Swami Ramanand Teerth Marathwada University, Nanded

M. Sc. Programs in (System Administration & Networking)

Credit Based System First Year (Two Semesters)

Semester-I					
Course Code	**Title of the paper**	**External Credits**	**Internal Credits**	**Total Credits**	**Total No. of Classes**
M.Sc. SAN-101	Fundamental of Computer	3	1	4	40hrs
M.Sc. SAN-102	Computer Network	3	1	4	40hrs
M.Sc. SAN-103	Fundamental of Linux OS	3	1	4	40hrs
M.Sc. SAN-104	TCP/IP	3	1	4	40hrs
M.Sc. SAN-105	**Elective – I** 1] Core Networking 2] Cryptography 3] Mobile Computing	3	1	4	40hrs
M.Sc. SAN-106	Lab-1 (FC and DOS)	2	0	2	60hrs
M.Sc. SAN-107	Lab-2 (Computer Network/H/W)	2	0	2	60hrs
M.Sc. SAN-108	Lab-3 (Linux OS)	1	0	1	40hrs
Total Credits		**20**	**5**	**25**	

Semester-II					
Course Code	**Title of the paper**	**External Credits**	**Internal Credits**	**Total Credits**	**Total No. of Classes**
M.Sc. SAN-101	Operating System	3	1	4	40hrs
M.Sc. SAN-102	Network Administration Part I	3	1	4	40hrs
M.Sc. SAN-103	Windows 2012 ADC Part-I	3	1	4	40hrs
M.Sc. SAN-104	Linux Administration - Part I	3	1	4	40hrs
M.Sc. SAN-105	**Elective – II** 1] Next generation networking 2] Adhoc and Senser network 3] System and N/W Administration	3	1	4	40hrs
M.Sc. SAN-106	Lab-1 (Network Administration Part I)	2	0	2	60hrs
M.Sc. SAN-107	Lab-2 (Windows 2012 ADC Part-I)	2	0	2	60hrs
M.Sc. SAN-108	Lab-3 (Linux Administration - Part I)	1	0	1	40hrs
Total Credits		**20**	**5**	**25**	

M.Sc.(SAN) - 101

Fundamental of Computers

Unit-I Introduction

Characters of computers, The Evolution of computer, The computer generations of Computer, Classification of computers.

Unit-II Basic computer organization & Microprocessor.

Basic computer organization, Introduction to family of microprocessor, Ideal micro-computer, Memory system for microcomputer, Minimum micro-computer configuration.

Unit-III Processor & Memory

Central processing unit , The control unit, Arithmetic logic unit ,Instruction sets , Registers, Processor speed ,Types of processors ,The main memory ,Storage evaluation criteria ,Main memory organization ,Main memory capacity ,RAM, ROM, PROM, EPROM, Cache Memory

Unit-IV Secondary Storage Devices

Sequential and Direct-Access Devices ,Magnetic tape ,Basic principles of operation Types of magnetic tapes ,Advantages & disadvantages of magnetic tapes , Uses of magnetic tapes ,Magnetic disks ,basic principles of operations ,types of magnetic disks ,Advantages & limitations of magnetic disks ,Magnetic disks ,Optical disk, Basic principles of operation ,Types of optical disks ,Advantages & limitations of optical disks ,Optical disks ,Mass storage devices ,Disk array ,Automated tape library CD-ROM jukebox ,Storage hierarchy.

Unit –V Input Output Devices

Input devices, Point-and-draw devices, Data scanning devices, Digitizer, Electronic card reader Output device, Monitors, Printers, Plotters, Screen image projector

Unit -VI. Computer Languages

Machine Language, Advantages & Limitations of Machine Language, Assembly Language Assembler , Advantages & limitations of Assembly Language , Level Language Compiler, Linker, Interpreter, Advantages & limitations of high level language language

Reference Books:

1) Fundamental of Computer –By Pradeep K.Sinha and Priti Sinha
2) Fundamental of Computer System-Low price Edition.
3) Computer Fundamental –By Rajaraman PHI publication.
4) Computer and Common Sense-By Hunt and Shelly.

