M.Sc. (Network Technology and Management)

Programme Code: MNT

Duration – 2 Years Full Time

**Programme Structure
and
Curriculum & Scheme of Examination**

**2017
(Choice Based Credit System)**

AMITY UNIVERSITY

RAJASTHAN

PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students and encourage them to reach the pinnacle of success. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Core and Elective), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The scheme of examination defines the various components of evaluation and the weightage attached to each component. The different codes used for the components of evaluation and the weightage attached to them are:

Components	Codes	Weightage (%)
Case Discussion/ Presentation/ Analysis	C	05-10
Home Assignment	H	05-10
Project	P	05-10
Seminar	S	05-10
Viva	V	05-10
Quiz	Q	05-10
Class Test	CT	10-15
Attendance	A	05
End Semester Examination	EE	70

It is hoped that it will help the students study in a planned and a structured manner and promote effective learning. Wishing you an intellectually stimulating stay at Amity University.

July, 2017

PROGRAMME STRUCTURE

FIRST SEMESTER

CODE	COURSE	CATEGORY	L	T	P/FW	CREDITS
MNT101	Data Communication	CC	2	1	-	3
MNT102	Core Hardware	CC	2	1	-	3
MNT103	Operating Systems	CC	2	1	-	3
MNT104	System Administration – I	CC	2	1	2	4
MNT105	Network Fundamentals	CC	2	1	2	4
MNT106	Computer Programming in C Language	CC	2	1	2	4
DE Electives: Student has to select 1 course from the list of following DE electives						
MNT130	Network devices & Hardware	DE	2	1	-	3
MNT131	Telecommunication Networks	DE				
MNT132	Mobile Communication	DE				
OPEN ELECTIVES						
	Open Electives	OE	2	1	-	3
VALUE ADDITION COURSES						
BCS111	Communication Skills – I	VA	1	-	-	1
BSS111	Behavioural Science - I	VA	1	-	-	1
FLF111 FLG111 FLS111 FLC111	Foreign Language - I French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**31**

SECOND SEMESTER

CODE	COURSE	CATEGORY	L	T	P/FW	CREDITS
MNT201	Wireless LAN	CC	2	1	-	3
MNT202	Network Planning & Design	CC	2	1	-	3
MNT203	System Administration - II	CC	3	1	2	5
MNT204	Routing Protocols and Concepts	CC	2	1	2	4
MNT205	LAN Switching and Wireless	CC	2	1	2	4
DE Electives: Student has to select 1 course from the list of following DE electives						
MNT230	Cloud Computing	DE	2	1	-	3
MNT231	Wireless Communication	DE				
MNT232	Emerging Technologies - I (VoIP & IPv6)	DE				
MNT233	Network Management	DE				
MNT234	Ad-Hoc Networks	DE				
MNT235	High Performance Networks	DE				
OPEN ELECTIVES						
	Open Electives	OE	2	1	-	3
VALUE ADDITION COURSES						
BCS211	Communication Skills - II	VA	1	-	-	1
BSS211	Behavioural Science - II	VA	1	-	-	1
FLF211 FLG211 FLS211 FLC211	Foreign Language - II French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**29**

SUMMER PROJECT

THIRD SEMESTER

CODE	COURSE	CATEGORY	L	T	P/FW	CREDITS
MNT301	System Administration - III (including Linux/Unix)	CC	3	1	2	5
MNT302	Accessing the WAN	CC	3	1	2	5
MNT360	Summer Project (Evaluation)	CC	-	-	-	6
DE Electives: Student has to select 1 course from the list of following DE electives						
MNT330	Information Security System	DE	2	1	-	3
MNT331	Optical Technologies	DE				
MNT332	Satellite Communication	DE				
MNT333	IT Enabled Services	DE				
MNT334	Network Simulation & Modeling	DE				
OPEN ELECTIVES						
	Open Electives	OE	2	1	-	3
VALUE ADDITION COURSES						
BCS311	Communication Skills - III	VA	1	-	-	1
BSS311	Behavioural Science - III	VA	1	-	-	1
FLF311 FLG311 FLS311 FLC311	Foreign Language - III French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**26**

FOURTH SEMESTER

CODE	COURSE	CATEGORY	L	T	P/FW	CREDITS
MNT401	Network Security	CC	3	1	-	4
MNT402	Emerging Technologies - II (Data Storage Solutions)	CC	3	1	-	4
MNT450	Dissertation		-	-	-	26
	TOTAL					**34**

DATA COMMUNICATION

Course Code	L	T	P/FW	Credit
MNT101	2	1	0	3

Course Objective:

The course aims at giving the students in-depth knowledge of digital modulation, ways of digital communication during transmission and its varied application in different types of transmission medium.

Course Contents:

Module I: Communication Theory
Amplitude modulation system: Band pass systems and signals, Frequency Modulation systems: Spectrum of an FM signals, Narrowband and wideband FM Pulse Modulation systems: Sampling Theorem, Generation and demodulation of PAM, PWM, PPM. Quantization of signals, quantization error. PCM. Companding and Multiplexing of PCM signals.

Module II: Digital Communication System
Line Code: On-Off(RZ), Polar(RZ), Bipolar(RZ), On-Off(NRZ), Polar(NRZ), and their power spectrum density(PSD), HDB Coding, Base band pulse transmission: Inter symbol interference(ISI) and its reduction techniques. Nyquist criterion for distortion less baseband binary transmission. Correlative coding. Eye pattern Digital baseband transmission: BPSK, BFSK, OPSK, OAM. MSK and M-ary. FSK transmitter and receiving systems and their probability of error. Power spectra, Different types of transmission system, Circuit switching and packet switching.

Module III: Microwave, Mobile and Satellite Communication.
Introduction to Microwave electromagnetic spectrum: Microwave signal propagation. Applications of microwave systems, Elements of satellite communication: Satellite concepts, Orbital period and velocity. Use of transponders. Uplink and downlink frequencies, GSM mobile Communication, CDMA Communication Fundamentals of Optical Fiber systems: Snell"s law. Attenuation characteristics of fiber, overview of SDH. Switching networks and traffic theory: Different types of switches, Erlang formula, Concept of BHCA.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:
- William Stallings, Data & Computer Communications, PHI (6th ed.)
- W. Tomasi, Advanced Electronic Communication Systems

References:
- Forouzan, Data Communication & Networking, McGraw Hill, 2nd ed.
- James Martin, Telecommunications & the Computer, PHI, 3rd ed.
- PC Gupta, Data Communications, PHI, 2001

CORE HARDWARE

Course Code	L	T	P/FW	Credit
MNT102	2	1	0	3

Course Objective:

The course aims at training the student for the following: Install, remove, upgrade, maintain, and troubleshoot computer hardware; connect a variety of peripherals to a PC and correctly configure them; Be prepared to take A+ Hardware Preparation (Exam 220-301) and A+ Operating System Technologies Preparation (Exam 220-302)

Course Contents:

Module I: Installation, configuring and updating
Assemblies like motherboards, power supplies, CPU, RAM, storage devices, add-on cards, firmware, IOS and CMOS. You need to know how to identify proper function, their role in the boot process, and how to add and replace them in the field.
Standard software parameters such as IRQ, DMA and I/O settings for common hardware and software configurations, and how to adjust these settings during installation.
Common peripheral ports and the cables & connectors associated therewith like DB-9/25, RJ11/45, BNC, PS/2, USB and IEEE-1394.
Installing and configuring IDE/EIDE and SCSI devices to include Primary/Secondary/Master/Slave, SCSI types, addresses, cabling and jumper block settings.
Peripheral installation, configuration and troubleshooting for monitors, USB devices, and IEEE 1284/1394 devices.
Portable system components. This will be mostly notebook-related. Know PCMCIA card types and implementation of card services. Familiarity with replacement of components like RAM, hard drives and batteries. Care and feeding of docking stations and port replicators.

Module II: Diagnosing and Troubleshooting
Common symptoms and problems with hardware. Isolating problems using error codes, POST audible/visual codes, and troubleshooting instruments like multimeters.
Troubleshooting procedures. Eliciting information from users/customers, determining whether the problem is hardware/software related, isolating problems by eliminating possibilities.

Module III: Preventive Maintenance
Types of maintenance tools/materials, and their use in the field. Cleaning compound requirements and non-static tool use.
Field procedures for protecting yourself and your equipment. UPS/Suppressors and signs of power issues.
Component storage. Hazards from high voltage/laser exposure. Disposal procedures for batteries, toner kits, CRT's, etc.
ESD precautions and symptoms of damage.

Module IV: Motherboards/Processors/Memory
CPU chip types and characteristics. Size, voltage, pin counts and slot types. CPU families and basic history including speed progression.
RAM categories and characteristics. Generations of system RAM: EDO/FPM/SIMM/DIMM. RIMM (Rambus) types. Video memory technology such as VRAM/WRAM. Memory banks and requirements based on processor generation/8-, 16-, 32-bit width. Parity versus non-parity chips.
Motherboard types. AT and ATX form factors, port types and locations, RAM type needed, processor sockets, cache memory. Bus architectures like ISA, PCI and AGP. Compatibility guidelines concerning what hardware works with which generation of motherboard.
CMOS knowledge. Basic CMOS settings for com/parallel ports, hard drive type, basic memory settings, boot sequence, date/time, passwords and Plug & Play.

Module V: Printers
Basic types and operational concepts for laser, inkjet and dot-matrix printers. Interface types such as parallel, USB, network, infrared, serial.
Service techniques and common problems. Feed jams, printed/displayed errors, print quality. Safety precautions and preventive maintenance.

Module VI: Basic Networking
Network types and topologies. Cable types, physical architecture, half- and full-duplex, infrared.
Setup such as configuring network cards, hardware protocols and recovering network function when repairs are performed.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:
- A+ computia certification
- A+ Dos module, David Growth
- A+ complete study guide, SYBEX
- Faster smarter A+ certification- Microsoft press

References:
- A+ Dos/windows module, David Growth
- A+ complete study guide, David Growth
- Faster smarter A+ certification, Drew Bird and Mike Harwood

OPERATING SYSTEMS

CODE	L	T	P/FW	CREDITS
MNT103	2	1	-	3

Course Objective:

This Part of A+ certification will be helpful for students to understand advanced operating systems, Understand installation, configuration & upgrading of Windows 9x or 2000 and Diagnose & troubleshoot them.

Course Contents:

Module I: OS Fundamentals

OS functions, structure, major system files and help functionality. Components like Windows Explorer/My Computer/Control Panel. Contrasts between Win 9x and Windows 2000. Contents, use and location of files like io.sys, boot.ini, win.com and the command prompt. Memory management methods including himem.sys. Win 9x files such as win.ini, system.ini, user.dat, system.dat, msconfig, regedit.exe. Windows 2000 files such as boot.ini, regedit/regedit32, ntldr. Some command prompt procedures: dir, ver, attrib, mem, scandisk and others. File/directory/disk management procedures. File attributes and naming conventions, backup/restore procedures, Windows 2000 Compress/Encrypt. Partitioning/formatting/file systems used with Windows. Utilities such as ScanDisk, msconfig, regedit, defrag, fdisk, asd, hwinfo.

Module II: Installation, Configuration and Upgrading

Install procedure for Win9x and Windows 2000. Appropriate setup utilities, partitioning and formatting, loading drivers.
Upgrade procedures within Win9x OS's, Windows NT 4.0 to Windows 2000, replacing Win9x with Windows 2000, dualbooting Win9x/WinNT/Win2k.
Basic boot sequences and methods, including the creation of an emergency boot disk for Win9x, WinNT and Win2k. Use of Startup disks, Safe Mode, NTLDR, boot.ini, making an Emergency Repair Disk (ERD).
Loading and configuring device drivers. Win9x Plug and Play and Win2k hardware drivers, installing and launching typical Windows and non-Windows applications. Setting up and configuring the Windows printing subsystem for Default Printer, spool settings and network printing.

Module III: Diagnosing and Troubleshooting

Common error codes and startup messages from the boot sequence. Safe Mode, No OS Found, Error in Config.sys, Command.com and Himem sys errors, Windows Protection Error, Device Referenced in System.ini/Win.ini.
Recognizing and resolving common problems. Diagnostic procedure involving the customer, identifying recent changes, printing problems. General Protection Faults, Illegal Operations, devices not functioning, inability to log onto network. Virus activities, types, sources, determining the presence of a virus.

Module IV: Networks

Identifying network capabilities and connection procedures. Protocols, Ipconfig, Winipcfg. Sharing drives/printers, network type and Network Interface Card (NIC), installing/configuring browsers, configuring OS for network.
Setting up Internet access. ISP's, Internet protocols, E-mail, Ping.exe, HTML/HTTP/FTP. Domain names, Dial-up Networking.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:
- A+ comptia certification
- A+ Dos module- David Growth
- A+ complete study guide –SYBEX
- Faster smarter A+ certification- Microsoft press

References:
- A+ Dos/windows module- David Growth
- A+ complete study guide-David Growth
- Faster smarter A+ certification- Drew Bird and Mike Harwood

SYSTEM ADMINISTRATION – I

CODE	L	T	P/FW	CREDITS
MNT104	2	1	0	3

Course Objective:

The Course aims at training the students for the following:

Identify the tasks involved in supporting Windows 2003 networks; Configure Microsoft Windows 2003 XP/Professional on stand-alone computers and on client computers that are part of a workgroup or domain; Install and configure Windows 2003 Server; Gain the knowledge and skills necessary to design a Microsoft Windows 2003 directory services infrastructure; Understand the strategies needed to design the Active Directory structure of an organization, and then design the Active Directory structure to meet those needs.

Course Contents:

Module I: Installing, configuring, and administering Microsoft Windows XP Professional
Getting Started with Windows XP Professional; Automating the windows XP Installation; Upgrading to windows XP Professional; Configuring the windows XP Environment; Managing the Windows XP Professional desktop; Managing Users and Groups; Managing Security; Managing Disks; Accessing Files and Folders; Managing Network Connections; Managing Printing; Dial-Up Networking and Internet Connectivity; Optimizing Windows XP; Performing System Recovery Functions.

Module II: Managing and Maintaining a Microsoft Windows Server 2003 Environment
Installing, licensing, and Updating Windows Server 2003; Configuring Windows Server 2003.
Managing Users, Groups, and Computers; Managing Disks; Accessing Files and Folders; Managing Web services; Managing Printing; Administering Terminal Services; Optimizing Windows Server 2003; Performing System Recovery Functions.

Module III: Implementing, Managing and Maintaining a Microsoft Windows Server 2003 Network Infrastructure (070-291)
Understanding Windows Server 2003 Networking; Installing and Configuring TCP/IP; Administering Security Policy; Managing IP Security; Managing the Dynamic Host Configuration Protocol (DHCP); Installing and Managing Domain Name Service (DNS); Managing Remote Access Services; Managing User Access to Remote Access Services; Managing IP Routing.

Examination Scheme:

Components	CT1	A/C/Q	ATTD.	EE
Weightage (%)	15	10	5	70

Text & References:

Text:
- Installing, configuring, and administering Microsoft Windows XP, Professional, BPB.
- Mastering windows 2000 professional, BPB.

References:
- Todd Lammele, Installing, configuring, and administering   Microsoft windows xp professional, BPB.
- Mark Minasi, Mastering windows 2000 professional, BPB.

