



RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN COMPUTER HARDWARE & MAINTENANCE

SEMESTER: SIXTH
COURSE CODE: 601

SCHEME: JUL.09
PAPER CODE:

NAME OF COURSE: NETWORK DEVICES CONFIGURATION
COMMON WITH PROGRAM (S): COMPUTER HARDWARE & MAINTENANCE

Rationale

This section covers basic network configuration set up and testing. Also covered are basic concepts and operations, including the difference between LAN and WAN networks and how IP Addressing is used. In a networked environment, such as a company, typically there are many computers connected together using a **router** or a **switch** (for more information, see router or switch in the definitions section). In larger companies, there may be several different routers distributed in buildings and plant locations. A router allows any LAN-side computer communicate with computers and devices outside the LAN (local area network). Routers send data packets from one place to another place on a network. Routers use network addresses to route packets to the correct destination. For example, in a TCP/IP network, the IP (internet protocol) address of the network interface is used to direct router destinations.

Because routers help computers inside the LAN “talk” with computers outside of the LAN. The security of a company’s LAN may be compromised by gaps of open ports in the router. Security measures may have been instituted to compensate for these vulnerabilities. Consult your network administrator to learn about the security measures taken to protect your network. VPN, or virtual private network, is one such security measure to protect the intelligence of the LAN. A computer outside the LAN must have an address or key known by the VPN to allow access to the LAN. Many companies use a VPN to connect two different LANs, thus allowing the transfer of data between the two networks.



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SCHEME OF STUDIES AND SPECIFICATION TABLE

Lectures: **6**Hrs. per week
Practical: **2** Hrs. per week

SCHEME OF STUDIES

S.No.	TOPICS	THEORY (HRS.)	PRACTICAL (HRS)	TOTAL (HRS)
1.	Networking fundamentals :	15	05	20
2.	Networking Media :	15	05	20
3.	Ethernet fundamentals :	08	05	13
4.	TCP/IP Protocol and IP addressing :	08	05	13
5.	Routing Fundamentals and Subnets:	07	05	12
6.	Switching Basics and Intermediate Routing:	07	05	13
	TOTAL	60	30	90



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COURSE CONTENT

Lectures: 6 Hrs. per week

S.No.	Course Content	Hours of study
1	Networking fundamentals : <ul style="list-style-type: none">• Communication model, communication tasks, categories of communication networks into LAN, MAN, WAN.• Protocols: characteristics and functions, network models: layered models, using layers for data communication, the OSI reference model, OSI layers and functions, tcp/ip model, encapsulation process, overview of different protocols associated with each layers.• Overview of network devices: Repeaters, hubs, network interface cards, switches, bridges, routers. Voice, DSLI, Cable modem and optical devices, security devices, wireless devices.• Transmission terminology: frequency, spectrum, bandwidth, transmission impairments.• Network topologies: bus, star and ring, hierarchical topology, full mesh and partial mesh topologies, logical topology	15
2	Networking Media : <ul style="list-style-type: none">• Copper Media: American Wire Gauge, Twisted pair cable, STP and UTP, Coaxial cable, Cable specification and Termination.• Optical Media: The Electromagnetic Spectrum, Total Internal reflection, OFCs, Multimode and Single Mode cables, Cable Designs, Optical Networking components, Signals and Noises in OFC, Installation, care and Testing of Optical Fiber. Network Cabling and Testing: Analog and Digital bandwidth, Signals and Noises on Network media, Structured Cabling Systems, Standards and Codes, Tools, Installation process.• Cabling the LANs: LAN physical layer, Ethernet Media and Connection Requirements, LAN connection Devices, Peer-peer Networks and Client Server Network installation., Cabling• WAN: WAN physical layer, WAN serial connection, Routers and Serial, ISDN,DSL and Cable connections. Setting up Console connection	15
3	Ethernet fundamentals: <ul style="list-style-type: none">• Introduction to Ethernet, Ethernet and OSI Model, MAC addressing, Ethernet frame structure and fields.• Ethernet Operation: Media Access control, Ethernet MAC, Simplex, Duplex operations, Ethernet timing, Interframe spacing, Error Handling, Types of collisions, Ethernet errors, Collision Domains and Broadcast Domains. Ethernet technologies and Ethernet switching: 10 and 100 mbps Ethernet,	08