Syllabus of M.Sc. (System Administration & Networking) - First Year

M.Sc. (SAN) - 102

Computer Networks

Unit-I Introduction

Uses of computer Networks, Network Hardware- LAN, MAN, WAN, Wireless Networks, Network Software-Protocol Hierarchy, Design and Issues for Layer. Client- Server Model, Peer to peer Network.

Unit-II LAN Hardware

Network Interface Card, Drivers, Magnetic Media, Twisted Pair Cable, Coaxial Cable, Fiber optic cable, Network Topologies- Bus, Ring, Star, Tree and other Topologies, Networking Devices – Repeaters, Bridges, Routers, Gateways, Hub and Switch.

Unit-III Multiplexing and Switching

Concept of modulation and their application, Multiplexing – Time division and Frequency division, Switching, Circuit Switching, Packet Switching, Message Switching.

Unit-IV Network Standards and Network protocols

OSI reference model, TCP/IP reference model, IP protocol, SMTP, PPP, FTP, HTTP, SNMP. IP-addresses, Concept of DNS.

Unit-V Introduction to ISDN, PBX, FDDI

ISDN Architecture. , Use of PBX, FDDI. Ethernet Standards (IEEE 802.3), Introduction to Other Standards

Unit-VI Internet

Definition, Internet verses Intranet, Internet Service Provider, E-mail–Architecture and Services, WWW-Client side and Server side, URL, Messenger, Search Engine.

Reference Book:

1) Gerd E. Keiser", Local Area Networks", Tata McGraw Hill Edition, New Delhi.

2) Peter Holdson, "Local Area Networks", (Third edition), BPB publication, New Delhi.

3) Willim Stallings"Data and Computer Communications", (Fifth Edition), Prentice-Hall of India Pvt. Ltd, New Delhi.

4) Andrew S. Tannenbaum,"Computer Networks", (Third Edition), Prentice-Hall of India Pvt. Ltd, New Delhi.

Syllabus of M.Sc. (System Administration & Networking) - First Year

M.Sc. (SAN) - 103

Fundamental of Linux Operating System

Unit-I Introduction to Fedora

Features of Fedora, Hardware Requirements, Fedora Installation.

Unit-II First Steps with Fedora

Working with the Linux File System, Logging In to and Working with Linux,Changing User Information Reading Documentation, Using the Shell, Using the Text Editors, Working with Permissions.

Unit-III Linux Commands and Utilities

Study of following command and utilities:
adduser, alias, at, atrm, banner, batch, bind, cat, cd, chmod, chown, chroot,,cp, cpio, dc, dd, df, dir, du, dump, ex, fax, fc, fdformat, file, find, finger, grep, gunzip, gv, gvim, gzip, halt, hostname, ifconfig, kill, in, locate, login, logout, look, lpc, lpd, lprm, ls, mail, man, mcopy, mdel, mdir, mformat, mkdir, mlabel, more, mount, mt, mv, netcft, netstat, passwd, ping, ps, pwd, quota, quotaoff, rm, rmdir, route, set, shutdown, sort, stat, strings, su, tar, tree, umount, unzip, vdir, vi, view, wc, who, whoami, xload, xset, zip.

Unit-IV The X Window System:

Basic X Concepts, Using XFree86, Starting X , Selecting and Using X Window Managers.

Unit-V Managing Services:

Fedora Core Linux Boot Process, System Services and Run levels, Controlling Services at Boot with Administrative Tools, Starting and Stopping Services Manually.

Unit-VI Managing Software and System Resources:

Using RPM for Software Management, Controlling Software from Source, System Monitoring Tools.

Reference Books:

1. **Red Hat Linux and Fedora Unleashed** – By Bill Ball and Hoyt Duff.
2. **Enterprise Linux & Fedora Edition**: *The Complete Reference*
   -By Richard L. Petersen

Syllabus of M.Sc. (System Administration & Networking) - First Year

M.Sc. (SAN) - 104

TCP/IP

Unit-I Introduction and overview

The motivation for Internetworking, The TCP/IP Internet, Internet services, History and scope of the Internet, The Internet Architecture Board , The Internet Society

Unit-II Reviews of Underlying Network Technologies

Introduction, Two Approaches to Network communication, WAN, LAN, Ethernet Technology, Fiber Distributed Data Interconnection (FDDI), ATM.

