

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED.
Revised Syllabus of M.Sc.(SAN)
M.Sc.(SAN) FIRST YEAR
Revised Syllabus with effect from 2011-2012

CODE No.	SUBJECT TITLE	TEACHING PERIODS / WEEK		MAXIMUM MARKS		TOTAL MARKS (A+B)	DURATION OF EXAM Hours
		Theory	Practical	Theory / Practical (A)	Internal Test Marks (B)		
SEMESTER 1 :							
M.Sc.(SAN).S1.1	Fundamental of Computers	4	---	100	0	100	3
M.Sc.(SAN).S1.2	Computer Networks	4	---	100	0	100	3
M.Sc.(SAN).S1.3	Fundamental of LINUX Operating System	4	---	100	0	100	3
M.Sc.(SAN).S1.4	TCP/IP	4	---	100	0	100	3
M.Sc.(SAN).S1.PR1	Computer laboratory 1 (FC-DOS)	---	3	50	---	50	3
M.Sc.(SAN).S1.PR2	Computer laboratory 2 (Computer Network/Hardware)	---	3	50	---	50	3
M.Sc.(SAN).S1.PR3	Computer laboratory 3 (Linux O.S)	-----	3	50	---	50	3
TOTAL MARKS						550	
SEMESTER 2 :							
M.Sc.(SAN).S2.1	Operating System	4	---	100	0	100	3
M.Sc.(SAN).S2.2	Network Administration - Part I	4	---	100	0	100	3
M.Sc.(SAN).S2.3	Windows 2008 ADC - Part I	4	---	100	0	100	3
M.Sc.(SAN).S2.4	Linux Administration - Part I	4	---	100	0	100	3
M.Sc.(SAN).S2.PR1	Computer Laboratory 4 (Network Administration Part I)	---	3	50	---	50	3
M.Sc.(SAN).S2.PR2	Computer Laboratory 5 (Windows ADC Part-I)	---	3	50	---	50	3
M.Sc.(SAN).S2.PR3	Computer Laboratory 6 (Linux Administration - Part I)	---	3	50	---	50	3
TOTAL MARKS						550	
TOTAL MARKS (SEMESTER 1 + SEMESTER 2)						1100	

Syllabus of M.Sc. (System Administration & Networking) - First Year
M.Sc.(SAN).S1.1
Fundamental of Computers

(100 Marks)

1. Introduction **7Hrs**

- 1.1 Characters of computers
- 1.2 The Evolution of computer
- 1.3 The computer generations
- 1.4 Generations of Computer

2. Basic computer organization **7Hrs**

- 2.1 Input unit
- 2.2 Output unit
- 2.3 Storage unit
- 2.4 Arithmetic logic unit
- 2.5 Control unit
- 2.6 Central processing unit

3. Processor & Memory **7Hrs**

- 3.1 Central processing unit
- 3.2 The control unit
- 3.3 Arithmetic logic unit
- 3.4 Instruction sets
- 3.5 Registers
- 3.6 Processor speed
- 3.7 Types of processors
- 3.8 The main memory
- 3.9 Storage evaluation criteria
- 3.10 Main memory organization
- 3.11 Main memory capacity
- 3.12 RAM, ROM, PROM, EPROM, Cache Memory

4. Secondary Storage Devices **7Hrs**

- 4.1 Sequential and Direct-Access Devices
- 4.2 Magnetic tape
- 4.3 Basic principals of operation
- 4.4 Types of magnetic tapes
- 4.5 Advantages & disadvantages of magnetic tapes
- 4.6 Uses of magnetic tapes
- 4.7 Magnetic disks
- 4.8 basic principals of operations
- 4.9 types of magnetic disks
- 4.10 Advantages & limitations of magnetic disks
- 4.11 Magnetic disks
- 4.12 Optical disk

- 4.13 Basic principles of operation
- 4.14 Types of optical disks
- 4.15 Advantages & limitations of optical disks
- 4.16 Optical disks
- 4.17 Mass storage devices
- 4.18 Disk array
- 4.19 Automated tape library
- 4.20 CD-ROM jukebox
- 4.21 Storage hierarchy