NETWORK FUNDAMENTALS

CODE	L	T	P/FW	CREDITS
MNT105	2	1	0	3

Course Objective:

The goal of CCNA Exploration Network Fundamentals course is to introduce you to fundamental networking concepts and technologies. This course will assist you in developing the skills necessary to plan and implement small networks across a range of applications.

Course Contents:

Module I: Living in a Network Centric World
Networks supporting the way we live, Examples of today"s popular communication tools, Communication, Network as platform, The Elements of Network, Converged network The Architecture of Internet, Trends in Networking.

Module II: Communicating over the Network
Introduction, LANs, WANs and Internetworks, Network Addressing

Module III: Application Layer Functionality and Protocols
Introduction, making provision for applications and services, Application layer protocols and services.

Module IV: OSI Transport Layer
Introduction, The TCP protocol –communicating with reliability, Managing TCP sessions, The UDP protocol communicating with low overheads

Module V: OSI Network Layer
Introduction, Networks-dividing host into groups, Routing –How our data packets are handled, Routing process.

Module VI: Addressing the Network - IPv4
Introduction, Address for different purpose, Assigning address, Calculating address, testing the Network layer.

Module VII: Data Link Layer
Introduction, Data Link Layer-Accessing the media. Media Access Control Techniques, Media Access Control Addressing and Framing Data.

Module VIII: OSI Physical Layer
Introduction, The Physical Layer-Communication Signals, Physical Signaling and Encoding, Representing Bits, Physical Media-Connecting Communication.

Module IX: Ethernet
Overview of Ethernet, Ethernet –Communication through the LAN, The Ethernet Frame, Ethernet Media Access Control, Ethernet Physical Layer, Hubs and Switches, Address Resolution Protocol (ARP)

Module X: Planning and Cabling Networks
Introduction, LANs-Making the Physical connections, Device Selection Factors, Device Interconnecting, Developing an Addressing Scheme, Calculating the subnets, Device Interconnections.

Module XI: Configuring and Testing Your Network
Configuring CISCO devices – IOS basics, applying a Basic Configuration using CISCO IOS, Verifying Connectivity, Monitoring and Documenting of Networks.

CCNA Exploration: Network Fundamentals (Guided Case Study)

Examination Scheme:

Components	CT1	A/C/Q	ATTD.	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- Cisco Networking Academy Programme CCNA 1 & 2 Companion Guide, 3rd Edn by Pearson Education
- Cisco Networking Academy Programme CCNA 1 & 2 Lab Companion, 3rd Edn by Pearson Education
- Cisco Networking Academy Programme CCNA 1 & 2 Engineering General, 3rd Edn by Pearson Education

References:

- Data Communications and Networking by Behrouz Forouzan, 3e, Tata McGraw-Hill
- Computer Networks by Andrews S. Tanenbaum, 4e, Pearson Education

COMPUTER PROGRAMMING IN „C" LANGUAGE

CODE	L	T	P/FW	CREDITS
MNT106	2	1	0	3

Course Objective:

This course provides an introduction to ANCI C, focusing on the C programming. Feature, syntax, structure and implementation will be covered. Lab instructions will be included, which will provide straight understanding and excises of C. Functions, Array, Pointer and File System are the important contents of the syllabus.

Course Contents:

Module I: Introduction to C
Character Set, Identifier and Keywords, Data Types and Constants, Variables

Module II: Operators and Expressions
Arithmetic Operators, Unary Operators, Relational and Logical Operators, Assignment and Condition Operators, Library Functions.

Module III: Data Input/Output Functions
Description of getchar() FUNCTION, Description of putchar() Function, Description of scanf() Function, Description of printf() Function, Description Of Gets() Function, Description Of Puts() Function

Module IV: Control Statements
Preliminaries, branching with if else structure, looping statements (while, do-while, for), switch statement, break and continue statement.

Module V: Functions
Introduction to functions, necessity of functions, defining and accessing functions, prototype of a function, passing arguments and receiving values from functions, call by value and call by reference functions

Module VI: Array
Defining an array, Processing an array, Passing an array to a Function, Multidimensional arrays, Strings as an special case of a Character String.

Module VII: Pointers
Fundamentals of Pointers, Declaration of a Pointer Variable, Passing Pointers to a Function. Pointers and One Dimensional Array, Dynamic Memory Allocation, Operations on Pointers, Array of Pointers, Passing Functions to Other Functions.

Module VIII: Structure and Unions
Definition, Processing of Structure, typedef Statement as User Defined Variable, Structure and Pointers, Passing Structure to Functions.

Module IX: Data Files
Opening and Closing Data Files, Creating a Data File, Processing of Data File, Unformatted Data Files.

Examination Scheme:

Components	CT1	A/C/Q	ATTD.	EE
Weightage (%)	15	10	5	70

Text & References:

Text:
- Gottfried, "Schaum"s Outline series in C Programming", McGraw Hill.
- Horowitz, E. and Sahni, S., "Fundamentals of Data Structures", Galgotia Publications.

References:
- Kernighan and Ritche, "The C programming Language", PHI.
- Lipschultz, "Schaum"s Outline series in Data Structures", McGraw Hill.
- Hutchison, R., "Programming in C", McGraw Hill.
- Johnsonbaugh, R. and Kalin M., "Applications programming in C", PHI.
- Yashwant Karnetkar, "Computer programming in C", PHI.

SYSTEM ADMINISTRATION LAB – I

Course Code	L	T	P	Credit
MNT120	-	-	2	1

List of Experiments

1. Different type of Installation process of Windows XP Professional.
2. Configuring and Managing Windows XP desktop.
3. Managing Users and Groups in Windows XP.
4. Managing Printing, Dial-Up and Network Connectivity in Windows XP.
5. Performing System Recovery Functions in Windows XP.
6. Installing, licensing, and Updating Windows Server 2003.
7. Configuring and Managing Windows Server 2003.
8. Managing Users and Groups in Windows Server 2003.
9. Managing Disk, Files & Folder, Printing and Web services in Windows Server 2003.
10. Performing System Recovery Functions in Windows Server 2003.
11. Administering Terminal Services in Windows Server 2003.
12. Installing and Configuring TCP/IP Windows Server 2003.
13. Managing Security Policy and IP Security in Windows Server 2003.
14. Configuring and Managing DHCP in Windows Server 2003.
15. Installing and Managing Domain Name Service in Windows Server 2003.
16. Managing Remote Access Services and IP Routing in Windows Server 2003.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

NETWORK FUNDAMENTALS LAB

Course Code	L	T	P	Credit
MNT121	-	-	2	1

List of Experiments

1.0 Data Stream Capture
- ▲ Capture or download an audio stream
- ▲ Record the characteristics of the file
- ▲ Examine data transfer rates associated with the file

2.0 Observing TCP and UDP using Netstat
- ▲ Explain common **netstat** command parameters and outputs.
- ▲ Use **netstat** to examine protocol information on a pod host computer.

3.0 TCP/IP Transport Layer Protocols, TCP and UDP
- ▲ Identify TCP header fields and operation using a Wireshark FTP session capture.
- ▲ Identify UDP header fields and operation using a Wireshark TFTP session capture

4.0 Application and Transport Layer Protocols Examination
- ▲ Configure the host computer to capture Application layer protocols.
- ▲ Capture and analyze HTTP communication between the pod host computer and a web server.
- ▲ Capture and analyze FTP communication between the pod host computer and an FTP server.
- ▲ Observe TCP establish and manage communication channels with HTTP and FTP connections

5.0 Examining a Device"s Gateway
- ▲ Understand and explain the purpose of a gateway address.
- ▲ Understand how network information is configured on a Windows computer.
- ▲ Troubleshoot a hidden gateway address problem

6.0 Examining a Route
- ▲ Use the **route** command to modify a Windows computer routing table.
- ▲ Use a Windows Telnet client command **telnet** to connect to a Cisco router.
- ▲ Examine router routes using basic Cisco IOS commands.

7.0 Ping and Traceroute
- ▲ Use the **ping** command to verify simple TCP/IP network connectivity.
- ▲ Use the **tracert/traceroute** command to verify TCP/IP connectivity.

8.0 Examining ICMP Packets
- ▲ Understand the format of ICMP packets.
- ▲ Use Wireshark to capture and examine ICMP messages.

9.0 IPv4 Address Subnetting
Scenario
When given an IP address, network mask, and subnetwork mask, you will be able to determine other information about the IP address such as:
- ▲ The subnet address of this subnet
- ▲ The broadcast address of this subnet
- ▲ The range of host addresses for this subnet
- ▲ The maximum number of subnets for this subnet mask
- ▲ The number of hosts for each subnet
- ▲ The number of subnet bits
- ▲ The number of this subnet

10.0 Subnet and Router Configuration
- ▲ Subnet an address space per given requirements.
- ▲ Assign appropriate addresses to interfaces and document.
- ▲ Configure and activate Serial and FastEthernet interfaces.
- ▲ Test and verify configurations.
- ▲ Reflect upon and document the network implementation

11.0 Frame Examination
- ▲ Explain the header fields in an Ethernet II frame.
- ▲ Use Wireshark to capture and analyze Ethernet II frames

12.0 Media Connectors Lab Activity
- ▲ Test cables using a Fluke620 LAN CableMeter and a Fluke LinkRunner
- ▲ Become familiar with the most common functions of a cable tester.
- ▲ Test different cables for type and wiring problems

13.0 Address Resolution Protocol (ARP)
- ▲ Use Windows **arp** command.
- ▲ Use Wireshark to examine ARP exchanges.

14.0 Cisco Switch MAC Table Examination
- ▲ Use the Telnet protocol to log into a Cisco Switch.
- ▲ Use the Cisco IOS **show mac-address-table** command to examine MAC address and port associations.

15.0 Intermediary Device as an End Device
- ▲ Use Wireshark to capture and analyze frames originating from network nodes.
- ▲ Examine the origination of frames in a small network

16.0 Establishing a Console Session with HyperTerminal
- ▲ Connect a router and computer using a console cable.
- ▲ Configure HyperTerminal to establish a console session with a Cisco IOS router.
- ▲ Configure HyperTerminal to establish a console session with a Cisco IOS switch.

17.0 Basic Cisco Device Configuration
Configure Cisco router global configuration settings.
- ▲ Configure Cisco router password access.
- ▲ Configure Cisco router interfaces.
- ▲ Save the router configuration file.
- ▲ Configure a Cisco switch

18.0 Final Case Study - Datagram Analysis with Wireshark
- ▲ How a TCP segment is constructed, and explain the segment fields.
- ▲ How an IP packet is constructed, and explain the packet fields.
- ▲ How an Ethernet II frame is constructed, and explain the frame fields.
- ▲ Contents of an ARP REQUEST and ARP REPLY

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

COMPUTER PROGRAMMING IN C LANGUAGE LAB

Course Code	L	T	P	Credit
MNT122	-	-	2	1

List of Experiments

1. Write a program to read 3 numbers x, y, z. Use conditional statement and evaluate values of variables a, b and c. Perform the sum with 2 set of variable. Check the sum for equality and print the sum.
2. Write a program to shift input data by 2 bits left and right.
3. Write a program to use bitwise "&" operator between 2 integer and display the result.
4. Write a program to input 6 numbers and find the biggest and smallest using nested if.
5. Write a program to enter a year and find the number of Minutes, Hours, Days, Months and Seconds
6. Write a program to find the sum of even and odd numbers using switch, if, if..else, nested if between 1 and 20.
7. Write a program to find the numbers between 1 and 100 that are not divisible by 2, 3 and 5.
8. Write a program to enter a character (alphabetical) and display its position and its corresponding ASCII value.
9. Write a program to find the sum of its digits till the result is in single digit.
10. Write a program to print the series: $x - x^3/3! + x^5/5! - x^7/7!...... x^n/n!$
11. Write a program to generate the following figures: Any two

```
a.      *        b.       *        c.  1        d.      1          e.  1
     *    *           *    *          12             121              12
    *  *  *         *   *   *         123          12321             123
     *    *        *   *   *   *      1234        1234321           1234
       *                             12345      123454321          12345
                                                                   1234
                                                                   123
                                                                   12
                                                                   1

f.  654321    g.  543212345    h.      z
    54321         5432  2345         yzy
    4321          543    345        xyzyx
    321           54      45         yzy
    21            5        5          z
    1

i.  Aa Bb Cc Dd Ee Ff Gg Hh Ii Jj Kk Ll.....
```

12. Write a program to find the factorial of a given number with recursion & without recursion.
13. Write a program to find the roots of a quadratic equation with each condition.
14. Write a program to find numbers between 7 and 100 which is exactly divisible by 4 and is divisible by either 5 or 6.
15. Write a program to perform Arithmetic operation on an array i.e. Addition, Subtraction, Multiplication and store the result in another array.
16. Write a program to perform following string operation: with string functions & without string functions
    a. Reverse a string
    b. Concatenate 2 string – strcat()
    c. Compare 2 string – strcmp(), strcmpi()
17. Write a program to display and count the number of vowels in a string.
18. Write a program to generate a palindrome.
19. Write a program to find the factorial of a number using recursion.
20. Write a program to perform different arithmetic operations using pointers
21. Write a program to obtain prime factors of any integer number using functions i.e. 24 -> 2, 2, 2, & 3.
22. Write a program to obtain Fibonacci series by using recursion & without using recursion.
23. Write a program to find the larger of the two numbers using macro with arg.
24. Write a program to count the number of character, word and lines in a text file whose name is supplied in the command line.
25. Write a program to arrange a list by using any sorting method.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Network devices & Hardware

CODE	L	T	P/FW	CREDITS
MNT130	2	1	-	3

Course Objective:

The course aims at training the student for the following: Install, remove, upgrade, maintain, and troubleshoot computer hardware; connect a variety of peripherals to a PC and correctly configure them; Be prepared to take A+ Hardware Preparation (Exam 220-301) and A+ Operating System Technologies Preparation (Exam 220-302)

Course Contents:

Module I: Installation, configuring and updating

Assemblies like motherboards, power supplies, CPU, RAM, storage devices, add-on cards, firmware, IOS and CMOS. You need to know how to identify proper function, their role in the boot process, and how to add and replace them in the field.

Standard software parameters such as IRQ, DMA and I/O settings for common hardware and software configurations. Common peripheral ports and the cables & connectors associated therewith like DB-9/25, RJ11/45, BNC, PS/2, USB and IEEE-1394.

Installing and configuring IDE/EIDE and SCSI devices to include Primary/Secondary/Master/Slave, SCSI types, addresses, cabling and jumper block settings. Know PCMCIA card types and implementation of card services. Familiarity with replacement of components like RAM, hard drives and batteries. Care and feeding of docking stations and port replicators.

Module II: Diagnosing and Troubleshooting

Common symptoms and problems with hardware. Isolating problems using error codes, POST audible/visual codes. Troubleshooting procedures. Eliciting information from users/customers, determining whether the problem is hardware/software related, isolating problems by eliminating possibilities

Module III: Preventive Maintenance

Types of maintenance tools/materials, and their use in the field. UPS/Suppressors and signs of power issues. Component storage. Hazards from high voltage/laser exposure. Disposal procedures for batteries, toner kits, CRT's, etc, ESD precautions and symptoms of damage

Module IV: Motherboards/Processors/Memory

CPU chip types and characteristics. CPU families and basic history, RAM categories and characteristics. Generations of system RAM: EDO/FPM/SIMM/DIMM. RIMM(Rambus) types. Video memory technology such as VRAM/WRAM. Motherboard types. AT and ATX form factors, port types and locations, processor sockets, cache memory. Bus architectures like ISA, PCI and AGP.