Unit-III Internetworking Concepts and Architectural Model

Introduction, Application level Interconnection, properties of the Internet, Network level Interconnection, Internet Architecture.

Unit-IV Internet Addresses

Introduction, Universal Identifiers , Three Primary classes of IP- addresses , Network and Broadcast addresses , Addresses specify Network connection

Unit-V Internet Protocol - Connectionless Data gram Delivery

Introduction. A Virtual Network , Internet Architecture and Philosophy , The concept of Unreliable Delivery , Connectionless Delivery system , The purpose of the Internet Protocol , The Internet Datagram ,ARP,RARP.

Unit-VI Reliable Stream Transport Service (TCP)

Introduction, the Need for Stream delivery, Properties of the reliable delivery service, providing reliability, The Idea behind Sliding Window, The Transmission Control Protocol, Connections and Endpoints

Reference Books -

1. Internetworking with TCPIIP, PriDc, T, les, Protocols & Architecture - Douglas E. Comer (PHI) (Vol,-3 Ed.)
2. Internetworking with TCPIIP, Principles, and Protocols & Architecture - Douglas E. Comer (Vol-14th Ed.) (LPE) (Pearson Education)

M.Sc.(SAN) - 105

CORE NETWORKING

Elective - I

Unit-1 Networking

Network Essentials , Network Definitions , Network Topologies, Network Categories, The OSI Reference Model, Functions and Advantages, The Layers, Network Components, Protocol Data Units

Unit-2 TCP/IP

TCP/IP and OSI Reference Model Comparison ,TCP/IP History, Comparing the Models, Application Layer Functions and Protocols, DNS, DHCP, Other Protocols ,Transport Layer Functions and Protocols , TCP, UDP Port Numbers and Multiplexing, Internet and Network Access Layer Functions and Protocols , IP and ICMP, Network Access Layer Protocols

Unit - 3 Network Media and Devices

Network Media, Media Terminology, Copper Cabling, Fiber Cabling, Network Devices, NICs, Transceivers, Repeaters, and Hubs, Bridges and Switches, Routers, Security Devices

Unit - 4 Ethernet Fundamentals

Ethernet History, Ethernet Characteristics, Frame Types and Addressing, Media Access, Data Flow, Ethernet Standards.

Unit - 5 Switching: Moving Data inside Your Network

Switch Fundamentals, Physical Features , Switch Initialization Functions , Duplex and Speed , Switch Modes , Switch Design Considerations , Switch Installation and Connections , Looping and STP , VLANs

Unit - 6 Routing Essentials and IP Addressing

Routing Fundamentals , Routing Logic and Data Flow , Routed and Routing Protocols , An Introduction to IP Addressing , IP Address Construction, IP Address Classes , IP Address Technologies

References Books:-

1] CCENT Cisco Certified, Entry Networking Technician, Study Guide (Exam 640-822)
By Matthew Walker and Angie Walker

M.Sc. (SAN) - 105

Cryptography

Elective – II

Unit 1- Introduction:

Attacks, Services and Mechanisms, Security Attacks, Security Services, Integrity check, digital Signature, authentication, has algorithms.

Unit - 2. Secret Key Cryptography:

Block Encryption, DES rounds, S-Boxes IDEA: Overview, comparison with DES, Key expansion, IDEA rounds, Uses of Secret key Cryptography; ECB, CBC, OFB, CFB, Multiple encryptions DES.

Unit- 3. Hash Functions and Message Digests:

Length of hash, uses, algorithms (MD2, MD4, MD5, and SHS) MD2: Algorithm (Padding, checksum, passes.) MD4 and 5: algorithm (padding, stages, digest computation.) SHS: Overview, padding, stages.

Unit - 4. Public key Cryptography:

Algorithms, examples, Modular arithmetic (addition, multiplication, inverse, and exponentiation) RSA: generating keys, encryption and decryption. Other Algorithms: PKCS, Diffie-Hellman, El-Gamal signatures, DSS, Zero-knowledge signatures.

Unit- 5 Digital certificate & PKI

Introduction, Digital certificate, Private Key management, Public key cryptography standard, PKI and security.

Unit-6 Internet security protocols

Basic concepts, SSL, TLS, SHTTP, TSP, SET, SSL vs SET, Electronic money.