5. Input Output Devices

7Hrs

- 5.1 Input devices
 - 5.1.1 Keyboard devices
 - 5.1.2 Point-and-draw devices
 - 5.1.3 Data scanning devices
 - 5.1.4 Digitizer
 - 5.1.5 Electronic card reader
- 5.2 Output devices
 - 5.2.1 Monitors
 - 5.2.2 Printers
 - 5.2.3 Plotters
 - 5.2.4 Screen image projector

6. Computer Languages

7Hrs

- 6.1 Machine Language
 - Advantages & Limitations of Machine Language
- 6.2 Assembly Language
 - Assembler
 - Advantages & limitations of Assembly Language
- 6.3 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).S1.2
Computer Networks

(100 Marks)

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|---|-------------|
| 1. Introduction | 7Hrs |
| 1.1 Uses of computer Networks. | |
| 1.2 Network Hardware- LAN, MAN, WAN. | |
| 1.3 Wireless Networks. | |
| 1.4 Network Software-Protocol Hierarchy, Design and Issues for Layer. | |
| 2. LAN Hardware | 8Hrs |
| 2.1 Network Interface Card. | |
| 2.2 Drivers. | |
| 2.3 Magnetic Media, Twisted Pair Cable, Coaxial Cable, Fiber optic cable. | |
| 2.4 Network Topologies- Bus, Ring, Star, Tree and other Topologies. | |
| 2.5 Networking Devices – Repeaters, Bridges, Routers, Gateways, Hub and Switch. | |
| 3. LAN Software | 9Hrs |
| 3.1 Client- Server Model. | |
| 3.2 File Server. | |
| 3.3 Database Server. | |
| 3.4 Print Server. | |
| 3.5 Peer- to- peer Networks. | |
| 4. Multiplexing and Switching | 8Hrs |
| 4.1 Concept of modulation and their application. | |
| 4.2 Multiplexing – Time division and Frequency division | |
| 4.3 Switching | |
| 4.3.1 Circuit Switching | |
| 4.3.2 Packet Switching | |
| 4.3.3 Message Switching. | |
| 5. Network Standards and Network protocols | 9Hrs |
| 5.1 OSI reference model. | |
| 5.2 TCP/IP reference model. | |
| 5.3 IP protocol, SMTP, PPP, FTP, HTTP, SNMP. | |
| 5.4 IP-addresses | |
| 5.5 Concept of DNS. | |
| 6. Introduction to ISDN, PBX, FDDI | 4Hrs |
| 6.1 ISDN Architecture. | |
| 6.2 Use of PBX. | |
| 6.3 FDDI. | |

7. Internet	8Hrs
7.1 Definition , Internet verses Intranet.	
7.2 Internet Service Providers.	
7.3 E-mail – Architecture and Services.	
7.4 WWW-Client side and Server side.	
7.5 URL, Messenger, Search Engine.	
8. Ethernet Standards (IEEE 802.3) and Introduction to Other Standards	3Hrs
9. TCP/IP Standard	4Hrs
9.1 File Transfer.	
9.2 E-mail, x.25, x.400.	
9.3 Internetworking.	
10. CASE STUDIES: Windows 2000 Server.	6Hrs.
10.1 Windows 2000 Server Overview	
10.2 Understanding and Using Active Directory Features.	
10.3 Managing and Creating User accounts.	
10.4 Creating and Managing Shared Folders-Managing Permissions.	

Books Recommended:

- 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.
- 5) Mark Minasi, Christa Anderson, Brian Smith, Doug Toombs “Windows 2000 Server”BPB publication.