	gigabits, 10gbps and future Ethernet, Ethernet switching: layer 2 and layer 3 switching, microsegmentation, switching modes and brief overview of spanning tree protocol	
4	TCP/IP Protocol and IP addressing : <ul style="list-style-type: none"> TCP/IP model and its comparison with OSI Model, Internet Architecture. IP address: IPV4 addressing, IP Address classes, Reserved IP addresses, Public and Private addresses, Subnetting ,Fields in IPV4 Header, overview of IPV6 and its comparison with IPV4.Obtaining IP addresses, Static assignment, ARP and RARP, BOOTP and DHCP. 	08
5	Routing Fundamentals and Subnets: <ul style="list-style-type: none"> Routed, Routable and Routing protocols. The mechanism of Subnetting, CIDR. TCP/IP Transport and Application Layer: TCP/IP transport layer: Flow control, Sessions. Windowing, TCP and UDP, port Numbers. Application layer: DNS, FTP, TFTP,HTTP,SMTP,SNMTP, Telnet Routing & Routers WANs and Routers: WAN characteristics, WAN routers. Router Fundamentals: Router Boot Sequences and setup mode, Establishing HyperTerminal session, CISCO IOS software fundamentals. Router Configuration. Managing CISCO IOS software, Introduction to CDP, getting information about remote Devices. Routing and Routing protocols: Routing basics, Static routing, dynamic routing, identifying the class of routing protocols. Distance Vector Routing protocols: Distance vector Routing, Examining Routing table, RIP features, IGRP.TCP/IP Error and Control Messages: ICMP, TCP/IP suite Control Messages. Basic Router trouble shooting. Intermediate TCP: The TCP/IP protocol suite, Overview of Transport layer ports, TCP/IP and Internet Layer. Access Control Lists: ACL overview, Creating and Using ACL, Working of ACL, Standard ACLs, Extended ACLs, Named ACLs, Firewall. 	07
6	Switching Basics and Intermediate Routing: <ul style="list-style-type: none"> Introduction to classless Routing: CIDR, VLSM, Route summarization, Route Flapping, RIP version 2, default routers. Single area OSPF: Concepts of OSPF, configuration of OSPF. Enhanced IGRP overview, EIGRP features and Technologies, EIGRP packet types, convergence, configuring EIGRP Switching concepts and LAN design: Ethernet LANs, LAN switching, basic operation of a switch LAN design. Switches: Overview, Starting switches, LAN switches and Hierarchical network design, Core layer Overview. Switch configuration: Micro segmentation, Switch forwarding, Switches and Collision domains, Communication between switches and PCs. Configuration of a Catalyst switch. Managing MAC address Table. Spanning Tree protocol: redundant topology overview, Spanning Tree overview, STP and RSTP. Virtual LANs: VLAN introduction, Broadcast Domain with VLAN and Routers, Operation and benefits of VLANs, VLAN configuration, VLAN frame identification. VLAN trunking protocol: Trunking, VTP, Inter-VLAN routing. Wireless Networking: Brief introduction to Protocols, Standards, Wireless Networking devices 	07
	Total	60



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LIST OF EXPERIMENTS

Practical: 2 Hrs. per Week

S.No.	Name of experiments	Hours of Study
1.	Installing Microsoft Windows XP professional operating system. • Configuring printers on Microsoft Windows 2003 based networks. • Installing Microsoft Windows 2003 Server operating system • Installing Active Directory and configuring directory services. • Creating domain users & groups using active directory. • Assigning permissions to specific folders & mapping network drives. • Configure Microsoft Windows group policy elements.	05
2.	Implement IP Routing in the given network scenario. • Configure the router interfaces as per the given scenario. • Create static and default routes and verify the results. • Configuring Router Information Protocol (RIP) and verify routing tables.	05
3.	• Configure Enhanced Interior Gateway Routing Protocol (EIGRP) and verify routing tables. • Configure Open Shortest Path First (OSPF) protocols and verify routing tables. • Configure access control lists and apply it to the interfaces	05
4.	• Configuring TCP/IP settings & installing service pack on Windows 2003 Server. • Installing SMTP & NNTP services. • Installing Active Directory & DNS Server on Microsoft Windows 2003 Server. • Prepare Active Directory Forest & Domain for Exchange using Forest-prep and Domain-prep.	05
5.	• Install Microsoft Exchange Server 2003, Enterprise Edition. • Installing SMTP Connector on Microsoft Exchange 2003. • Creating Mail-enabled users and Mailboxes for the existing users. • Creating and applying recipient policies.	05
6.	• Configuring Microsoft Outlook with Microsoft Exchange Server 2003.	05
TOTAL		30



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BOOKS RECOMMENDED.