Reference Books -

1] Cryptography and network security by Atul Kahate second edition

M.Sc. (SAN) - 105

MOBILE COMPUTING

Elective – III

UNIT-I Mobile Physical Layer

Review of generation of mobile services, overview of wireless telephony, cellular concept, GSM: air-interface, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

UNIT – II Mobile Computing Architecture:

Issues in mobile computing, three tier architecture for mobile computing, design considerations, Mobile file systems, Mobile databases. WAP: Architecture, protocol stack, Data gram protocol, Wireless transport layer security, Wireless transaction protocol, wireless session protocol, application environment, and applications.

UNIT-III Mobile Data Link Layer

Wireless LAN over view, IEEE 802.11, Motivation for a specialized MAC, Near & far terminals, multiple access techniques for wireless LANs such as collision avoidance, polling, Inhibit sense, spread spectrum, CDMA, LAN system architecture, protocol architecture, physical layer MAC layer and management, Hiper LAN. IEEE 802.15 Blue tooth.

UNIT- IV MOBILE IP Network Layer

IP and Mobile IP Network Layer- Packet delivery and Handover Management-Location Management- Registration- Tunnelling and Encapsulation-Route Optimization- Dynamic Host Configuration Protocol.

UNIT – V Mobile Transport Layer

Traditional TCP/IP, Transport Layer Protocols-Indirect, Snooping, Mobile TCP.

UNIT-VI Support for Mobility

Data bases, Data dissemination, Service discovery, Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, Mobile devices and File systems, Data Synchronization, Sync ML.

Reference Books:

[1] J. Schiller, "Mobile Communications", 2nd edition, Pearson, 2011.

[2] Raj Kamal "Mobile Computing" Oxford Higher Education, Second Edition, 2012.

[3] Dharam prakash Agrawal and Qing-An Zeng, "Introduction to Wireless and Mobile Systems" 3rd edition, Cengage learning 2013.

Syllabus of M. Sc. (System Administration and Networking) – First Year
M. Sc. (SAN) - 201

Operating System

Unit-I Importance of Operating System

Definition of Operating System, Basic Concept & Terminology, Multi-User, Multiprocessor, Multiprogramming, Multi-Tasking, Extended Machine Concept, Hierarchical Machine Concept

Unit-II Memory Management

Single Contiguous memory management, Partition Memory Management, Relocatable Partition Memory Management, Paged Memory Management, Demand Page Memory Management

Unit-III Processor Management

Definition of Process, State Diagram of Process, Context Switching, Process Control Block Multiprocessor System

Unit -IV Process Synchronization

Race Condition, Synchronization mechanism, Deadlock, Deadlock Prevention, Deadlock Avoidance

Unit-V Device Management

Techniques of device Management - Dedicated, Shared, Virtual , Device Characteristics ,Channels & Control Units , I/O Traffic Controllers ,I/O Scheduler Device Handler

Unit-VI Information Management

Simple File System, General Model of file System.

Reference Books -

1. Operating System - Stuart E. Madnic & John J. Donovan

2. Operating System - Achyut Godbole

3. Operating System - By H. M. Deitel

Syllabus of M. Sc. (System Administration and Networking) – First Year

M. Sc. (SAN) - 202

Network Administration Part – I

Unit-I The TCP/IP and OSI Networking Models

The TCP/IP Protocol Architecture , The TCP/IP Application Layer , The TCP/IP Transport Layer , The TCP/IP Internet Layer , The TCP/IP Network Access Layer ,Data Encapsulation Terminology , Comparing OSI and TCP/IP, OSI Layers and Their Functions , OSI Layering Concepts and Benefits OSI Encapsulation Terminology.

Unit-II Fundamentals of LANs & WANs

An Overview of Modern Ethernet LANs , A Brief History OF Ethernet , Ethernet UTP Cabling UTP Cables and RJ-45 Connectors , Transmitting Data Using Twisted Pairs , UTP Cables inouts for 10BASE-T and 100BASE-TX , 1000BASE-T Cabling ,Improving Performance by Using Switches Instead of Hubs ,Increasing Available Bandwidth Using Switches, HDLC , Point-to-Point Protocol

Unit-III Fundamentals of IP Addressing and Routing

Overview of Network Layer Functions, PC1's Logic. Sending Data to a Nearby Router, R1 and R2's Logic. Routing Data across the Network, R3's Logic. Delivering Data to the End Destination, Network Layer Interaction with the Data Link Layer, IP Packets and the IP Header, Network Layer (Layer3) Addressing, Routing Protocols, IP Addressing, IP Routing.