CMOS knowledge. Basic CMOS settings for com/parallel ports, hard drive type, basic memory settings, boot sequence, date/time, passwords and Plug & Play.

Module V: Printers

Basic types and operational concepts for laser, inkjet and dot-matrix printers. Service techniques and common problems. Feed jams, printed/displayed errors, print quality. Safety precautions and preventive maintenance

Module VI: Basic Networking

Network types and topologies. Cable types, physical architecture, half- and full-duplex, infrared. Setup such as configuring network cards, hardware protocols and recovering network function when repairs are performed

Examination Scheme:

Components	CT1	A/C/Q	ATTD.	EE
Weightage (%)	15	10	5	70

Text & References:

Text:
1. A+ comptia certification
2. A+ Dos module, David Growth

References:
1. A+ Dos/windows module, David Growth
2. A+ complete study guide, David Growth
3. Faster smarter A+ certification, Drew Bird and Mike Harwood

Telecommunication Networks

CODE	L	T	P/FW	CREDITS
MNT131	2	1	-	3

Course Objective: To acquire basic knowledge of telecommunication, architecture & exchanges, Different type of switching, coding, traffic engineering, data communication in PSTN.

Course Contents:

Module I Evolution of telecommunication network, Basic switching system, simple telephone communication, crossbar switching systems, Electronic switching-Space division switching, Stored Program control-Centralized SPC, Distributed SPC, Software Architecture.

Module II Speech digitization, Quantization Noise, Companding, Differential coding, delta modulation, line coding, NRZ & RZ codes, Manchester coding, AMI coding, Walsh coding, TDM.

Module III Time division switching-Time division space switching, Time division time switching, Time multiplexed space switching, Time multiplexed time switching.

Module IV Traffic engineering parameters, Grade of service, blocking probability, delay systems, switching hierarchy and routing, transmission plan, Signaling techniques, Common channel signaling, SS7, Data rates in PSTN

Examination Scheme:

Components	CT1	A/C/Q	ATTD.	EE
Weightage (%)	15	10	5	70

Text & References:
- V Thyagarajan: Telecommunication, Switching systems and networks
- Forouzon: ―data communication‚‚
- Tanenbaum : Computer Network
- M. Schwartz : Telecommunication networks

Mobile Communication

CODE	L	T	P/FW	CREDITS
MNT132	2	1	-	3

Course Objective

This course provides knowledge about Personal Communication Services, General Packet Radio Services (GPRS), Wireless Application Protocol (WAP), Third Generation (3G) Mobile Services. Course Contents

Course Contents:

Module I: Introduction to Personal Communication Services (PCS)
PCS architecture, Mobility management, Networks signaling. Global system for Mobile Communication (GSM) system overview: GSM Architecture, Mobility Management, Network signaling.

Module II: General Packet Radio Services (GPRS)
GPRS architecture, GPRS Network nodes.Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.

Module III: **Wireless Application Protocol (WAP)**
The Mobile Internet standard, WAP Gateway and Protocols, Wireless Markup Languages (WML)

Module IV: **Third Generation (3G) Mobile Services**
Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (WCDMA), and CDMA 2000, Quality of services in 3G.

Module V: **Wireless local Loop (WLL)**
Introduction to WLL architecture, WLL technologies. Global Mobile Satellite Systems: Case studies of IRIDIUM and GLOBALSTAR systems. Bluetooth technology and Wi-Max

Examination Scheme:

Components	CT1	PR.	ATTD.	EE
Weightage (%)	15	10	5	70

Text & References:

Text:
1. "Mobile & Personnel communication Systems and Services", By Raj Pandya, Prentice Hall India, 2001.
2. "Mobile communications," Jochen Schiller, Pearson Education Pvt. Ltd., 2002.

References:
1. "Wireless Communication- Principles and practices," 2nd Ed., Theodore S. Rappaport, Pearson Education Pvt. Ltd, 2003.
2. "Wireless and mobile Networks Architecture," by Yi –Bing Lin & Imrich Chlamatac, John Wiley & Sons, 2001.
3. " The Wireless Application Protocol," Singhal & Bridgman et. al., Pearson Education, 2004.
4. "Principles of Mobile Computing," 2nd Ed., Hensmann, Merk, & Stober, Springer International Edition, 2003. "3G Wireless Networks," Smith & Collins, TMH, 2007.
5. Mobile Computing," Talukdar & Yaragal, TMH, 2005.

COMMUNICATION SKILLS – I

CODE	L	T	P/FW	CREDITS
BCS 111	1	-	-	1

Course Objective:
The Course is designed to give an overview of the four broad categories of English Communication thereby enhance the learners" communicative competence.

Course Contents:

Module I: Listening Skills
Effective Listening: Principles and Barriers
Listening Comprehension on International Standards

Module II: Speaking Skills
Pronunciation and Accent
Reading excerpts from news dailies & magazines
Narrating Incident; Story telling.
Extempore & Role Plays

Module III: Reading Skills
Vocabulary: Synonyms, antonyms, diminutives, homonyms, homophones
Idioms & phrases
Foreign words in English

Module IV: Writing Skills
Writing Paragraphs
Précis Writing
Letter writing
Coherence and structure
Essay writing

Module V: Activities
News reading
Picture reading
Movie magic
Announcements

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Working in English, Jones, Cambridge
- Business Communication, Raman –Prakash, Oxford
- Speaking Personally, Porter-Ladousse, Cambridge
- Speaking Effectively, Jermy Comfort, et.al, Cambridge

BEHAVIOURAL SCIENCE - I

CODE	L	T	P/FW	CREDIS
BSS 111	1	-	-	1

Course Objective:
This course aims at imparting an understanding of:
Self and the process of self exploration
Learning strategies for development of a healthy self esteem
Importance of attitudes and their effect on work behaviour
Effective management of emotions and building interpersonal competence.

Course Contents:

Module I: Understanding Self
Formation of self concept
Dimension of Self
Components of self
Self Competency

Module II: Self-Esteem: Sense of Worth
Meaning and Nature of Self Esteem
Characteristics of High and Low Self Esteem
Importance & need of Self Esteem
Self Esteem at work
Steps to enhance Self Esteem

Module III: Emotional Intelligence: Brain Power
Introduction to EI
Difference between IQ, EQ and SQ
Relevance of EI at workplace
Self assessment, analysis and action plan

Module IV: Managing Emotions and Building Interpersonal Competence
Need and importance of Emotions
Healthy and Unhealthy expression of emotions
Anger: Conceptualization and Cycle
Developing emotional and interpersonal competence
Self assessment, analysis and action plan

Module V: Leading Through Positive Attitude
Understanding Attitudes
Formation of Attitudes
Types of Attitudes
Effects of Attitude on
Behaviour
Perception
Motivation
Stress
Adjustment
Time Management
Effective Performance
Building Positive Attitude

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Towers, Marc: Self Esteem, 1st Edition 1997, American Media
- Pedler Mike, Burgoyne John, Boydell Tom, A Manager"s Guide to Self-Development: Second edition, McGraw-Hill Book Company.
- Covey, R. Stephen: Seven habits of Highly Effective People, 1992 Edition, Simon & Schuster Ltd.
- Khera Shiv: You Can Win, 1st Edition, 1999, Macmillan
- Gegax Tom, Winning in the Game of Life: 1st Edition, Harmony Books
- Chatterjee Debashish, Leading Consciously: 1998 1st Edition, Viva Books Pvt. Ltd.
- Dr. Dinkmeyer Don, Dr. Losoncy Lewis, The Skills of Encouragement: St. Lucie Press.
- Singh, Dalip, 2002, Emotional Intelligence at work; First Edition, Sage Publications.
- Goleman, Daniel: Emotional Intelligence, 1995 Edition, Bantam Books
- Goleman, Daniel: Working with E.I., 1998 Edition, Bantam Books.

FRENCH - I

CODE	L	T	P/FW	CREDITS
FLF 111	2	-	-	2

Course Objective:
To familiarize the students with the French language
- with the phonetic system
- with the syntax
- with the manners
- with the cultural aspects

Course Contents:

Module A: pp. 01 to 37: Unités 1, 2, Unité 3 Objectif 1, 2
Only grammar of Unité 3: objectif 3, 4 and 5

Contenu lexical: Unité 1: Découvrir la langue française: (oral et écrit)
1. se présenter, présenter quelqu"un, faire la connaissance
   des autres, formules de politesse, rencontres
2. dire/interroger si on comprend
3. Nommer les choses

Unité 2: Faire connaissance
1. donner/demander des informations sur une personne,
premiers contacts, exprimer ses goûts et ses préférences
2. Parler de soi: parler du travail, de ses activités, de son pays, de sa ville.

Unité 3: Organiser son temps
1.   dire la date et l"heure

Contenu grammatical:
1. organisation générale de la grammaire
2. article indéfini, défini, contracté
3. nom, adjectif, masculin, féminin, singulier et pluriel
4. négation avec « de », "moi aussi", "moi non plus"
5. interrogation: Inversion, est-ce que, qui, que, quoi, qu"est-ce
   que, où, quand, comment, quel(s), quelle(s)
   Interro-négatif: réponses: oui, si, non
6. pronom tonique/disjoint- pour insister après une préposition
7. futur proche

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre: Campus: Tome 1

GERMAN - I

CODE	L	T	P/FW	CREDITS
FLG 111	2	-	-	2

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Course Contents:

Module I: Introduction

Self introduction: heissen, kommen, wohnwn, lernen, arbeiten, trinken, etc.

All personal pronouns in relation to the verbs taught so far.

Greetings: Guten Morgen!, Guten Tag!, Guten Abend!, Gute Nacht!, Danke sehr!, Danke!, Vielen Dank!, (es tut mir Leid!),

Hallo, wie geht"s?:   Danke gut!, sehr gut!, prima!, ausgezeichnet!,
                          Es geht!, nicht so gut!, so la la!, miserabel!

Module II: Interviewspiel

To assimilate the vocabulary learnt so far and to apply the words and phrases in short dialogues in an interview – game for self introduction.

Module III: Phonetics

Sound system of the language with special stress on Dipthongs

Module IV: Countries, nationalities and their languages

To make the students acquainted with the most widely used country names, their nationalitie and the language spoken in that country.

Module V: Articles

The definite and indefinite articles in masculine, feminine and neuter gender. All Vegetables, Fruits, Animals, Furniture, Eatables, modes of Transport

Module VI: Professions

To acquaint the students with professions in both the genders with the help of the verb "sein".

Module VII: Pronouns

Simple possessive pronouns, the use of my, your, etc.

The family members, family Tree with the help of the verb "to have"

Module VIII: Colours

All the color and color related vocabulary – colored, colorful, colorless, pale, light, dark, etc.

Module IX: Numbers and calculations – verb "kosten"

The counting, plural structures and simple calculation like addition, subtraction, multiplication and division to test the knowledge of numbers.

"Wie viel kostet das?"

Module X: Revision list of Question pronouns

W – Questions like who, what, where, when, which, how, how many, how much, etc.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – I

CODE	L	T	P/FW	CREDITS
FLS 111	2	-	-	2

Course Objective:
To enable students acquire the relevance of the Spanish language in today"s global context, how to greet each other, how to present / introduce each other using basic verbs and vocabulary

Course Contents:

Module I
A brief history of Spain, Latin America, the language, the culture…and the relevance of Spanish language in today"s global context.
Introduction to alphabets

Module II
Introduction to „*Saludos*" (How to greet each other. How to present / introduce each other).
Goodbyes (despedidas)
The verb *llamarse* and practice of it.

Module III
Concept of Gender and Number
Months of the years, days of the week, seasons. Introduction to numbers 1-100, Colors, Revision of numbers and introduction to ordinal numbers.

Module IV
Introduction to *SER* and *ESTAR* (both of which mean To Be).Revision of „*Saludos*" and „*Llamarse*". Some adjectives, nationalities, professions, physical/geographical location, the fact that spanish adjectives have to agree with gender and number of their nouns. Exercises highlighting usage of *Ser* and *Estar*.

Module V
Time, demonstrative pronoun (Este/esta, Aquel/aquella etc)

Module VI
Introduction to some key AR /ER/IR ending regular verbs.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

CHINESE – I

CODE	L	T	P/FW	CREDITS
FLC 111	2	-	-	2

Course Objective:

There are many dialects spoken in China, but the language which will help you through wherever you go is Mandarin, or Putonghua, as it is called in Chinese. The most widely spoken forms of Chinese are Mandarin, Cantonese, Gan, Hakka, Min, Wu and Xiang. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Show pictures, dialogue and retell.
Getting to know each other.
Practicing chart with Initials and Finals. (CHART – The Chinese Phonetic Alphabet Called "Hanyu Pinyin" in Mandarin Chinese.)
Practicing of Tones as it is a tonal language.
Changes in 3rd tone and Neutral Tone.

Module II
Greetings
Let me Introduce
The modal particle "ne".
Use of Please „qing" – sit, have tea ………….. etc.
A brief self introduction – Ni hao ma? Zaijian!
Use of "bu" negative.

Module III
Attributives showing possession
How is your Health? Thank you
Where are you from?
A few Professions like – Engineer, Businessman, Doctor, Teacher, Worker.
Are you busy with your work?
May I know your name?

Module IV
Use of "How many" – People in your family?
Use of "zhe" and "na".
Use of interrogative particle "shenme", "shui", "ma" and "nar".
How to make interrogative sentences ending with "ma".
Structural particle "de".
Use of "Nin" when and where to use and with whom. Use of guixing.
Use of verb "zuo" and how to make sentences with it.

Module V
Family structure and Relations.
Use of "you" – "mei you".
Measure words
Days and Weekdays.
Numbers.
Maps, different languages and Countries.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation, I – Interaction/Conversation Practice

Text & References:

 "Elementary Chinese Reader Part I" Lesson 1-10

WIRELESS LAN

CODE	L	T	P/FW	CREDITS
MNT201	2	1	-	3

Course Objective:

The course gives the practical and theoretical aspects of the installation, configuration and site survey preparation and other related technical requirements for the access point, bridges and antennas.

