETWORK SECURITY MONITORING REVISITED AND EXTRUSION DETECTION ILLUSTRATED                    (Periods:12)**
Network Security Monitoring Revisited: Defining the security process, Principles, Network security monitoring (NSM) Theory, Techniques and tools. Defensible Network Architecture- Defensible network Monitoring, Controlling, Minimizing and current.
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.
**Network Incident Response**: Preparation for network incident response, Secure CSIRT communication, Intruder Profiles, Incident Detection Methods, Network First Response, Network-Centric General Response and Remediation.

## 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:

1. Richard Bejtlich, "*Extrusion Detection: Security Monitoring for Internal Intrusions*," First Edition. Pearson Education, New Delhi, 2004.
2. Earl Carter, Jonathan Hogue, "*Intrusion Prevention Fundamentals*," First Edition, Pearson Education, New Delhi, 2002.

## REFERENCE BOOKS:

1. Carl Endorf, Eugene Schultz and Jim Mellander, "*Intrusion Detection and Prevention*," McGraw-Hill, 2004
2. Stephen Northcutt, Judy Novak, "*Network Intrusion Detection*," New Riders Publishing, Third Edition, 2002

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

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 4 | -- | -- | 4 |

**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 OVERVIEW-** Cloud computing at a Glance, The Vision of Cloud Computing, Defining a Cloud, A Closer Look, Cloud Computing Reference Model, Characteristics and Benefits, Pros and Cons of cloud, Challenges Ahead; Historical Developments, Building Cloud Computing Environments, Computing Platforms and Technologies
**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)**
Data-Intensive Computing, Technologies for Data-Intensive Computing, Aneka Map Reduce Programming.

**UNIT-IV: CLOUD TECHNOLOGIES**                          **(Periods:10)**
**Amazon Web Services**-Compute Services, Storage Services, Communication Services, Additional Services, **Google AppEngine** -Architecture and Core Concepts, Application Life-Cycle, **Microsoft Azure-**Azure Core Concepts, SQL Azure, Windows Azure Platform Appliance.

## 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:
1. Raj Kumar Buyya, Christian Vecchiola, S.Thamarai Selvi, *"Mastering Cloud Computing,"* Tata McGraw Hill ,New Delhi,2013
2. Ivanka Menken, Gerard Blokdijk, *"Cloud Computing Specialist Certification Kit – Virtualization, The Art of Service,"* Emereo Pty Ltd, 2009

### REFERENCE BOOKS:
1. Michael Miller, *"Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online,"* Que Publishing, Pearson, August 2011.
2. George Reese, *"Cloud Application Architectures Building Applications and Infrastructure in the Cloud,"* O'Reilly Media Released, April 2009.
3. Gautham Shroff, *"Enterprise Cloud Computing: Technology, Architecture, Application,"* Cambridge University Press, 2010.
4. Barrie Sosinky, *"Cloud Computing Bible"*, Wiley Publishing Inc, 2011.

| Int Marks | Ext Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 4 | -- | -- | 4 |

**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: INTROUDCTION 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
**More HTML-**Tables, Multimedia Objects, Frames, Forms towards Interactivity, The HTML Document Head in detail.
**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)
**An Introduction to Java Script-**Dynamic HTML, **Java Script-**Basics, Variables, String Manipulation, Mathematical Function, Statements, Operators, Arrays, Functions.
**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 JavaScript:** 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.
**XML: Defining Data for Web Applications:** Basic XML, Document Type Definition, XML Schema, Document Object Model, Presenting XML, Using XML Parser

**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.

**Advanced PHP:** PHP and Web Forms, **Handling File Uploads**- Uploading files with PHP, Session Handlers: Working with Sessions.

**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:**

1. Chris Bates, *"Web Programming: Building Internet Applications,"* Third Edition. New Delhi, India: Wiley India Pvt. Ltd., 2009.
2. W Jason Gilmore, *"Beginning PHP and MySQL: From Novice to Professional,"* Fourth Edition, New Delhi, India, Springer India Pvt Ltd., 2011.

**REFERENCE BOOKS:**

1. Robin Nixon, *"Learning PHP, MySQL, and JavaScript,"* Second Edition, Sebastopol, CA: O'Reilly Media, Inc., 2012.
2. Kevin Tatroe, Peter MacIntyre, and Rasmus Lerdorf, *"Programming PHP,"* Third Edition, Sebastopol, CA: O'Reilly Media, Inc., 2002.
3. Marc Wandschneider, *"Core Web Application Development with PHP and MySQL,"* First Edition, Prentice Hall Professional Technical Reference, 2006

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

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|:---:|:---:|:---:|---|:---:|:---:|:---:|:---:|
| 40 | 60 | 100 | | 4 | -- | -- | 4 |

**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                                    (Periods:10)

**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:

1. Noreen Burlingame and Lars Nielsen, "A Simple Introduction to Data Science," New Street Communications, LLC, Wick ford, Rhode Island**,** 2012
2. Paul Zikopoulos and Chris Eaton, "Understanding Big Data: Analytics for Enterprise Class Hadoop and streaming Data," The McGraw-Hill Companies, 2012.

## REFERENCE BOOKS:

1. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012
2. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.