Unit- IV LAN Switching

LAN Switching Concepts, Historical Progression. Hubs, Bridges, and Switches , Switching Logic LAN Switching Summary , Collision Domains and Broadcast Domains , Broadcast Domains The Impact of Collision and Broadcast Domains on LAN Design, Virtual LANs (VLAN)

Unit-V Operating CISCO LAN Switches

Foundation Topics , Accessing the Cisco Catalyst 2960 Switch CLI , Cisco Catalyst Switches and the 2960 Switch , Switch Status from LEDs , Accessing the Cisco IOS CLI , CLI Access from the Console , Accessing the CLI with Telnet and SSH , Password Security for CLI Access , 6.9 User and Enable (Privileged) Modes , CLI Help Features .

Unit-VI Routing Protocol Concepts

Connected and Static Routes , Connected Routes , Static Routes , Extended ping Command,Default Routes ,RIP-2 Basic Concepts , Comparing and Contrasting IP Routing Protocols , Interior and Exterior Routing Protocols

Reference Book -

1. CCENT/CCNA ICND1 (Official Exam Certification Guide, Second Edition) – Wendell Odom

Syllabus of MSc (System Administration & Networking) - First Year

M.Sc(SAN) - 203

WINDOWS SERVER 2012 ACTIVE DIRECTORY CONFIGURATION (Part-I)

Unit-1 Installing and configuring servers

Install servers, Configure servers , Configure local storage

Unit-2 Configuring server roles and features

Configure file and share access, Configure print and document services, Configure servers for remote management

Unit-3 Configuring Hyper-V

Create and configure virtual machine settings , Create and configure virtual machine storage, Create and configure virtual networks

Unit-4 Deploying and configuring core network services

Configure IPv4 and IPv6 addressing, Configure servers , Deploy and configure the DNS service

Unit-5 Installing and administering Active Directory

Install domain controllers , Create and manage Active Directory users , Create and manage Active Directory groups

Unit-6 Creating and managing Group Policy

Create Group Policy Objects, Configure security policies, Configure application restriction policies, Configure Windows Firewall

References Books :

1) MCTS Self-Paced Training Kit (Exam 70-410): Installing and Configuring Windows Server 2012
    - By Craig Zacker
    - MCTS Self-Paced Training Kit (Exam 70-410): Installing and Configuring Windows Server 2012 By Ian Maclean (Microsoft prepress)

Syllabus of M. Sc. (System Administration and Networking) – First Year

M. Sc. (SAN) - 204

Linux Administration Part – I

Unit-I Managing Users

User Accounts, Managing Groups , Managing Users , Managing Passwords , Getting System Administrator Privileges to Regular Users , The User Login Process , Disk Quotas .

Unit-II Managing the File system

The Fedora Core Linux File system Basics, Working with ext3 File system , Other File system Available to Fedora Core Linux , Creating a File system , Mounting File systems , Relocating a File system .

Unit- III Backing Up, Restoring, and Recovery

Choosing a Backup Strategy , Choosing a Backup Hardware and Media, Using Backup Software Copying Files , Undeleting Files ,System Rescue

Unit-IV Printing with Fedora

Overview of Fedora Printing , Configuring and Managing Print Services, Creating and Configuring Local Printers , Creating Network Printers , Console Print Control , Using the Common UNIX Printing System (CUPS) GUI

Unit-V Network Connectivity

Networking with TCP/IP , Network Organization , Hardware Devices for Networking , Using Network Configuration Tools , Dynamic Host Configuration Protocol , Using the Network File System , Putting Samba to work

Unit – VI Managing DNS

Configuring DNS, Essential DNS concept , Overview of DNS Tools ,Configuring Name servers with BIND , providing DNS for Real Domain

Reference Books –

1. Red Hat Linux and Fedora Unleashed – Bill Ball and Hoyt Duff
2. Linux - The Complete Reference
3. Linux Administration Handbook – Evi. Nemeth Prentice Hall
4. Linux Network Administrator's Guide - Olaf Kirch & Terry Dawson

Elective – II

M. Sc. (SAN) - 205

Next Generation Networks

UNIT I Converged Services for Next Generation Networks

GSM/UMTS Network protocols: SS7 and 14tandardi basics, Supplementary Services: UMTS procedures. Intelligent Network: IN principles, CAMEL, Services: what are the challenges? , Integration, deployment issues.