Course Contents:

Module I: Introduction to Wireless LANs
What is a wireless LAN?, No more wires?, Why wireless?, Evolution of wireless LANs; **Networking Media:** Physical layer media, STP, UTP, Coaxial cable, Optical fiber, Atmosphere: the wireless medium, Media installation; **Wireless Technologies:** Overview, Digital wireless and cellular; **Wireless LAN Market:** Implications, WLAN growth and applications, Market requirements; **Challenges and Issues:** Radio signal interference and degradation, Power management, Interoperability, Network security, Reliability and connectivity, Installation and site design issues, Health issues, Future directions

Module II: 802.11 (a,b,g) and Network Interface Cards
802.11 Standards: Overview, IEEE and 802.11, IEEE 802.2 LLC review, Wireless LAN general description, Logical architecture; **802.11 MAC Layer:** MAC services, MAC frame structure, architecture, and operation, Carrier-sense mechanism, MAC-level acknowledgements, and interframe spaces; **Physical Layer (PHY):** Scope and functions, IEEE 802.11b (High–Rate) DSSS PHY specification, 802.11b modulation, IEEE 802.11a PHY specification, IEEE 802.11g PHY specification, FHSS and Infrared (IR) PHY specifications

Module III: Wireless Radio Technology
Waves: Overview of waves, Sine waves, Analog to digital conversion; **Mathematics for Studying Radio:** Watts, Decibels, Decibel references; **Electromagnetic (EM) Waves:** Basics of EM waves, EM spectrum chart, Fourier synthesis, Spectrum uses; **Signals:** Viewing signals in time, Viewing signals in frequency, Signals in time and frequency, Noise in time and frequency; **Modulation Techniques:** Carrier frequency, Basic modulation techniques, FHSS, DSSS, OFDM; **Multiple Access and Bandwidth:** Multiple access to shared medium, WLAN DSSS and CSMA/CA, Bandwidth; **Radio Wave Propagation:** Propagation of RF, Refraction, Reflection, Diffraction and scattering, Multipath, Path-loss.

Module IV: Wireless Topologies
Components: Laptops and workstations, Mobile computers, PDAs, and barcode readers, Clients and adapters, Access points and bridges, Antennas, Ethernet and wired LANs; **WLAN Topologies:** Modularity, WLAN categories, Local area networks (LAN), Wireless repeater, System redundancy and load balancing, Roaming, Scalability; **Channel Setup:** Overview, Access point coverage and comparison, Multirate implementation, Channel usage and interference; **Bridge Topologies:** Root modes, Point-to-point configuration, Point-to-multipoint configuration, Distance limitations, Bandwidth; **Sample Topologies**: Basic topologies, Campus topologies, WLAN addition to AVVID; **VLAN, QoS, and Proxy Mobile IP**: VLAN features, Quality of Service (QoS) feature, eDCF, Proxy mobile IP

Module V: Access Points
Access Point Connection: Introduction, Connecting the 1100/1200, 1100/1200 LED indicators, Connecting to the AP; **Basic Configuration:** Configuration summary, Setting the APs IP address and SSID, Using the web browser Configuration summary, Setting the APs IP address and SSID, Using the web browser: express setup to enter basic settings, Command Line Interface (CLI) and SNMP Setup, Management navigation; **Ethernet Port Configuration:** Overview, Ethernet identification page, Ethernet hardware page, Ethernet protocol filter page, Ethernet advanced page **AP Radio Port Configuration:** Overview, Radio port identification, Radio port hardware, Radio port filters, AP radio advanced **Configure Services:** Time server, Boot server, Web server, Name server, FTP, Routing, Console and telnet setup

Module VI: Bridges
Wireless Bridges: Wireless bridging defined, Roles of a bridge in a network, Installation considerations, Distance and path loss considerations; **Basic Configuration**: Precautions, Connecting to the bridge, Setting the IP address and SSID for the bridge, Entering the basic configuration with express setup; **Configuring the radio and Ethernet ports:** Basic radio port configuration, Extended radio configuration – hardware page, Extended radio configuration – advanced page, Configuring the Ethernet port – identification page, Configuring the Ethernet port – hardware page, Configuring the Ethernet port – advanced page; **Configuring Services:**

Configuring time services, Configuring boot services, Configuring name services, Configuring routing setup; **Cisco Services:** Services overview, CDP, Firmware upgrade and distribution, Hot standby management, Manage system configuration

Module VII: Antennas
Antennas: Introduction, Variables, Bandwidth, Beamwidth, Gain, Polarization, Radiation patterns, Diversity; **Omnidirectional Antennas:** Theory, 2.2 dBi dipole "standard rubber ducky", 2.2 dBi ceiling mount, 5.14 dBi mast mount vertical, 5.14 dBi ceiling mount, 5.14 dBi pillar mount diversity, 5.14 dBi ground plane, 12 dBi omnidirectional (long range only); **Directional Antennas:** Theory, Patch antennas, 13.5 dBi yagi antenna - 25 degree, 21 dBi parabolic dish antenna - 12 degree, Integrated 5 GHz antennas, Integrated 2.4 GHz antennas; **Cable and Accessories:** Cable selection, Cable loss, Cable connectors and splitters, Amplifiers, Lightning arrestor **Link Engineering and RF Path Planning:** Overview, Earth bulge, Site survey and path profiling, Alignment and interference **Antenna Installation:** Overview, Ladder safety, Installation safety, Legal issues, EIRP rules

Module VIII: Security
Security Fundamentals: What is security?, WLAN vulnerabilities, WLAN threats, Reconnaissance, Access, Denial of service; **Basic WLAN Security Technologies:** The WLAN security wheel, First generation wireless security, Wired equivalent privacy (WEP), Authentication and association; **Configuring Basic WLAN Security**: Basic WLAN security, Enabling protocol and MAC filters on Aps, Securing clients and Aps, Monitoring WLAN equipment, Disable unneeded services; **Enterprise WLAN Authentication:** Second generation authentication, Authenticating wireless users, 802.1x basics, How 802.1x works, 802.1x authentication types, Choosing an 802.1x type; **Enterprise Wireless Encryption:** Strengthening WEP, Message integrity check, Broadcast key rotation (BKR), Second generation encryption, Using VPNs; **Other Enterprise Security Services** : VLANs, Spanning tree

Module IX: Application Design and Site Survey Prep
Site Survey: Overview, Site survey considerations, Standards and topologies, Important considerations**; Applications:** Changing technology and applications**; WLAN Design:** Overview, Applications and data collection, Load and coverage, Bandwidth and throughput, Mobile users, Power consumption, Interference, Encryption, Fire code and safety issues; **Building-to-building Design** : Overview, Design examples, Path considerations; **Site Survey Equipment** : Equipment, APs and cards, Antennas and attenuators, Battery packs, cables, mounting, and markers, Measuring devices and digital cameras, Travel Case, RF Test Device; **Site Survey Documentation and Utilities:** Site drawing and walkthrough, Bridge range calculation utility, ACU site survey, Link status meter (LSM)

Module X: Site Survey
Infrastructure Awareness: Working with personnel, LAN infrastructure, Network map, LAN media, Firewalls, risers, cable paths, and service loops, LAN infrastructure, Check the existing network health, Network performance baseline; **Survey:** Preparation, Getting started, Channel selection, data rates, and overlap, Work with existing conditions, Freezers, Multifloor survey, Interference and RF propagation; **Mounting and Installation:** AP mounting, Antenna mounting, Power, NEMA enclosures; **Documentation:** Documenting the WLAN design, Request for proposal, WLAN site survey specifics, Site survey report.

Module XI: Troubleshooting Management, Monitoring, and Diagnostics
General Approach to Troubleshooting: Overview, Symptom - diagnosis – solution, Preparing for network failure, Network and fault management; **OSI Troubleshooting:** Model overview, Troubleshooting layers, Layer 1: media, connectors, and devices, Layer 2: bridges and switches, Layer 3: routers, Troubleshooting TCP/IP; **Diagnostic Tools:** Cable testers, multimeters, and network monitors, Sniffers, Spectrum analyzers, Gauss and Tesla meters; **Single Point Failures:** Firmware and drivers, Software configuration, Antenna cables, Antenna; **Event Logging:** AP event setup, Event notification setup, Syslog server, SNMP, SNMP setup; **Enterprise Management:** Overview, Wavelink mobile manager

Module XII: Emerging Technologies
Ultra-wideband Wireless : Overview of ultra-wideband (UWB) wireless, UWB applications, UWB acceptance, Interference, Avoiding interference from other devices, UWB specifics; **VoIP and Voice over WLANs** : Overview of voice over IP (VoIP), Components of VoIP, Centralized and distributed VoIP architectures, The ITU-T umbrella protocol: H.323, Session Initiation Protocol (SIP), MGCP and H.248/Megaco, Miscellaneous VoIP protocols, VoIP and Quality of Service (QoS), VoIP and WLANs; **Mobile Wireless**Brief history of mobile wireless, Overview of mobile wireless systems, Roaming in a mobile wireless system, Mobile wireless middleware, Wireless Application Protocol (WAP), The Open Mobile Alliance (OMA), The future of mobile wireless; **Wireless Organizations and Certification** : The Wireless Fidelity (Wi-Fi) Alliance, Wireless LAN Association (WLANA), Federal Communications Commission (FCC), UL, Cisco Wireless Certifications, CWNA, Case studies of wireless installations

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

- K. Feher, Wireless Digital Communication, PH 1995
- Jochen Schiller, Mobile Communication, Pearson Education

Network Planning & Design

CODE	L	T	P/FW	CREDITS
MNT202	2	1	-	3

Course Objective:

This subject will give students knowledge about network analysis and delay and loss in networks,designing data network, Bottleneck path problem. The stress will be given to the case studies.

Course Contents:

Module I: Making the business care for the network

What is network design; Job of network designer; Major steps of network design; Methods of system development; Characteristics of successful systems; Need for quality assurance; Technical solutions for quality; Major challenges in network design; Types of network (centralized and distributed); Criteria to evaluate different design alternatives; Network design process; Data collection; Technical requirement specification; Network topology; Routing strategy; Network management introduction; Linear programming.

Module II: Queing theory

Performance Analysis; Queing essentials; Analysis and delay and loss in network; M/M/1 Model; M/M/C model; Erlang B model; Analysis of network reliability.

Module III: Introduction to network design

Two location voice network design problem; Traffic intensity and erlang calculation; Average line/server utilization in systems with blocking / losses.

Module IV: Three location data network design problems

Analysis of link delays in data network; Exponential problems; M/M/1 queue; Designing data network; Costs of network component; Design principles; Representing traffic using tables; Drop algorithm.

Module V: Network design and graph theory

Graphs; Minimum spanning three (MST); Kruskal"s Algorithm; Prim"s algorithm; Trees; Tree design; Drawback of MST"s; Shortage path trees and tours; Bottleneck path problem.

Module VI: Capacity Assignment in centralized network

Network problem; Network performance criteria; Network design objectives.

Module VII: Traffic and cost generation

Structure of a network design problem; Sites table for network generator; Traffic generator; Realistic traffic models; Normalization of traffic matrices; Asymmetric traffic flow and its traffic models; Link costs (Tariffs); Factors affecting tariffs; Tariff taxonomy; Fixed pipes; Tariff generator; Network generator and design tools.

Module VIII: Centralized network

Time and cost trade off"s; Definition of the problem; Delay and cost table; Terminal assignment problem using a star topology.

Module IX: Project Management

Fundamentals of project management; Use of project management techniques; PERT / CPM network; Project scheduling using PERT/CPM; Critical path; Stack of an activity; Lab upgrade example.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:
- Network Planning & Designing in Windows, BPB
- Managing and Maintaining a Microsoft Windows Server 2003 Environment

References:
- Network Planning & Designing in Windows, Todd lammale
- Managing and Maintaining a Microsoft Windows Server 2003 Environment-Dan holme, Orin thomas

System Administration – II

CODE	L	T	P/FW	CREDITS
MNT203	3	1	0	4

Course Objective:

The Course aims at training the student for the following: Install, configure, manage and support a network infrastructure that uses Microsoft Windows 2003 server; Gain skills needed to create a networking services infrastructure design that supports the required network applications; Learn network solution technologies: including DHCP, IP, OSPF, RIP, and IGMP; Gain the knowledge and skills needed to design a security framework for small, medium, and enterprise networks by using Microsoft Windows 2003 technologies.

Course Contents:

Module I: Windows Server 2003 Network Infrastructure Planning and Maintenance (070 –293)
Planning a Network Infrastructure: A Technology Primer; Planning a TCP/IP Network Infrastructure; Planning a Network Connectivity Strategy; Planning a DNS Strategy; Planning a WINS Strategy; Planning Secure Network Access; Planning Certificate Services; Planning High Availability Services; Planning Network Monitoring, Remote Administration and recovery.

Module II: Designing Active Directory Services & Network Infrastructure
Introduction to Designing an Active Directory and Network Infrastructure: Explain basic design principles; describe the process of and the tasks involved in designing an Active Directory infrastructure; **Designing a Forest and Domain Infrastructure:** Gather and analyze the information that you need to design a forest and domain infrastructure, Create a logical forest design, Create a domain design, Design a DNS namespace strategy for forests and domains, Create a trust strategy for forests, Determine a migration plan for the existing infrastructure, Design a schema management policy; **Designing a Site Infrastructure:** Determine the information needed to design a site infrastructure, Create a site design, Modify the site design for replication, Determine the placement of domain controllers in the site design, Determine the placement of global catalog servers in the site design, Determine the placement of single operations masters in the site design.
Designing the Administrative Structure: Determine the information needed to design an administrative structure, Design a network administration model, Design an organizational unit structure, Design an account strategy; **Designing for Group Policy:** Determine the information needed to design for Group Policy, Design a Group Policy structure, create an organization unit (OU) structure for Group Policy, and Create a Group Policy management design; **Designing the Physical Network:** Explain the preparation necessary to design a network infrastructure, create an IP addressing scheme, Design a DHCP infrastructure, Design a change management structure for networking; **Designing for Network Connectivity:** Determine the information that you need to design for network connectivity, Evaluate connection types, Design a connectivity infrastructure, Create a design for Internet connectivity; **Designing a Name Resolution Strategy:** Determine the information needed to design a name-resolution strategy, Design a strategy for interoperability with Active Directory, BIND, WINS, and DHCP, Design a WINS replication strategy, Design a name resolution strategy for clients; **Designing the Network Access Infrastructure:** Gather data for network access design, Design network access security, Choose remote access methods, Design a remote access infrastructure, Design a wireless access infrastructure.

Module III: Microsoft Exchange Server 2003 Administration
Understanding And Planning: Introduction exchange server 2003, Windows Server 2003 and Exchange server, Two key Architectural component of windows 2003 server, Exchange server 2003 Architecture, Designing a new exchange 2003 system, Upgrading to windows server 2003 and exchange server 2003; **Installation**: Installing windows server as a domain controller, Installing windows server2003; **The OUTLOOK CLIENT**: Installing outlook 2003 from a customized server, A quick overview of outlook 2003; **Basic Exchange Server 2003 Management**: Managing exchange users, Distribution Groups, and contacts, Managing the exchange server hierarchy, Expanding the exchange server organization, Managing Exchange 2003 Internet Services, Managing Exchange 2003 Services for internet clients, Managing and installing additional Exchange servers; **Exchange And Outlook: Next Level**: Advanced Exchange server administration and management, Exchange server reliability and availability, Exchange server system security, Wireless access to exchange server 2003, Building using and managing outlook forms designer application

Examination Scheme:

Components	CT1	A/C/Q	ATTD.	EE
Weightage (%)	15	10	5	70

Text & References:

*Text***:**

- Implementing, Managing and Maintaining a Microsoft Windows server 2003 Network Infrastructure.(070-291), BPB.
- Windows Server 2003 Network Infrastructure Planning and Maintenance   (070 –293), BPB
- Windows Server 2003 Active Directory Planning, Implementation, and Maintenance. (070-294),BPB

References:

- TODD LAMMALE - Windows Server 2003 Active Directory Planning, Implementation, and Maintenance (070-294).
- TODD LAMMALE -Windows Server 2003 Network Infrastructure Planning and Maintenance (070 –293)
- TODD LAMMALE- Windows Server 2003 Active Directory Planning, Implementation, and Maintenance. (070-294).