TEXT BOOK

1. Windows Server 2003 network administration, [Craig Hunt](#), [Roberta Bragg](#), O'Reilly Media, Inc., 2005

REFERENCES:

1. Networking Device Drivers, [Sanjay Dhawan](#), John Wiley & Sons Inc, 1995
2. The computer networking book, [Peter O'Dell](#), [Marion Laird](#), edition illustrated, Ventana Press, 1989
3. Computer Networks, Andrew S Tanenbaum, Publisher- PHI, New Delhi
4. B. A. Fourozan, TCP/IP Protocol Suite, Tata McGraw Hill
5. Internetworking with TCP/IP, Douglas E. Comer, Publisher- PHI, New Delhi



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NAME OF COURSE: **LINUX SERVER ADMINISTRATION**

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RATIONALE

The objective of the course is to make students aware of a Linux Server administration. This course will serve as an advanced course in the Linux. The students are expected to learn to install and maintenance of the Linux Server After completion of the course students will be able to:

- Understand Linux Server concepts.
- Handle the Administrative Tasks.
- Understand the Network Setting.
- Perform Domain Name System Setting.
- Configure the Networking Services.



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SCHEME OF STUDIES

Unit	Topic	Mini. Hrs
I	Installing Linux in Server Configuration	10
II	Booting of Kernel	10
III	System Administration	12
IV	Network Configuration	10
V	Domain Name System (DNS) and File Transfer Protocol	13
VI	Apache server	08
VII	Internet Services	12
	Total Hrs.	75



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COURSE CONTENT

Unit		Min. Hrs
1	Installing Linux as a Server 1.1 Hardware Requirements 1.2 Methods of installation 1.3 Installing Fedora 1.4 Installing Ubuntu 1.5 Software Package Management & installation of GNU software	10
2	Booting of Kernel 2.1 Boot Loader-GRUB,LILO 2.2 Kernel and source code of the kernel 2.3 Bootstrapping 2.4 Kernel configuration 2.5 The init Process 2.6.Enabling and Disable services	10
3	System administration 3.1 Role of system administrator 3.2 Manage the users and groups 3.3 Monitoring the System 3.4 Managing drives and media 3.5 Creating and Editing Disk partition 3.6 Backup and restore files 3.7 Disk Usage Analyzer 3.8 Setting up and managing computer Network	12



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4	Network Configuration 4.1 Modules and Network Interfaces 4.2 Network Device Configuration utilities 4.3 IP aliasing 4.4 Setting Up NIC at Boot Time 4.5 Managing Routes 4.6 Simple Usage 4.7 Displaying Routes 4.8 Static and Dynamic Routing.	10
5	Domain Name System (DNS) and File Transfer Protocol 5.1 Working principal of DNS 5.2 Domain and Host Naming Convention. 5.3 Installation of DNS Server 5.4 DNS Toolbox :-host, dig, nslookup, whois, nsupdate, configuring the clients 5.5 FTP: vsftpd, starting and testing FTP server.	13
6	Apache server 6.1 HTTP protocol. 6.2 Starting apache at boot time. 6.3 Testing the installation. 6.4 Configuring apache server.	08



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7	<p>Internet Services</p> <p>7.1 Mail Server: SMPT, POP and IMAP basics and settings.</p> <p>7.2 Secure Shell: Public key cryptography, OpenSSH and OpenBSD,</p> <p>7.3. Network File Systems (NFS), Network Information Services(NIS)</p> <p>7.4 SAMBA server.</p> <p>7.5 LDAP, Printing, DHCP, Virtualization.</p>	12
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List of Experiments

Practical: 2 Hrs. per Week

S.No	Name of experiments	Hours of Study
1.	Create the Hard Disk partitions	02
2.	Installing Linux Server and Manage the GNU software.	04
3.	Configure the Linux Kernel and enable or disable the required services.	02
4.	Create the User accounts and group	02
5.	Create the backup of the files and restore them	02
6.	Configure Linux Server for accessing its services form the host computer.	04
7.	Configure the Domain Name Server.	02
8	Configure the Apache Server	02
9.	Configure the Mail Server	02
10	Configure the SAMBA Server	02
11	Set the File Transfer Protocol	02
12	Set the Dynamic Host Configuration Protocol	02
13	Configure the Network Information Services	02
	Total	30