UNIT II Introduction to Next Generation Networks

IMS: the convergence. NGN architecture, NGN control architectures and protocols, Multi-access to the services: 3G, WiFi, DSL, Cable. TISPAN, SIP, Service architectures, Transition of networks (PSTN, IP-based) to NGN, Ipv6-based NGN, MEGACO, H.248, P2P systems, P2P SIP, Social Networks: Web-NGN convergence, Telco 2.0, IPTV, RCS. UMTS standardized14on at 3GPP: Standardisation process and principles in ETSI and 3GPP, Functionalities standardized in UMTS from Release 99 to Release 9. Latest 3GPP updates: what happened in 2010?

UNIT III Wireless Access and Transport Technologies

RAN architecture : Radio Access Network Architecture for GSM, GPRS and UMTS, network devices, interfaces and protocols , QoS definition and management in GPRS and UMTS, Access methods and radio resource management in mobile networks, mainly for: TDMA systems

UNIT IV CDMA systems and OFDMA systems.

Scheduling issues for GPRS, UMTS and WiMAX : downlink, uplink Physical to logical channel mapping : for GSM , for UMTS Procedure and protocol used for resource allocation ,PDP Context and TBF allocation.

UNIT V WPAN, WLAN, WMAN and Broadcast technologies

WLAN, WPAN, WMAN, DVB-H: Introduction ,WiFi: Standards, performance, usage and applications, new evolutions ,WiMAX, DVB-H :Usage and standard, Security :Basics, architectures, algorithms, Bluetooth: Standard, performance, usage and applications , Zigbee, UWB: Standards and usage, Service discovery in wireless Networks (jxta, UPnP,…) , Security in Wireless Networks: PANs, LANs and cellular Wireless Networks Simulation (tools and methods)

UNIT VI Optimization: Theory and Network applications

Graph algorithms, linear programming basics, Introduction to Integer programming, Traffic engineering, Network topology calculus, Network optimal routing and dimensioning, Frequency assignment, Pricing, Game theory.

Reference Books:

[1] Next Generation Network Services: Technologies & Strategies by Neill Wilkinson, Publication, Edition: 1.

[2] Next Generation Networks: Perspectives and Potentials by Jingming Li Salina, Pascal Salina, Publisher:John Wiley & Sons, 2008

[3] Next-Generation Network Services: By Robert Wood, Published Nov 1, 2005 by Cisco Press. Part of the Networking Technology series

[4] Best Practices for Implementing Next Generation Networks (NGN) in the Asia and Pacific Region, International Telecommunication Union, Telecommunication Development Bureau, June 2012.

Elective – II

M. Sc. (SAN) - 205

ADHOC AND SENSOR NETWORKS

UNIT I Ad Hoc Wireless Networks

Introduction. Issues in Ad Hoc Wireless Networks. Ad Hoc Wireless Internet.
MAC Protocols for Ad Hoc Wireless Networks:
Introduction, Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks. Design Goals of a MAC Protocol for Ad Hoc Wireless Networks. Classifications of MAC Protocols. Contention-Based Protocols. Contention-Based Protocols with Reservation Mechanisms. Contention-Based MAC Protocols with Scheduling Mechanisms. MAC Protocols in Directional Antennas. Other MAC Protocols

UNIT II Routing Protocols for Ad Hoc Wireless Networks:

Introduction to Routing algorithm, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks. Classifications of Routing Protocols. Table-Driven Routing Protocols. On-Demand Routing Protocols. Hybrid Routing Protocols. Routing Protocols with Efficient Flooding Mechanisms. Hierarchical Routing Protocols. Power-Aware Routing Protocols.