Routing Protocols and Concepts

CODE	L	T	P/FW	CREDITS
MNT204	2	1	0	3

Course Objective:

The goal of CCNA Exploration Routing Protocols and Concepts course is to develop an understanding of how a router learns about remote networks and determines the best path to those networks. This course includes both static routing and dynamic routing protocols.

Course Contents:

Module I: Intro to Routing and Packet Forwarding
Introduction, Inside the Router, CLI Configuration and Addressing, Building the Routing Tables, Path Determination and Switching Functions.

Module II: Static Routing
Introduction, Routers and Network, Router Configuration Review, Exploring Directly Connected Networks, Static Routes with "Next Hop", Addresses, Static Routes with Exit Interface, Summary and Default Static Routes, Managing and Troubleshooting Static Routes

Module III: Introduction to Dynamic Routing Protocols
Introduction, Classifying Dynamic Routing Protocols, Metrics, Administrative Distance, Routing Protocols and Subneting Activities.

Module IV: Distance Vector Routing Protocols
Introduction to Distance Vector Routing Protocols, Network Discovery, Routing Table Maintenance, Routing Loops, Distance Vector Routing Protocols Today.

Module V: RIP Version - I
Introduction, RIP v1, Distance Vector, Classful Routing Protocols, Basic RIPv1 Configuration, Verification and Troubleshooting, Automatic Summarization, Default Route and RIP v1.

Module VI: VLSM and CIDR
Introduction, Classful and Classless Addressing, VLSM, CIDR, VLSM and Route Summarization Activity.

Module VII: RIP Version - II
Introduction, RIPv1 Limitations, Configuration RIPv2, VLSM & CIDR, Verifying & Troubleshooting RIPv2.

Module VIII: The Routing Table – A Close Look
Introduction, the Routing Table Structure, Routing Table Lookup Process, Routing Behaviour.

Module IX: EIGRP
Introduction to EIGRP, Basic EIGRP Configuration, EIGRP Metric Calculation, DUAL, More EIGRP Configuration.

Module X: Link State Routing Protocols
Introduction, Link State Routing, Implementing Link State Routing Protocols.

Module XI: OSPF
Introduction to OSPF, Basic OSPF Configuration, The OSPF metric, OSPF and Multi-access Networks, More OSPF Configuration.

Examination Scheme:

Components	CT1	A/C/Q	ATTD.	EE
Weightage (%)	15	10	5	70

Text & References:

Text:
- Cisco Networking Academy Programme CCNA 1 & 2 Companion Guide, 3rd Edn by Pearson Education
- Cisco Networking Academy Programme CCNA 1 & 2 Lab Companion, 3rd Edn by Pearson Education

- Cisco Networking Academy Programme CCNA 1 & 2 Engineering General, 3rd Edn by Pearson Education

References:
- Data Communications and Networking by Behrouz Forouzan, 3e, Tata McGraw-Hill
- Computer Networks by Andrews S. Tanenbaum, 4e, Pearson Education

LAN Switching and Wireless

CODE	L	T	P/FW	CREDITS
MNT205	2	1	0	3

Course Objective:

The goal of CCNA Exploration LAN Switching and Wireless course is to introduce you to develop an understanding of how switches are interconnected and configured to provide network access to LAN users. This course also teaches how to integrate wireless devices into a LAN.

Course Contents:

Module I: LAN Design
Switched LAN Architecture, Principles of Hierarchical Network Design, Matching Switches to Specific LAN Function

Module II: Basic Switch Concepts and Configuration
Introduction to Ethernet/ 802.3 LAN, Forward Frame Using a Switch, Switch Management Configuration, Configuring Switch Security,

Module III: VLANs
Introducing VLAN, VLAN Trunking, Configuring VLAN and Trunks", Trouble Shooting VLANs and Trunks

Module IV: VTP
VTP Concept, VTP Operation, Configure VTP

Module V: STP
Redundant Layer 2 Topology, Introduction to STP, STP Convergence, PVSTP+, RSTP and Paired PVSTP+

Module VI: Inter-VLAN Routing
Inter- VLAN Routing, Configuring Inter-VLAN Routing, Trouble Shooting Inter-VLAN Rioting

Module VII: Basic Wireless Concepts and Configuration
The Wireless LAN, Wireless LAN Security, Configuring Wireless LAN Access, Trouble Shooting Simple WLAN Problems

Examination Scheme:

Components	CT1	PR.	ATTD.	EE
Weightage (%)	15	10	5	70

Text & References:

Text
- Cisco Networking Academy Programme CCNA 3 & 4 Companion Guide, 3rd Edn by Pearson Education
- Cisco Networking Academy Programme CCNA 3 & 4 Lab Companion, 3rd Edn by Pearson Education

References:
- Cisco Networking Academy Programme CCNA 3 & 4 Engineering General, 3rd Edn by Pearson Education
- Data Communications and Networking by Behrouz Forouzan, 3e, Tata McGraw-Hill
- Computer Networks by Andrews S. Tanenbaum, 4e, Pearson Education

SYSTEM ADMINISTRATION LAB – II

Course Code	L	T	P	Credit
MNT 220	-	-	2	1

List of Experiments

1. Installing Active Directory Services in Windows Server 2003.
2. Designing and Creating a Forest and Domain Infrastructure in Active Directory.
3. Designing and Creating Network Connectivity in Active Directory.
4. Designing and Creating Organization Unit in Active Directory
5. Designing and Creating Group Policy in Active Directory.
6. Designing and Creating Network Access Infrastructure in Active Directory.
7. Designing and Creating Site Infrastructure in Active Directory.
8. Designing and Creating Name Resolution in Active Directory.
9. Installing, Configuring and Managing Exchange Server 2003.
10. Installing, Configuring and Managing OUTLOOK.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ROUTING PROTOCOLS AND CONCEPTS LAB

Course Code	L	T	P	Credit
MNT 221	-	-	2	1

List of Experiments

1.0 Cabling a Network and Basic Router Configuration
- Cable devices and establish console connections.
- Erase and reload the routers.
- Perform basic IOS command line interface operations.
- Perform basic router configuration.
- Verify and test configurations using show commands, ping and traceroute.
- Create a startup configuration file.
- Reload a startup configuration file.
- Install a terminal emulation program.

2.0 Basic Router Configuration
- Cable a network according to the Topology Diagram given by Lab Coordinator
- Erase the startup configuration and reload a router to the default state.
- Perform basic configuration tasks on a router.
- Configure and activate Ethernet interfaces.
- Test and verify configurations.
- Reflect upon and document the network implementation.

3.0 Challenge Router Configuration
- Subnet an address space given requirements.
- Assign appropriate addresses to interfaces and document.
- Cable a network according to the Topology Diagram.
- Erase the startup configuration and reload a router to the default state.
- Perform basic configuration tasks on a router.
- Configure and activate Serial and Ethernet interfaces.
- Test and verify configurations.
- Reflect upon and document the network implementation.

4.0 Basic Static Route Configuration
- Cable a network according to the Topology Diagram given by Lab Coordinator
- Erase the startup configuration and reload a router to the default state.
- Perform basic configuration tasks on a router.
- Interpret **debug ip routing** output.
- Configure and activate Serial and Ethernet interfaces.
- Test connectivity.
- Gather information to discover causes for lack of connectivity between devices.
- Configure a static route using an intermediate address.
- Configure a static route using an exit interface.
- Compare a static route with intermediate address to a static route with exit interface.
- Configure a default static route.
- Configure a summary static route.
- Document the network implementation.

5.0 Challenge Static Route Configuration
- Subnet an address space given requirements.
- Assign appropriate addresses to interfaces and document.
- Cable a network according to the Topology Diagram.
- Erase the startup configuration and reload a router to the default state.
- Perform basic configuration tasks on a router.
- Configure and activate Serial and Ethernet interfaces.
- Determine appropriate static, summary, and default routes.
- Test and verify configurations.
- Reflect upon and document the network implementation.
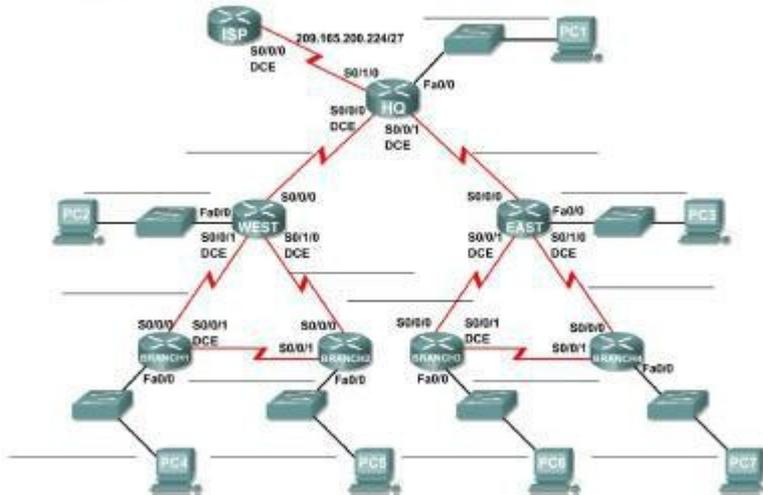
6.0 Subnetting Scenario 1

Topology Diagram
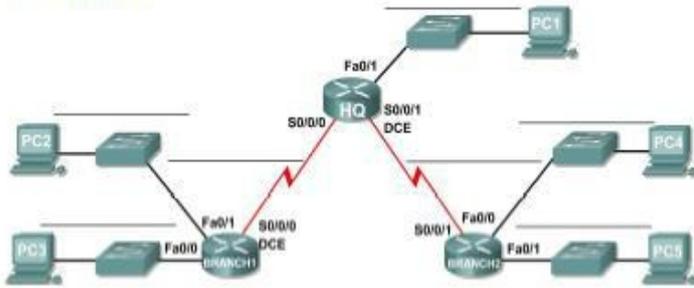
- Determine the number of subnets needed.
- Determine the number of hosts needed.
- Design an appropriate addressing scheme.
- Assign addresses and subnet mask pairs to device interfaces and hosts.
- Examine the use of the available network address space.
- Determine how static routing could be applied to the network.

7.0 Subnetting Scenario 2

Topology Diagram

Determine the number of subnets needed.
Determine the number of hosts needed.
Design an appropriate addressing scheme.
Assign addresses and subnet mask pairs to device interfaces and hosts.
Examine the use of the available network address space.
   Determine how static routing could be applied to the network.

8.0 Routing Table Interpretation Lab

Given: The output from the HQ router.
HQ#**show ip route**
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B –
BGP D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E – EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o –
ODR P - periodic downloaded static route
Gateway of last resort is not set
10.0.0.0/30 is subnetted, 1 subnets
C 10.10.10.252 is directly connected, Serial0/0/0

172.16.0.0/30 is subnetted, 1 subnets
C 172.16.100.0 is directly connected, Serial0/0/1
R 192.168.1.0/24 [120/1] via 10.10.10.254, 00:00:03, Serial0/0/0
R 192.168.2.0/24 [120/1] via 10.10.10.254, 00:00:03, Serial0/0/0
R 192.168.3.0/24 [120/1] via 10.10.10.254, 00:00:03, Serial0/0/0
C 192.168.4.0/24 is directly connected, Loopback0 C
192.168.5.0/24 is directly connected, Loopback1
C 192.168.6.0/24 is directly connected, Loopback2
R 192.168.7.0/24 [120/1] via 172.16.100.2, 00:00:04, Serial0/0/1 R
192.168.8.0/24 [120/1] via 172.16.100.2, 00:00:04, Serial0/0/1 R
192.168.9.0/24 [120/1] via 172.16.100.2, 00:00:04, Serial0/0/1

Given: The output from the BRANCH1 router
BRANCH1#**show ip route**
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B –
BGP D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E – EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o –
ODR P - periodic downloaded static route
Gateway of last resort is not set
10.0.0.0/30 is subnetted, 1 subnets
C 10.10.10.252 is directly connected, Serial0/0/0
R 172.16.0.0/16 [120/1] via 10.10.10.253, 00:00:04,
Serial0/0/0 C 192.168.1.0/24 is directly connected, Loopback0
C 192.168.2.0/24 is directly connected, Loopback1 C
192.168.3.0/24 is directly connected, Loopback2
R 192.168.4.0/24 [120/1] via 10.10.10.253, 00:00:04, Serial0/0/0 R
192.168.5.0/24 [120/1] via 10.10.10.253, 00:00:04, Serial0/0/0 R
192.168.6.0/24 [120/1] via 10.10.10.253, 00:00:04, Serial0/0/0 R
192.168.7.0/24 [120/2] via 10.10.10.253, 00:00:04, Serial0/0/0 R
192.168.8.0/24 [120/2] via 10.10.10.253, 00:00:04, Serial0/0/0 R
192.168.9.0/24 [120/2] via 10.10.10.253, 00:00:04, Serial0/0/0

Given the output from the BRANCH2 router
BRANCH2#**show ip route**
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B –
BGP D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E – EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o –
ODR P - periodic downloaded static route
Gateway of last resort is not set
R 10.0.0.0/8 [120/1] via 172.16.100.1, 00:00:19,
Serial0/0/1 172.16.0.0/30 is subnetted, 1 subnets
C 172.16.100.0 is directly connected, Serial0/0/1
R 192.168.1.0/24 [120/2] via 172.16.100.1, 00:00:19, Serial0/0/1
R 192.168.2.0/24 [120/2] via 172.16.100.1, 00:00:19, Serial0/0/1
R 192.168.3.0/24 [120/2] via 172.16.100.1, 00:00:19, Serial0/0/1
R 192.168.4.0/24 [120/1] via 172.16.100.1, 00:00:19, Serial0/0/1
R 192.168.5.0/24 [120/1] via 172.16.100.1, 00:00:19, Serial0/0/1
R 192.168.6.0/24 [120/1] via 172.16.100.1, 00:00:19, Serial0/0/1
C 192.168.7.0/24 is directly connected, Loopback0
C 192.168.8.0/24 is directly connected, Loopback1
    C 192.168.9.0/24 is directly connected, Loopback2

Draw a diagram of the network based on your interpretation of the router outputs and do the following:
- Interpret router outputs.
- Identify the IP addresses for each router.
- Draw a diagram of the network topology.
- Cable and configure a network based on the topology diagram.
- Test and verify full connectivity.
- Reflect upon and document the network implementation.
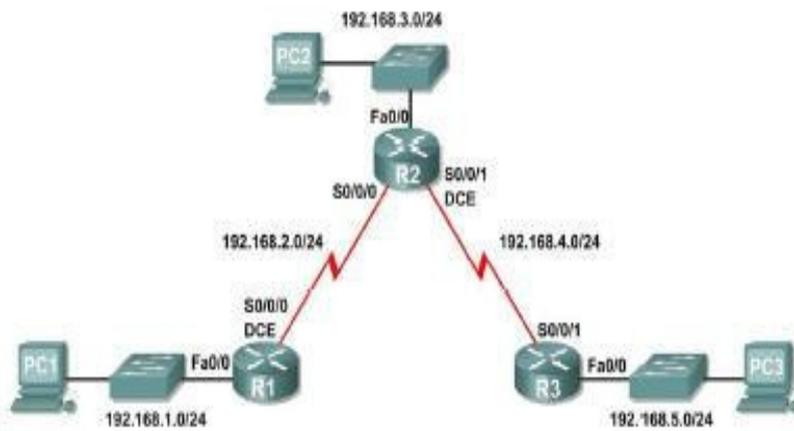
9.0 Basic RIP Configuration

- Cable a network according to the Topology Diagram given below
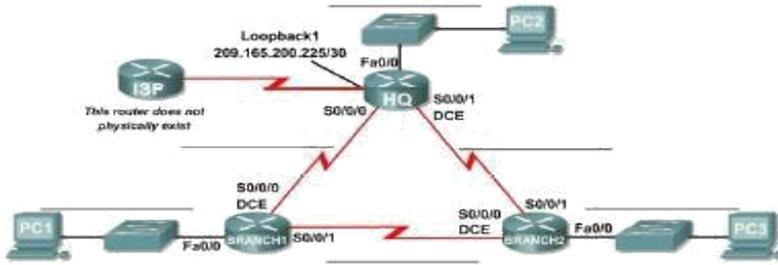- Erase the startup configuration and reload a router to the default state.
- Perform basic configuration tasks on a router.
- Configure and activate interfaces.
- Configure RIP routing on all routers.
- Verify RIP routing using **show** and **debug** commands.
- Reconfigure the network to make it contiguous.
- Observe automatic summarization at boundary router.
- Gather information about RIP processing using the **debug ip rip** command.
- Configure a static default route.
- Propagate default routes to RIP neighbors.
- Document the RIP configuration.