Syllabus of M.Sc. (System Administration & Networking) - First Year
M.Sc.(SAN).S1.3

Fundamental of Linux Operating System

(100 Marks)

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|---|--------------|
| 1. Introduction to Fedora: | 6Hrs |
| 1.1 Features of Fedora | |
| 1.2 Hardware Requirements | |
| 1.3 Fedora Installation. | |
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| 2. First Steps with Fedora: | 8Hrs |
| 2.1 Working with the Linux File System | |
| 2.2 Logging In to and Working with Linux | |
| 2.3 Changing User Information | |
| 2.4 Reading Documentation | |
| 2.5 Using the Shell | |
| 2.6 Using the Text Editors | |
| 2.7 Working with Permissions. | |
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| 3. Linux Commands and Utilities | 15Hrs |
| 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. | |
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| 4. The X Window System: | 6Hrs |
| 4.1 Basic X Concepts | |
| 4.2 Using XFree86 | |
| 4.3 Starting X | |
| 4.4 Selecting and Using X Window Managers. | |
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| 5. Managing Services: | 7Hrs |
| 5.1 Fedora Core Linux Boot Process | |
| 5.2 System Services and Runlevels | |
| 5.3 Controlling Services at Boot with Administrative Tools | |
| 5.4 Starting and Stopping Services Manually. | |
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| 6. Managing Software and System Resources: | 8Hrs |
| 6.1 Using RPM for Software Management | |
| 6.2 Controlling Software from Source | |
| 6.3 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).S1.4
TCP/IP

(100 Marks)

11. Introduction and overview	7Hrs
The motivation for Internetworking. The TCP/IP Internet. Internet services. History and scope of the Internet. The Internet Architecture Board. The Internet Society.	
12. Reviews of Underlying Network Technologies	8Hrs
Introduction. Two Approaches to Network communication, WAN, LAN. Ethernet Technology. Fiber Distributed Data Interconnection(FDDI).	
13. Internetworking Concepts and Architectural Model	9Hrs
Introduction. Application level Interconnection, properties of the Internet. Network level Interconnection. Internet Architecture.	
14. Internet Addresses	8Hrs
Introduction. Universal Identifiers. Three Primary classes of IP- addresses. Network and Broadcast addresses. Addresses specify Network connection.	
15. Internet Protocol: Connectionless Data gram Delivery.	9Hrs
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.	

16. Reliable Stream Transport Service (TCP)	8Hrs
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.	
17. TCP/IP over ATM Networks.	3Hrs
Introduction. ATM Hardware. Large ATM Networks.	
18. Mapping Internet Addresses to Physical Addresses (ARP).	4Hrs
Introduction. The address resolution problem. Two types of Physical addresses. Resolution through Direct mapping. Resolution through Dynamic binding.	
19. Determining an Internet Address at Startup (RARP).	2Hrs
Introduction. Reverse Address Resolution protocol. Timing RARP.	

Books Recommended:

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

Syllabus of M.Sc. (System Administration & Networking) - First Year
M.Sc.(SAN).S2.1
Operating System

(100 Marks)

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|---|---------------|
| 1. Importance of Operating System | 10 Hrs |
| 1.1 Definition of Operating System | |
| 1.2 Basic Concept & Terminology | |
| 1.3 Multi-User | |
| 1.4 Multiprocessor | |
| 1.5 Multiprogramming | |
| 1.6 Multi Tasking | |
| 1.7 Extended Machine Concept | |
| 1.8 Hierarchical Machine Concept | |
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| 2. Memory Management | 12Hrs |
| 2.1 Single Contiguous memory management | |
| 2.2 Partition Memory Management | |
| 2.3 Relocatable Partition Memory Management | |
| 2.4 Paged Memory Management | |
| 2.5 Demand Page Memory Management | |
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| 3. Processor Management | 7Hrs |
| 3.1 Definition of Process | |
| 3.2 State Diagram of Process | |
| 3.3 Context Switching | |
| 3.4 Process Control Block | |
| 3.5 Multiprocessor System | |
| 3.6 Race Condition | |
| 3.7 Deadlock | |
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| 4. Device Management | 6 Hrs |
| 4.1 Techniques of device Management | |
| 4.1.1 Dedicated | |
| 4.1.2 Shared | |
| 4.1.3 Virtual | |
| 4.2 Device Characteristics | |
| 4.3 Channels & Control Units | |
| 4.4 I/O Traffic Controller | |
| 4.5 I/O Scheduler | |
| 4.6 Device Handler | |
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| 5. Information Management | 6Hrs |
| 5.1 Simple File System | |
| 5.2 General Model of file System | |