UNIT III Transport Layer and Security Protocols for Ad Hoc Wireless Networks:

Introduction. 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 in Ad Hoc Wireless Networks. Network Security Requirements. Issues and Challenges in Security Provisioning. Network Security Attacks. Key Management. Secure Routing in Ad Hoc Wireless Networks.

UNIT IV Wireless Sensor Networks:

Introduction. Sensor Network Architecture. Data Dissemination. Data Gathering. MAC Protocols for Sensor Networks. Location Discovery. Quality of a Sensor Network. Evolving Standards. Other Issues.

UNIT V Hybrid wireless Networks:

Introduction. Next-Generation Hybrid Wireless Architectures. Routing in Hybrid Wireless Networks. Pricing in Multi-Hop Wireless Networks. Power Control Schemes in Hybrid Wireless Networks. Load Balancing in Hybrid Wireless Networks.

UNIT VI Wireless Geolocation Systems:

Introduction. What is wireless Geolocation? Wireless Geolocation System Architecture. Technologies for Wireless Geolocation. Geolocation Standards for E-911 Services. Performance Measures for Geolocation Systems. Questions. Problems.

Recent Advances in Wireless Networks:
Introduction. Ultra-Wide-Band Radio Communication. Wireless Fidelity Systems. Optical Wireless Networks. The Multimode 802.11 -IEEE 802.11a/b/g. The Meghadoot Architecture, introduction to vehicular sensor networks.

Reference Books

[1] Toh, C. K., Ad hoc Mobile Wireless Networks Protocols and Systems, Prentice Hall, PTR, (2001) 3rd Edition.
[2] Pahlavan, Kaveh., Krishnamoorthy, Prashant., Principles of Wireless Networks, - A united approach - Pearson Education, (2002) 2nd ed.
[3] Wang X. and Poor H.V., Wireless Communication Systems, Pearson education, (2004) 3rd ed.
[4] Schiller Jochen., Mobile Communications, Person Education – 2003, 2nd ed.
[5] Carlos De Morais Cordeiro and Dharam P Agrawal, "Adhoc and Sensor Networks-Theory & Applications", 2nd Ed, Cambridge Univ Press India Ltd

Elective - II

M. Sc. (SAN) - 205

SYSTEM AND NETWORK ADMINISTRATION

UNIT- I System Hardware

PC and Server Hardware Architecture, Operating System Administration: UNIX, Windows, MAC OS. **entralization and Decentralization:** Centralized Authentication, Active Directories; LDAP; **torage:** RAID, Storage Area Network (SAN), Direct Attached Storage (DAS), Network Attached Storage (NAS); Data Integrity Backup and Recovery.

UNIT- II System Configuration

Cloning, Monitoring and Administering them; workstations, server, Data centers Data Center Management: Administering, Surveillance, Access Control, High Performance Computing, Virtualization and Cloud Computing.

UNIT- III Network Administration:

Network administrator (definition and functions), Network Planning, Routine system maintenance **Computer Networks:** OSI & TCP/IP Model, clean architecture;

UNIT – IV Switching & Routing

Layer 2 & Layer 3 switching; Routing; VLAN; Cisco L2 and L3 Switch Configuration; DHCP Configuration; IPv6, Wireless LAN: 802.11 a/b/g/n/ac WiFi; Access Point and Wireless Router configuration.

UNIT-V Internet Architecture

ISP Architecture; DNS Resolution; Content Mirroring, Internet Applications: DNS, Web, Mail, Proxy, NTP; **Perimeter Security:** Firewall, UTM,

UNIT-VI Network Security

LAN and WLAN Security issues; IP Spoofing; Dictionary Attack; DoS and DDoS Attack; Rogue/Misconfigured/External APs; Network Troubleshooting: ping, traceroute, nslookup, dig, tcpdump; Network Monitoring: SNMP; MRTG.

References Books:

[1] Thomas A Limoli, Christina J. Hogan , Strata R. Chalup " Theory and Practise of System and Network administration " Addison-Wesley Professional; 2 edition 2007

[2] Subramaniam Mani, Subramanian " Network Management: Principles And Practice" Pearson Education India, 2006

[3] Evi Nemeth, Garth Snyder, Trent R. Hein , Ben Whaley "UNIX and Linux System Administration Handbook" (4th Edition),