Scenarios

• Scenario A: Running RIPv1 on Classful Networks

Scenario A: Running RIPv1 on Classful Networks

Topology Diagram

• Scenario B: Running RIPv1 with Subnets and Between Classful Networks

Scenario B: Running RIPv1 with Subnets and Between Classful Networks
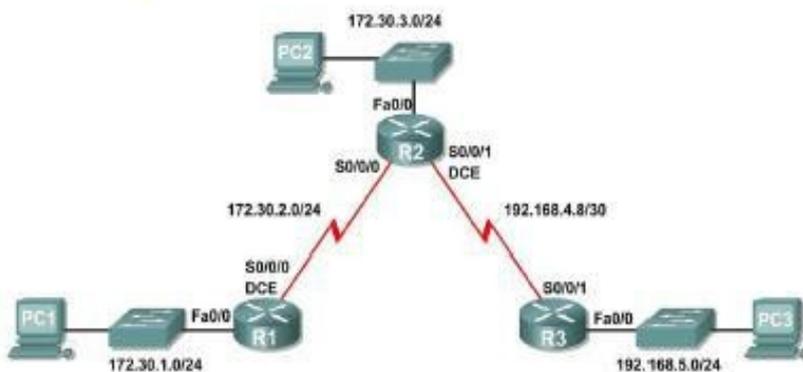
Topology Diagram

Scenario C: Running RIPv1 on a Stub Network

10.0 Challenge RIP Configuration

Topology Diagram

Subnet an address space given requirements.

• Assign appropriate addresses to interfaces and document them in the Addressing Table.
• Cable a network according to the Topology Diagram.
• Erase the startup configuration and reload a router to the default state.
• Configure RIPv1 routing on all routers.
• Configure and propagate a static default route.
• Verify RIPv1 operation.
• Test and verify full connectivity.
• Reflect upon and document the network implementation.

11.0 Basic VLSM Calculation and Addressing Design

Topology Diagram

- Determine the number of subnets needed.
- Determine the number of hosts needed for each subnet
- Design an appropriate addressing scheme using VLSM.
- Assign addresses and subnet mask pairs to device interfaces.
- Examine the use of the available network address space.

12.0 Troubleshooting a VLSM Addressing Design
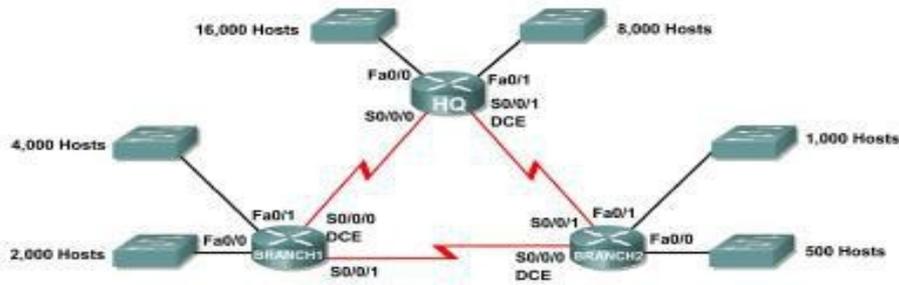
Topology Diagram

- Discover errors in a VLSM design.
- Propose solutions for VLSM design errors.
- Document the corrected VLSM assignments.

13.0 Basic Route Summarization

Topology Diagram
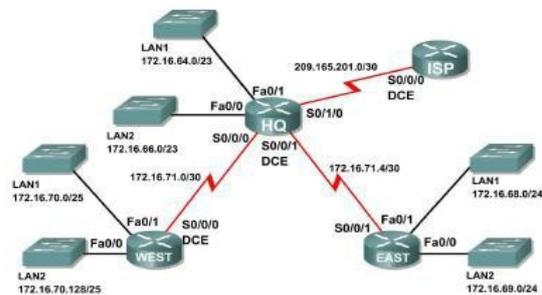
Determine summarized routes that can be used to reduce the size of routing tables

15.0 Basic EIGRP Configuration Lab
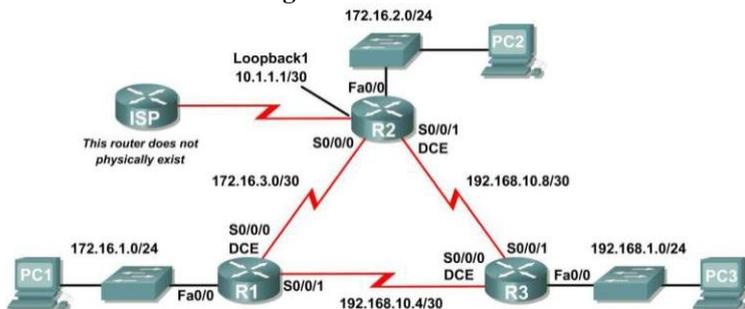
- Cable a network according to the Topology Diagram.
- Erase the startup configuration and reload a router to the default state.
- Perform basic configuration tasks on a router.
- Configure and activate interfaces.
- Configure EIGRP routing on all routers.
- Verify EIGRP routing using **show** commands.
- Disable automatic summarization.
- Configure manual summarization.
- Configure a static default route.
- Propagate default route to EIGRP neighbors.
- Document the EIGRP configuration.

16.0 Challenge EIGRP Configuration Lab

Topology Diagram

- Create an efficient VLSM design given requirements.
- Assign appropriate addresses to interfaces and document.
- Cable a network according to the Topology Diagram.
- Erase the startup configuration and reload a router to the default state.
- Configure routers including EIGRP.
- Configure and propagate a static default route.
- Verify EIGRP operation.
- Test and verify full connectivity.
- Reflect upon and document the network implementation.

17.0 Basic OSPF Configuration Lab

- Cable a network according to the Topology Diagram

Topology Diagram
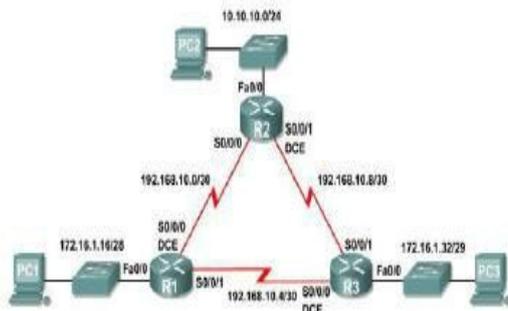
- Erase the startup configuration and reload a router to the default state
- Perform basic configuration tasks on a router
- Configure and activate interfaces
- Configure OSPF routing on all routers
- Configure OSPF router IDs
- Verify OSPF routing using show commands
- Configure a static default route
- Propagate default route to OSPF neighbors
- Configure OSPF Hello and Dead Timers
- Configure OSPF on a Multi-access network
- Configure OSPF priority
- Understand the OSPF election process

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

LAN SWITCHING AND WIRELESS LAB

Course Code	L	T	P	Credit
MNT 222	-	-	2	1

List of Experiments

Lab I: Review of Concepts from Exploration - I

- Create a logical topology given network requirements
- Create subnets to meet host requirements
- Configure the physical topology
- Configure the logical topology
- Verify network connectivity
- Configure and verify passwords

Lab II: Troubleshooting a Small Network

Topology Diagram
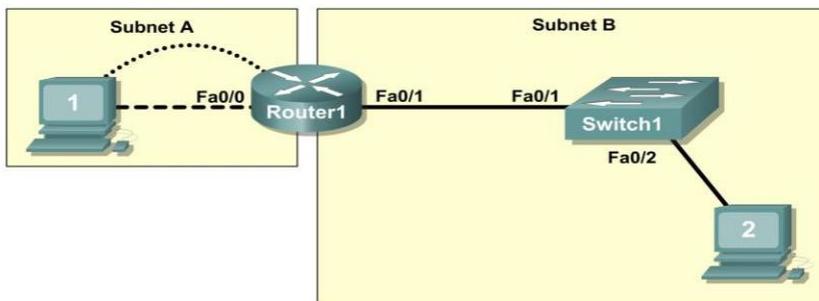
- Verify that a paper design meets stated network requirements
- Cable a network according to the topology diagram
- Erase the startup configuration and reload a router to the default state
- Load the routers with supplied scripts
- Discover where communication is not possible
- Gather information about the misconfigured portion of the network along with any other errors
- Analyze information to determine why communication is not possible
- Propose solutions to network errors
- Implement solutions to network errors

Examine the Logical LAN Topology

The IP address block of 172.16.30.0 /23 is subnetted to meet the following requirements:

Subnet	Number of Hosts
Subnet A	174
Subnet B	60

Additional requirements and specifications:
- The 0 subnet is used.
- The smallest possible number of subnets that satisfy the requirements for hosts should be used, keeping the largest possible block in reserve for future use.
- Assign the first usable subnet to Subnet A.
- Host computers use the first IP address in the subnet. The network router uses the last network host address.

Based on these requirements, the following topology has been provided to you:

Subnet A	
Specification	**Value**
IP mask (decimal)	255.255.255.0
IP address	172.16.30.0
First IP host address	172.16.30.1

Last IP host address	172.16.30.254

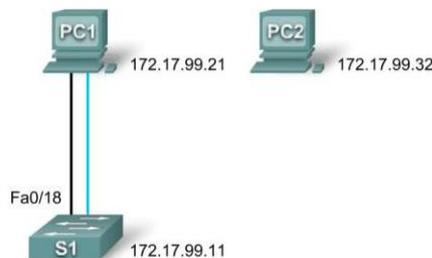| Subnet B	
Specification	**Value**
IP mask (decimal)	255.255.255.128
IP address	172.16.31.0
First IP host address	172.16.31.1
Last IP host address	172.16.31.126

Examine each of the values in the tables above and verify that this topology meets all requirements and specifications. Are any of the given values incorrect? _____

If yes, correct the values in the table above and write the corrected values below:

_____

_____

Create a configuration table similar to the one below using your corrected values:

Device	IP address	Mask	Gateway
Host1	172.16.30.1	255.255.255.0	172.16.30.254
Router1–Fa0/0	172.16.30.254	255.255.255.0	N/A
Host2	172.16.31.1	255.255.255.128	172.16.31.126
Router1–Fa0/1	172.16.31.126	255.255.255.128	N/A

Lab III: Basic Switch Configuration

Addressing Table

PC1	**NIC**	172.17.99.21	255.255.255.0	172.17.99.1
PC2	**NIC**	172.17.99.32	255.255.255.0	172.17.99.1
S1	**VLAN99**	172.17.99.11	255.255.255.0	172.17.99.1

Learning Objectives
- Cable a network according to the topology diagram
- Clear an existing configuration on a switch
- Examine and verify the default configuration
- Create a basic switch configuration, including a name and an IP address
- Configure passwords to ensure that access to the CLI is secured
- Configure switch port speed and duplex properties for an interface
- Configure basic switch port security
- Manage the MAC address table
- Assign static MAC addresses
- Add and move hosts on a switch

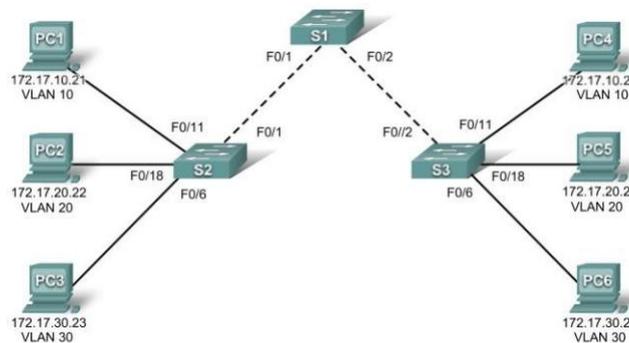## Lab IV: Managing Switch Operating System and Configuration Files
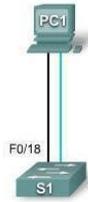
Addressing Table

Device	Hostname	Interface	IP Address	Subnet Mask	Default Gateway
PC1	Host-A	NIC	172.17.99.21	255.255.255.0	172.17.99.1
S1	ALSwitch	VLAN99	172.17.99.11	255.255.255.0	172.17.99.1

Learning Objectives

- Create and save a basic switch configuration
- Set up a TFTP server on the network
- Back up the switch Cisco IOS software to a TFTP server and then restore it
- Back up the switch configuration to a TFTP server
- Configure a switch to load a configuration from a TFTP server
- Upgrade the Cisco IOS software from a TFTP server

Lab V: Basic VLAN Configuration

Topology Diagram

Addressing Table

(Hostname)	Interface			
S1	VLAN 99	172.17.99.11	255.255.255.0	N/A
S2	VLAN 99	172.17.99.12	255.255.255.0	N/A
S3	VLAN 99	172.17.99.13	255.255.255.0	N/A
PC1	NIC	172.17.10.21	255.255.255.0	172.17.10.1
PC2	NIC	172.17.20.22	255.255.255.0	172.17.20.1
PC3	NIC	172.17.30.23	255.255.255.0	172.17.30.1
PC4	NIC	172.17.10.24	255.255.255.0	172.17.10.1
PC5	NIC	172.17.20.25	255.255.255.0	172.17.20.1
PC6	NIC	172.17.30.26	255.255.255.0	172.17.30.1

Initial Port Assignments (Switches 2 and 3)

| Ports	Assignment	Network
Fa0/1 – 0/5	802.1q Trunks (Native VLAN 99)	172.17.99.0 /24
Fa0/6 – 0/10	VLAN 30 – Guest (Default)	172.17.30.0 /24
Fa0/11 – 0/17	VLAN 10 – Faculty/Staff	172.17.10.0 /24
Fa0/18 – 0/24	VLAN 20 – Students	172.17.20.0 /24