Reference Books:

- 1) Operating System -By Stuart E. Madnic & John J. Donovan
- 2) Operating System -By Achyut Godbole
- 3) Operating System -By H.M.Deitel

Syllabus of M.Sc. (System Administration & Networking) - First Year
M.Sc.(SAN).S2.2

Network Administration - Part I

(100 Marks)

1. The TCP/IP and OSI Networking Models **8Hrs**

- 1.1 The TCP/IP Protocol Architecture
- 1.2 The TCP/IP Application Layer
- 1.3 The TCP/IP Transport Layer
- 1.4 The TCP/IP Internet Layer
- 1.5 The TCP/IP Network Access Layer
- 1.6 Data Encapsulation Terminology
- 1.7 Comparing OSI and TCP/IP
- 1.8 OSI Layers and Their Functions
- 1.9 OSI Layering Concepts and Benefits
- 1.10 OSI Encapsulation Terminology

2. Fundamentals of LANs **7Hrs**

- 2.1 An Overview of Modern Ethernet LANs
- 2.2 A Brief History OF Ethernet
- 2.3 Ethernet UTP Cabling
- 2.4 UTP Cables and RJ-45 Connectors
- 2.5 Transmitting Data Using Twisted Pairs
- 2.6 UTP Cables Pinouts for 10BASE-T and 100BASE-TX
- 2.7 1000BASE-T Cabling
- 2.8 Improving Performance by Using Switches Instead of Hubs
- 2.9 Increasing Available Bandwidth Using Switches

3. Fundamentals of WANs **6Hrs**

- 3.1 WAN Connections from the Customer Viewpoint,
- 3.2 WAN Cabling Standards,
- 3.3 Clock Rates, Synchronization, DCE, and DTE,
- 3.4 Building a WAN Link in a Lab,
- 3.5 Link Speeds Offered by Telco's,
- 3.6 HDLC,
- 3.7 Point-to-Point Protocol,
- 3.8 Point-to-Point WAN Summary,
- 3.9 The Scaling Benefits of Packet Switching,

4. Fundamentals of IP Addressing and Routing **7Hrs**

- 4.1 Overview of Network Layer Functions,
- 4.2 PC1's Logic: Sending Data to a Nearby Router,
- 4.3 R1 and R2's Logic: Routing Data across the Network,
- 4.4 R3's Logic: Delivering Data to the End Destination,
- 4.5 Network Layer Interaction with the Data Link Layer,
- 4.6 IP Packets and the IP Header,

- 4.7 Network Layer (Layer3) Addressing,
- 4.8 Routing Protocols,
- 4.9 IP Addressing,
- 4.10 IP Routing,

5. LAN Switching

6Hrs

- 5.1 LAN Switching Concepts,
- 5.2 Historical Progression: Hubs, Bridges, and Switches,
- 5.3 Switching Logic,
- 5.4 LAN Switching Summary,
- 5.5 Collision Domains and Broadcast Domains,
- 5.6 Broadcast Domains,
- 5.7 The Impact of Collision and Broadcast Domains on LAN Design ,
- 5.8 Virtual LANs (VLAN),

6. Operating CISCO LAN Switches

8Hrs

- 6.1 Foundation Topics
- 6.2 Accessing the Cisco Catalyst 2960 Switch CLI,
- 6.3 Cisco Catalyst Switches and the 2960 Switch,
- 6.4 Switch Status from LEDs,
- 6.5 Accessing the Cisco IOS CLI,
- 6.6 CLI Access from the Console,
- 6.7 Accessing the CLI with Telnet and SSH,
- 6.8 Password Security for CLI Access,
- 6.9 User and Enable (Privileged) Modes,
- 6.10 CLI Help Features,