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RECOMMENDED BOOKS

1. Linux Administration: A Beginner's Guide Fifth Edition, Wale Soyinka, McGraHill
2. Linux Administration: A Beginner's Guide, 3rd Edition, By Steven Graham, Steve Shah, Wiley-India



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SEMESTER: SIXTH

COURSE CODE: 603

NAME OF COURSE: **NETWORK SECURITY AND CYBER LAW**

SCHEME: JUL.09

PAPER CODE:

COMMON WITH PROGRAM (S): COMPUTER HARDWARE & MAINTENANCE

RATIONALE

In a network, the hosts most vulnerable to attack are those that provide services to users outside of the local area network, such as e-mail, web and DNS servers. Every organization want that his network with proper secure and having good performance.

The course will enable students to protect the host from the unauthorized access using antivirus, secrete communication and applying the security option.

This subject provides the basics of secrete communication, network security, cyber law and applying the security option.



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SEMESTER: SIXTH

COURSE CODE: 603

NAME OF COURSE: **NETWORK SECURITY AND CYBER LAW**

SCHEME: JUL.09

PAPER CODE:

COMMON WITH PROGRAM (S): COMPUTER HARDWARE & MAINTENANCE

Lectures: **5** Hrs. per week

SCHEME OF STUDIES

Unit	Topic	Min. Hrs
I	Network Security	08
II	Information System Security Management	08
III	Secrete Communication	15
IV	Security at Application Layer & Transport Layer	15
V	Security at Network Layer	10
VI	System Security	10
VII	Cyber Law	09
	Total Hrs.	75



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COURSE CONTENT

Lectures: 5 Hrs. per week

Unit		Min. Hrs
1	Network security 1.1 Security Overview, Computer Security, Network Security, Key Principles of Network Security-Confidentially, Integrity, Availability. 1.2 Threats to Security, Need of Security, Types of Security, Security Issues.	08
2	Information System Security Management 2.1 Security Polices, Security Awareness, Security Control - Physical Controls, Procedural Controls, Technical Controls and Legal and liability. 2.2 Identification and Authentication- Password, Biometrics, Single Sign On.	08
3	Secrete Communication 3.1 Introduction to Secrete Communication, Basics of Cryptography – Substitution Cipher, Cryptographic Primitives. 3.2 Encryption, Symmetric Encryption- Stream Cipher, Block cipher, Sharing Keys. 3.3 Asymmetric Encryption- Using Certificate Authority, Digital signature, SSL(Secure Socket Layer), TLS (Transport Secure Layer), Hashing Algorithms.	15

4	<p>Security at Application Layer & Transport Layer.</p> <p>Application Layer:-</p> <p>4.1 E-mail Security</p> <p>4.2 Pretty Good Privacy(PGP)</p> <p>4.3 Secure/ Multipurpose Internet Mail Extension (S/MIME)</p> <p>Transport Layer:-</p> <p>4.4 SSL Architecture and message format</p> <p>4.5 Transport Layer Security</p>	15
5	<p>Security at Network Layer</p> <p>5.1 Transport and Tunnel Mode</p> <p>5.2 Authentication Header protocol and Encapsulating Security Protocol</p> <p>5.3 Security Association and Policy</p> <p>5.4 Internet Key Exchange</p>	10
6	<p>System Security</p> <p>6.1 Description of the System</p> <p>6.2 Users, Trust and Trusted Systems</p> <p>6.3 Buffer Overflow and Malicious Software</p> <p>6.4 Malicious Programs</p> <p>6.5 Worms and Virus</p> <p>6.6 Instruction Detection system and Firewall</p>	10

7	<p>Cyber Law</p> <p>7.1 Cyber law :- Introduction and Need</p> <p>7.2 Evolution of Cyber law</p> <p>7.3 Cyber Crime and its Classifications</p> <p>7.4 Punishment/Provision in Different Cyber Crime.</p>	09
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RECOMMENDED BOOKS

1. Cryptography and Network Security. By Behrouz A Forouzan and Deddeep Mukhopadhyay
2. Fundamentals of Network Security by John E. Canavan
3. Network Security Bible by Dr. Eric Cole, Dr. Ronald Krutz, and James W. Conley
4. Network Security by Charkie Kauman, Radia Perlman, Mike Specianer.