Learning Objectives

- Cable a network according to the topology diagram
- Erase the startup configuration and reload a switch to the default state
- Perform basic configuration tasks on a switch

- Create VLANs
- Assign switch ports to a VLAN
- Add, move, and change ports
- Verify VLAN configuration
- Enable trunking on inter-switch connections
- Verify trunk configuration
- Save the VLAN configuration

Lab VI: Troubleshooting VLAN Configurations

Topology Diagram
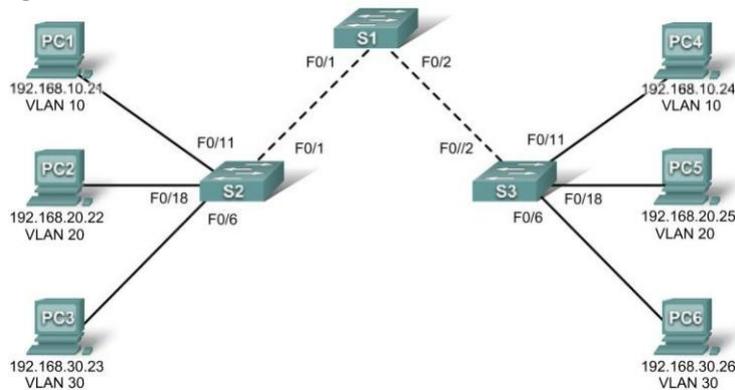
Addressing Table

(Hostname)	Interface			
S1	VLAN 56	192.168.56.11	255.255.255.0	N/A
S2	VLAN 56	192.168.56.12	255.255.255.0	N/A
S3	VLAN 56	192.168.56.13	255.255.255.0	N/A
PC1	NIC	192.168.10.21	255.255.255.0	192.168.10.1
PC2	NIC	192.168.20.22	255.255.255.0	192.168.20.1
PC3	NIC	192.168.30.23	255.255.255.0	192.168.30.1
PC4	NIC	192.168.10.24	255.255.255.0	192.168.10.1
PC5	NIC	192.168.20.25	255.255.255.0	192.168.20.1
PC6	NIC	192.168.30.26	255.255.255.0	192.168.30.1

Initial Port Assignments (Switches 2 and 3)

Ports	Assignment	Network
Fa0/1 – 0/5	802.1q Trunks (Native VLAN 56)	192.168.56.0 /24
Fa0/6 – 0/10	VLAN 30 – Guest (Default)	192.168.30.0 /24
Fa0/11 – 0/17	VLAN 10 – Faculty/Staff	192.168.10.0 /24
Fa0/18 – 0/24	VLAN 20 – Students	192.168.20.0 /24

In this lab, you will practice troubleshooting a misconfigured VLAN environment. Load or have your instructor load the configurations below into your lab gear. Your objective is to locate and correct any and all errors in the configurations and establish end-to-end connectivity. Your final configuration should match the topology diagram and addressing table. All passwords are set to **cisco**, except the enable secret password, which is set to **class**.

Task 1: Prepare the Network

Step 1: Cable a network that is similar to the one in the topology diagram.

Step 2: Clear any existing configurations on the switches, and initialize all ports in the shutdown state.

Step 3: Import the configurations below.

Switch 1

hostname S1
no ip domain-lookup
enable secret class
!
!
interface range FastEthernet0/1-5
 switchport mode trunk

```
!
interface range FastEthernet0/6-24
 shutdown
!
interface Vlan1
 no ip address
 no ip route-cache
!
interface Vlan56
 ip address 192.168.56.11 255.255.255.0
 no ip route-cache
!
line con 0
 logging synchronous
line vty 0 4
 no login
line vty 5 15
 password cisco
 login
!
end
```

Switch 2
```
hostname S2
no ip domain-lookup
enable secret class
!
vlan 10,20,30,56
!
interface range FastEthernet0/1-5
 switchport trunk native vlan 56
 switchport mode access
!
interface range FastEthernet0/6-10
 switchport access vlan 30
 switchport mode access
!
interface range FastEthernet0/11-17
 switchport access vlan 10
 switchport mode access
!
interface range FastEthernet0/18-24
 switchport access vlan 20
 switchport mode access
!
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
interface Vlan1
 ip address 192.168.56.12 255.255.255.0
 no ip route-cache
 shutdown
!
line con 0
 password cisco
 login
line vty 0 4
 password cisco
 login
line vty 5 15
 password cisco
 login
!
end
```

Switch 3
hostname S3
no ip domain-lookup
enable secret class
!
vlan 10,20,30
!
interface range FastEthernet0/1-5
 switchport trunk native vlan 56
 switchport mode trunk
!
interface range FastEthernet0/6-10
 switchport mode access
!
interface range FastEthernet0/11-17
 switchport mode access
!
interface range FastEthernet0/18-24
 switchport mode access
!
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
interface Vlan1
 no ip address
 no ip route-cache
 shutdown
!
interface Vlan56
 no ip route-cache
!
line con 0
 password cisco
 login
line vty 0 4
 password cisco
 login
line vty 5 15
 password cisco
 login
!
end
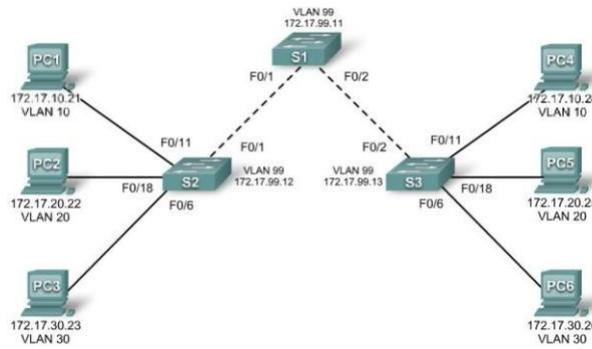
Task 2: Troubleshoot and Repair the VLAN Configuration

Task 3: Document the Switch Configurations
  On each switch, capture the running configuration to a text file and save for future reference:

Task 4: Clean Up
  Erase the configurations and reload the switches. Disconnect and store the cabling. For PC hosts that are normally connected to other networks (such as the school LAN or to the Internet), reconnect the appropriate cabling and restore the TCP/IP settings.

Lab VII: Basic VTP
Configuration
Topology Diagram

Addressing Table

(Hostname)	Interface			
S1	VLAN 99	172.17.99.11	255.255.255.0	N/A
S2	VLAN 99	172.17.99.12	255.255.255.0	N/A
S3	VLAN 99	172.17.99.13	255.255.255.0	N/A
PC1	NIC	172.17.10.21	255.255.255.0	172.17.10.1
PC2	NIC	172.17.20.22	255.255.255.0	172.17.20.1
PC3	NIC	172.17.30.23	255.255.255.0	172.17.30.1
PC4	NIC	172.17.10.24	255.255.255.0	172.17.10.1
PC5	NIC	172.17.20.25	255.255.255.0	172.17.20.1
PC6	NIC	172.17.30.26	255.255.255.0	172.17.30.1

Port Assignments (Switches 2 and 3)

Ports	Assignment	Network
Fa0/1 – 0/5	802.1q Trunks (Native VLAN 99)	172.17.99.0 /24
Fa0/6 – 0/10	VLAN 30 – Guest (Default)	172.17.30.0 /24
Fa0/11 – 0/17	VLAN 10 – Faculty/Staff	172.17.10.0 /24
Fa0/18 – 0/24	VLAN 20 – Students	172.17.20.0 /24

Learning Objectives
- Cable a network according to the topology diagram
- Erase the startup configuration and reload a switch to the default state
- Perform basic configuration tasks on a switch
- Configure VLAN Trunking Protocol (VTP) on all switches
- Enable trunking on inter-switch connections
- Verify trunk configuration
- Modify VTP modes and observe the impact
- Create VLANs on the VTP server, and distribute this VLAN information to switches in the network
- Explain the differences in operation between VTP transparent mode, server mode, and client mode
- Assign switch ports to the VLANs
- Save the VLAN configuration
- Enable VTP pruning on the network
- Explain how pruning reduces unnecessary broadcast traffic on the LAN

Lab VIII: Troubleshooting VTP Configuration
Topology Diagram
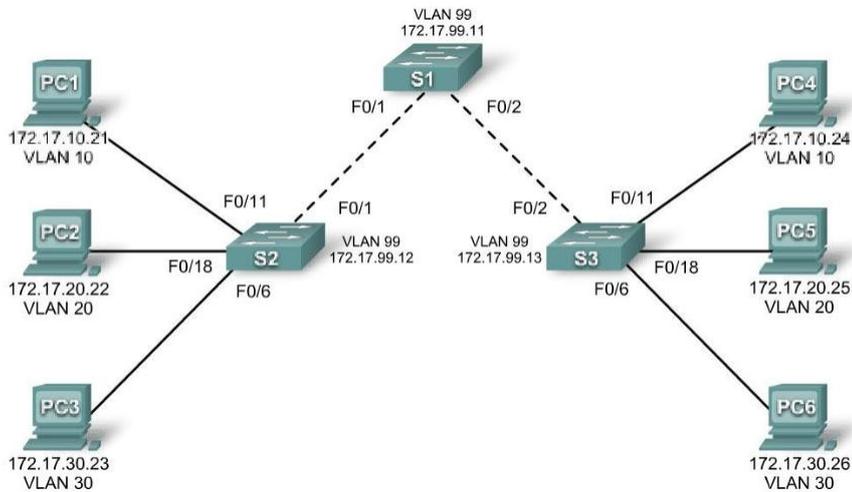
Addressing Table

(Hostname)	Interface		
S1	VLAN 99	172.17.99.11	255.255.255.0
S2	VLAN 99	172.17.99.12	255.255.255.0
S3	VLAN 99	172.17.99.13	255.255.255.0
PC1	NIC	172.17.10.21	255.255.255.0
PC2	NIC	172.17.20.22	255.255.255.0
PC3	NIC	172.17.30.23	255.255.255.0
PC4	NIC	172.17.10.24	255.255.255.0
PC5	NIC	172.17.20.25	255.255.255.0
PC6	NIC	172.17.30.26	255.255.255.0

Port Assignments (Switches 2 and 3)

Ports	Assignment	Network
Fa0/1 – 0/5	802.1q Trunks (Native VLAN 99)	172.17.99.0 /24
Fa0/6 – 0/10	VLAN 30 – Guest (Default)	172.17.30.0 /24
Fa0/11 – 0/17	VLAN 10 – Faculty/Staff	172.17.10.0 /24
Fa0/18 – 0/24	VLAN 20 – Students	172.17.20.0 /24

Objectives

- Cable a network according to the topology diagram
- Erase the startup configuration and vlan.dat files and reload switches to the default state
- Load the switches with supplied scripts
- Find and correct all configuration errors
- Document the corrected network
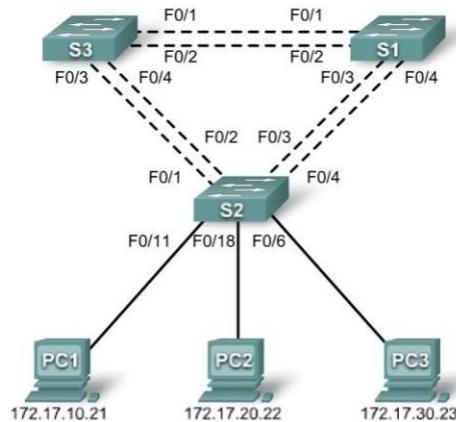
Lab IX: Basic Spanning Tree Protocol
Topology Diagram
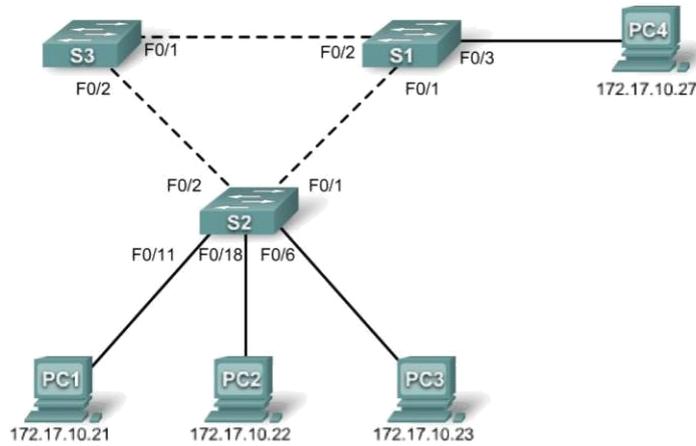
Addressing Table

(Hostname)	Interface			
S1	VLAN 1	172.17.10.1	255.255.255.0	N/A
S2	VLAN 1	172.17.10.2	255.255.255.0	N/A
S3	VLAN 1	172.17.10.3	255.255.255.0	N/A
PC1	NIC	172.17.10.21	255.255.255.0	172.17.10.254
PC2	NIC	172.17.10.22	255.255.255.0	172.17.10.254
PC3	NIC	172.17.10.23	255.255.255.0	172.17.10.254
PC4	NIC	172.17.10.27	255.255.255.0	172.17.10.254

Learning Objectives

- Cable a network according to the topology diagram
- Erase the startup configuration and reload the default configuration, setting a switch to the default state
- Perform basic configuration tasks on a switch
- Observe and explain the default behavior of Spanning Tree Protocol (STP, 802.1D)
- Observe the response to a change in the spanning tree topology

Lab X: Troubleshooting Spanning Tree Protocol

Topology Diagram

Addressing Table

(Hostname)	Interface			
S1	VLAN 99	172.17.99.11	255.255.255.0	N/A

S2	VLAN 99	172.17.99.12	255.255.255.0	N/A
S3	VLAN 99	172.17.99.13	255.255.255.0	N/A
PC1	NIC	172.17.10.21	255.255.255.0	172.17.10.1
PC2	NIC	172.17.20.22	255.255.255.0	172.17.20.1
PC3	NIC	172.17.30.23	255.255.255.0	172.17.30.1

Port Assignments – Switch 2

|		
Fa0/1 – 0/4	802.1q Trunks (Native VLAN 99)	172.17.99.0 /24
Fa0/5 – 0/10	VLAN 30 – Guest (Default)	172.17.30.0 /24
Fa0/11 – 0/17	VLAN 10 – Faculty/Staff	172.17.10.0 /24
Fa0/18 – 0/24	VLAN 20 – Students	172.17.20.0 /24

Learning Objectives
- Analyze a congestion problem in a redundant, switched LAN network.
- Recognize the capabilities for per-VLAN load balancing with PVST.
- Modify the default STP configuration to optimize available bandwidth.
- Verify that modifications have had the intended effect.

You are responsible for the operation of the redundant switched LAN shown in the topology diagram. You and your users have been observing increased latency during peak usage times, and your analysis points to congested trunks. You recognize that of the six trunks configured, only two are forwarding packets in the default STP configuration currently running. The solution to this problem requires more effective use of the available trunks. The PVST+ feature of Cisco switches provides the required flexibility to distribute the inter-switch traffic using all six trunks.

This lab is complete when all wired trunks are carrying traffic, and all three switches are participating in per-VLAN load balancing for the three user VLANs.