7. Routing protocol concepts

7Hrs

- 7.1 Connected and Static Routes
- 7.2 Connected Routes,
- 7.3 Static Routes ,
- 7.4 Extended ping Command,
- 7.5 Default Routes,
- 7.6 RIP-2 Basic Concepts,
- 7.7 Comparing and Contrasting IP Routing Protocols,
- 7.8 Interior and Exterior Routing Protocols,

Reference Book

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

Syllabus of M.Sc. (System Administration & Networking) - First Year
M.Sc.(SAN).S2.3

WINDOWS SERVER 2008 ACTIVE DIRECTORY CONFIGURATION (Part-I)
(100 Marks)

1. INSTALLATION	7Hrs
1.1 Installing Active Directory Domains Services	
1.2 Active Directory Domain Service on Server Core	
2. ADMINISTRATION	8Hrs
2.1 Working with Active Directory Snap-ins	
2.2 Creating Objects in Active Directory	
2.3 Delegation and Security of Active Directory Objects	
3. USERS	8Hrs
3.1 Automating the Creation of User Accounts	
3.2 Creating Users with Windows Power Shell and VBScript	
3.3 Supporting User Objects and Accounts	
4. GROUPS	6Hrs
4.1 Creating and Managing Groups	
4.2 Automating the Creation and Management of Groups	
4.3 Administering Groups in an Enterprise	
5. COMPUTERS	4Hrs
5.1 Creating Computers and Joining the Domain	
5.2 Automating the Creation of Computer Objects	
5.3 Supporting Computers Objects and Accounts	
6. GROUP POLICY INFRASTRUCTURE	8Hrs
6.1 Implementing Group Policy	
6.2 Managing Group Policy Scope	
6.3 Supporting Group Policy	
7. GROUP POLICY SETTINGS	7Hrs
7.1 Delegating the Support of Computers	
7.2 Managing Security Settings	
7.3 Managing Software with Group Policy Software Installation	
7.4 Auditing	
8. AUTHENTICATION	6Hrs
8.1 Configuring Password and Lockout Policies	
8.2 Auditing Authentication	
8.3 Configuring Read-Only Domain Controllers	

9. INTEGRATING DOMAIN NAME SYSTEM WITH AD DS

5Hrs

9.1 Understanding and Installing Domain Name System

9.2 Configuring and Using Domain Name System

Reference Books :

- 1) MCTS Self-Paced Training Kit (Exam 70-640): Configuring Windows Server 2008 Active Directory:-
 - By [Nelson Ruest, and Danielle Ruest Dan Holme](#) (Microsoft press)
- 2) Windows Server 2008 Active Directory Resource Kit
 - By [Stan Riemer, Conan Kezema ,Mike Mulcare , Byron Wright](#) (Microsoft press)
- 3) Mastering Active Directory for Windows Server 2008
 - By [John A. Price , Brad Price , Scott Fenstermacher](#) (sybex press)
- 4) MCTS: Windows Server 2008 Active Directory Configuration Study Guide: Exam 70-640
 - By [William Panek , James Chellis](#) (Sybex press)

Syllabus of M.Sc. (System Administration & Networking) - First Year
M.Sc.(SAN).S2.4

Linux Administration - Part I

(100 Marks)

20. Managing Users **8Hrs**

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

21. Managing the File system **8Hrs**

- 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

22. Backing Up, Restoring, and Recovery **7Hrs**

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

23. Printing with Fedora **7Hrs**

- 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

24. Network Connectivity **9Hrs**

- 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

25. Managing DNS

9Hrs

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

Reference Books:

3. Red Hat Linux and Fedora Unleashed – By Bill Ball and Hoyt Duff.
4. Enterprise Linux & Fedora Edition: *The Complete Reference*
-By Richard L. Petersen
5. Linux Administration Handbook By – Evi Nemeth Prentice Hall
6. Linux Network Administrator's Guide By- Olaf Kirch & Terry Dawson