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

| Int.<br>Marks | Ext.<br>Marks | Total<br>Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 4 | -- | -- | 4 |

**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)**
Introduction, Random Bit Generation, Pseudorandom Bit generation, Statistical Tests, Cryptographically Secure Pseudorandom Bit Generation, Linear Congruential Generators, Linear Feedback Shift Registers, Design and Analysis Of Stream Ciphers, Stream Ciphers Using LFSRs.
**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
**Asymmetric Techniques-**Introduction, Knapsack Algorithms, Diffie-Hellman Key Exchange Protocol, RSA Cryptosystem, RSA problem, Rabin Cryptosystem, Elgamal Cryptosystem, Security Notations for Public Key Cryptosystems, Combination of Symmetric and Asymmetric Cryptosystems, Key Channel Establishment for public Key Cryptosystem.

**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)
Background, Snefru, N-Hash, MD5, Secure Hash function (SHA), Ripe-MD, Haval, Other One-Way Hash Functions, One-Way Hash Function using Symmetric Block Algorithms, Using Public–Key Algorithms, Choosing a One-Way Hash Functions, Advanced Attacks on Hash Functions, Message Authentication Codes.

## UNIT-V: SECURITY IMPLEMENTAIONS          (No. of Periods: 08)
IBM Secret–Key Management Protocol, MITRENET, ISDN, STU-III, Kerberos, KryptoKnight, Sesame, Privacy-Enhanced Mail(PEM), PGP, Smart Cards, Public Key Cryptography Standards(PKCS), Universal Electronic Payment Systems(UEPS), Clipper, Capstone.

**Total Periods:58**

## TEXTBOOKS:
1. Bruce Schneier, *"Applied Cryptography,"* New Delhi: Wiley India Pvt. Ltd, Student Edition, Second Edition, 2012.
2. Wenbo Mao, *"Modern Cryptography – Theory and Practice,"* New Delhi, Pearson Education, First Edition, 2008.

## REFERENCE BOOKS:
1. Alfred Jimenez's, Paul C. Van Borscht, Scott A. Vanstone, *"Handbook of Applied Cryptography,"* CRC Press, Special Indian Edition.
2. William Stallings, *"Cryptography and Network Security,"* New Delhi: Pearson Education, Fifth Edition, 2003.
3. Atul Kahate, *"Cryptography and Network Security,"* New Delhi: Tata McGraw Hill, Third Edition, 2013.

# M. Tech (CN&IS) II-Semester
## (14MT26305) HIGH SPEED NETOWRKS (Elective-II)

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 4 | -- | -- | 4 |

**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.
CO2. Analyze the QoS and performance 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)
**Overview of graph theory and least-cost paths** - Elementary concepts of graph theory, shortest path length determination, Interior routing protocols – principles, Distance-vector protocol, Link-state protocol, Exterior routing protocols – Path-vector protocols, Multicasting.

**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

**Protocols For QoS Support-**RSVP, Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms, Multiprotocol Label Switching, Operations, Label Stacking, Protocol details, **RTP –** Protocol Architecture, Data Transfer Protocol, RTCP

**Total Periods:57**

**TEXT BOOK:**

1. William Stallings, *"High Speed Networks and Internet,"* Second Edition, Pearson Education, 2012.

**REFERENCES:**

1. Warland, Pravin Varaiya, *"High performance communication networks,"* Second Edition, Jean Harcourt Asia Pvt. Ltd., 2001.
2. Behrouz A. Forouzan, "*Data communication and Networking*," Fifth Edition, Tata McGraw-Hill, 2013.
3. Abhijit S. Pandya, Ercan Sea, *"ATM Technology for Broad Band Telecommunication Networks,"*CRC Press, New York, 2004.

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

| Int.<br>Marks | Ext.<br>Marks | Total<br>Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 4 | -- | -- | 4 |

**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** **(Periods:11)**
**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, Supernetting, Classless addressing, IPV6, IPV6 addressing, IPV6 protocol, ARP (Address Resolution Protocol), ARP Package, RARP (Reverse Address Resolution Protocol)

**UNIT-II: NETWORK LAYER PROTOCOLS** **(Periods:11)**
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**
**(Periods:12)**
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** **(Periods:11)**
**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:**

1. Behrouz A Forouzan, "*TCP/IP Protocol Suite,*" Fourth Edition, McGraw-Hill, 2011
2. Douglas E.Comer, "*Internetworking with TCP/IP, Principles, Protocols and Architectures,*" Vol. 1, Sixth Edition, Addison-Wesley Educational Publishers Inc, 2013

**REFERENCE BOOKS:**

1. Donglas E.Comer, "*Internetworking with TCP/IP Principles, Protocols, and Architecture,*" Fourth Edition, Pearson Education, 2003
2. W. Richard Stevens, "*TCP/IP Illustrated,*" Pearson Education, 2003.
3. James F. Kurose, Keith W. Ross, "*Computer Networking – A Top-Down Approach featuring the internet,*" Fifth Edition, Addison Wesley

# M.Tech. (CN&IS) – II Semester
## (14MT26321) SEMINAR

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|------------|------------|-------------|---|----|----|----|---|
| -- | 50 | 50 | | -- | -- | -- | 2 |

**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

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|:---:|:---:|:---:|---|:---:|:---:|:---:|:---:|
| 25 | 50 | 75 | | - | - | 4 | 2 |

**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:**

7.  Create and Configure Virtual Machines using MS-Azure.
8. Create and configure SQL server in an Azure VM
9. Web hosting using MS-Azure.

**VMware:**

10.  Illustrate forms of virtualization on VMware.

# M.Tech. (CN&IS) – III & IV Semesters
## (14MT36321 & 14MT46321) PROJECT WORK

**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.