Lab XI: Inter-VLAN Routing
Topology Diagram
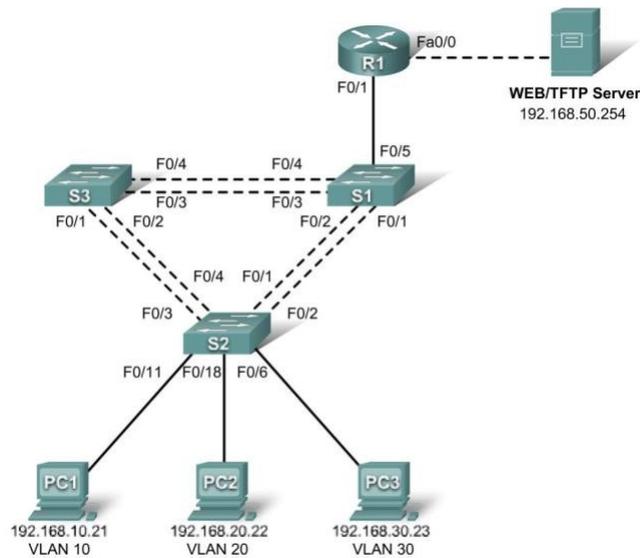
Addressing Table

(Hostname)	Interface			
S1	VLAN 99	192.168.99.11	255.255.255.0	192.168.99.1
S2	VLAN 99	192.168.99.12	255.255.255.0	192.168.99.1
S3	VLAN 99	192.168.99.13	255.255.255.0	192.168.99.1
R1	Fa 0/0	192.168.50.1	255.255.255.0	N/A
R1	Fa 0/1	See Subinterface Configuration Table		N/A

PC1	**NIC**	192.168.10.21	255.255.255.0	192.168.10.1
PC2	**NIC**	192.168.20.22	255.255.255.0	192.168.20.1
PC3	**NIC**	192.168.30.23	255.255.255.0	192.168.30.1
Server	**NIC**	192.168.50.254	255.255.255.0	192.168.50.1

Port Assignments – Switch 2

Fa0/1 – 0/5	802.1q Trunks (Native VLAN 99)	192.168.99.0 /24
Fa0/6 – 0/10	VLAN 30 – Sales	192.168.30.0 /24
Fa0/11 – 0/17	VLAN 10 – R&D	192.168.10.0 /24
Fa0/18 – 0/24	VLAN 20 – Engineering	192.168.20.0 /24

Subinterface Configuration Table – Router 1

|		
Fa0/1.1	VLAN1	192.168.1.1
Fa0/1.10	VLAN 10	192.168.10.1
Fa0/1.20	VLAN 20	192.168.20.1
Fa0/1.30	VLAN 30	192.168.30.1
Fa0/1.99	VLAN 99	192.168.99.1

Learning Objectives

Upon completion of this lab, you will be able to to:

- Cable a network according to the topology diagram
- Clear configurations and reload a switch and a router to the default state
- Perform basic configuration tasks on a switched LAN and a router
- Configure VLANs and VLAN Trunking Protocol (VTP) on all switches
- Configure a router to support 802.1q trunking on a Fast Ethernet interface
- Configure a router with subinterfaces corresponding to the configured VLANs
- Demonstrate inter-VLAN routing

Lab XII: Troubleshooting Inter-VLAN Routing

Topology Diagram
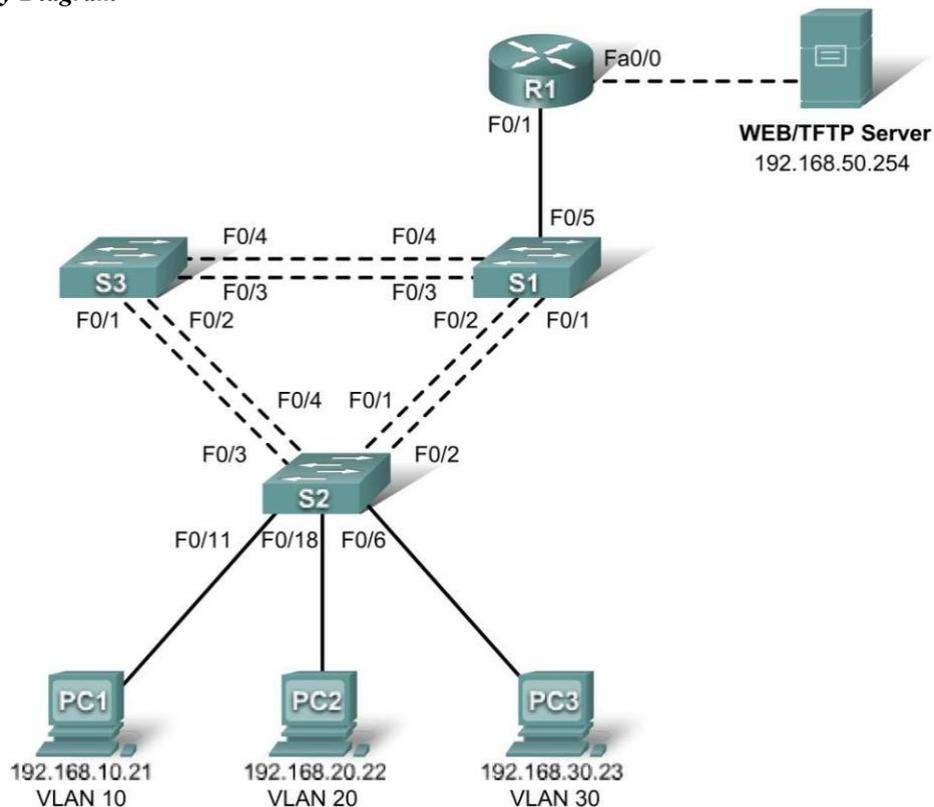
Addressing Table

Device (Hostname)	Interface	IP Address	Subnet Mask	Default Gateway

S1	**VLAN 99**	192.168.99.11	255.255.255.0	192.168.99.1
S2	**VLAN 99**	192.168.99.12	255.255.255.0	192.168.99.1
S3	**VLAN 99**	192.168.99.13	255.255.255.0	192.168.99.1
R1	**Fa 0/0**	192.168.50.1	255.255.255.0	N/A
R1	**Fa 0/1**	See Subinterface Configuration Table		N/A
PC1	**NIC**	192.168.10.21	255.255.255.0	192.168.10.1
PC2	**NIC**	192.168.20.22	255.255.255.0	192.168.20.1
PC3	**NIC**	192.168.30.23	255.255.255.0	192.168.30.1
Server	**NIC**	192.168.50.254	255.255.255.0	192.168.50.1

Port Assignments – Switch 2

Fa0/1 – 0/5	802.1q Trunks (Native VLAN 99)	192.168.99.0 /24
Fa0/6 – 0/10	VLAN 30 – Sales	192.168.30.0 /24
Fa0/11 – 0/17	VLAN 10 – R&D	192.168.10.0 /24
Fa0/18 – 0/24	VLAN 20 – Engineering	192.168.20.0 /24

Subinterface Configuration Table – Router 1

Fa0/1.1	VLAN1	192.168.1.1
Fa0/1.10	VLAN 10	192.168.10.1
Fa0/1.20	VLAN 20	192.168.20.1
Fa0/1.30	VLAN 30	192.168.30.1
Fa0/1.99	VLAN 99	192.168.99.1

Learning Objectives

- Cable a network according to the topology diagram
- Erase any existing configurations and reload switches and the router to the default state
- Load the switches and the router with supplied scripts
- Find and correct all configuration errors
- Document the corrected network

Scenario

The network has been designed and configured to support five VLANs and a separate server network. Inter-VLAN routing is being provided by an external router in a router-on-a-stick configuration, and the server network is routed across a separate Fast Ethernet interface. However, it is not working as designed, and complaints from your users have not given much insight into the source of the problems. You must first define what is not working as expected, and then analyze the existing configurations to determine and correct the source of the problems.

This lab is complete when you can demonstrate IP connectivity between each of the user VLANs and the external server network, and between the switch management VLAN and the server network.

Lab XIII: Basic Wireless Configuration
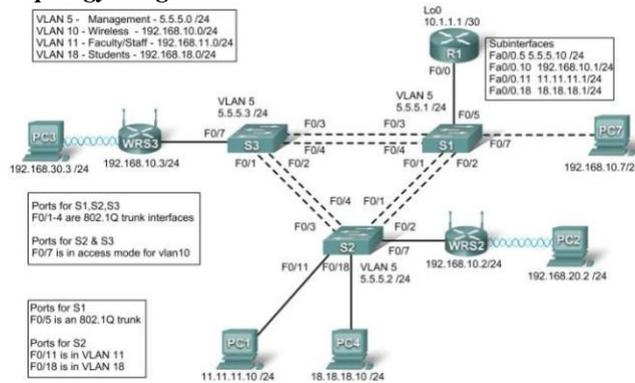*Topology Diagram*
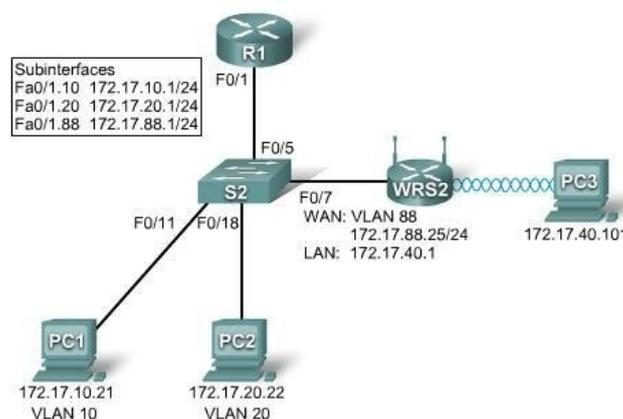
Learning Objectives
- Configure options in the Linksys Setup tab.
- Configure options in the Linksys Wireless tab.
- Configure options in the Linksys Administration tab.

- ♣ Configure options in the Linksys Security tab.
- ♣ Add wireless connectivity to a PC.
- ♣ Test connectivity.

Lab XIV: Troubleshooting Wireless Configuration

Topology Diagram

Addressing Table

	Fa0/0.5	5.5.5.10	255.255.255.0	N/A
	Fa0/0.10	192.168.10.1	255.255.255.0	N/A
R1	**Fa0/0.11**	11.11.11.1	255.255.255.0	N/A
	Fa0/0.18	18.18.18.1	255.255.255.0	N/A
	Lo0	10.1.1.1	255.255.255.252	N/A
WRS2	**WAN**	192.168.10.2	255.255.255.0	192.168.10.1
	LAN/Wireless	192.168.20.1	255.255.255.0	N/A
WRS3	**WAN**	192.168.10.3	255.255.255.0	192.168.10.1
	LAN/Wireless	192.168.30.1	255.255.255.0	N/A
PC1	**NIC**	11.11.11.10	255.255.255.0	11.11.11.1
PC4	**NIC**	18.18.18.10	255.255.255.0	18.18.18.1
S1	**VLAN 5**	5.5.5.1	255.255.255.0	N/A
S2	**VLAN 5**	5.5.5.2	255.255.255.0	N/A
S3	**VLAN 5**	5.5.5.3	255.255.255.0	N/A

Scenario

In this lab, a basic network and wireless network have been configured improperly. You must find and correct the misconfigurations based on the minimum network specifications provided by your company. Here are the configurations to load into your router and switches.

R1 Configuration
hostname R1
!
interface Loopback0
 ip address 10.1.1.1 255.255.255.0
!
interface FastEthernet0/0
 no ip address
 duplex auto
 speed auto
 no shutdown
!
interface FastEthernet0/0.5
 encapsulation dot1Q 5
 ip address 5.5.5.10 255.255.255.0
!

```
interface FastEthernet0/0.10
 encapsulation dot1Q 10
 ip address 192.168.11.1 255.255.255.0
!
!
interface FastEthernet0/0.18
 encapsulation dot1Q 18
 ip address 18.18.18.1 255.255.255.0
!
ip route 192.168.20.0 255.255.255.0 192.168.10.2
ip route 192.168.30.0 255.255.255.0 192.168.10.3
!
line con 0
 exec-timeout 0 0
 logging synchronous
!
end
```

Switch 1 Configuration

```
hostname S1
!
vtp mode transparent
!
vlan 5,10-11
!
interface FastEthernet0/1
 switchport trunk allowed vlan 5,10,11
 switchport mode trunk
 switchport trunk native vlan 5
!
interface FastEthernet0/2
 switchport trunk allowed vlan 5,10,11
 switchport mode trunk
 switchport trunk native vlan 5
!
interface FastEthernet0/3
 switchport trunk allowed vlan 5,10,11
 switchport mode trunk
 switchport trunk native vlan 5
!
interface FastEthernet0/4
 switchport trunk allowed vlan 5,10,11
 switchport mode trunk
 switchport trunk native vlan 5
!
interface FastEthernet0/5
 switchport mode trunk
 switchport trunk native vlan 5
!
interface Vlan5
 ip address 5.5.5.1 255.255.255.0
 no shutdown
!
line con 0
 exec-timeout 0 0
 logging synchronous
!
End
```

Switch 2 Configuration

```
hostname S2
!
vtp mode transparent
ip subnet-zero
```

```
!
vlan 5,10-11,18
!
interface FastEthernet0/1
 switchport trunk allowed vlan 5,10,11,18
 switchport mode access
!
interface FastEthernet0/2
 switchport trunk allowed vlan 5,10,11,18
 switchport mode access
!
interface FastEthernet0/3
 switchport trunk allowed vlan 5,10,11,18
 switchport mode access
!
interface FastEthernet0/4
 switchport trunk allowed vlan 5,10,11,18
 switchport mode access
!
interface FastEthernet0/7
 switchport access vlan 10
!
interface FastEthernet0/11
 switchport access vlan 11
 switchport mode access
 switchport port-security mac-address sticky
 switchport port-security mac-address sticky 0336.5b1e.33fa
!
interface FastEthernet0/18
 switchport access vlan 18
 switchport mode access
 switchport port-security
 switchport port-security mac-address sticky
 switchport port-security mac-address sticky 022c.ab13.22fb
!
interface Vlan1
 no ip address
 shutdown
!
interface Vlan5
 ip address 5.5.5.2 255.255.255.0
 no shutdown
!
line con 0
 exec-timeout 0 0
 logging synchronous
!
End
```

Switch 3 Configuration

```
hostname S3
!
vtp mode transparent
!
vlan 5,10-11,18
!
interface FastEthernet0/1
 switchport trunk allowed vlan 5,10,11,18
 switchport mode trunk
 switchport trunk native vlan 5
!
interface FastEthernet0/2
 switchport trunk allowed vlan 5,10,11,18
 switchport mode trunk
 switchport trunk native vlan 5
```

```
!
interface FastEthernet0/3
 switchport trunk allowed vlan 5,10,11,18
 switchport mode trunk
 switchport trunk native vlan 5
!
interface FastEthernet0/4
 switchport trunk allowed vlan 5,10,11,18
 switchport mode trunk
 switchport trunk native vlan 5
!
interface FastEthernet0/7
!
interface Vlan1
 no ip address
 no ip route-cache
!
interface Vlan5
 ip address 6.6.6.3 255.255.255.0
no shutdown
!
line con 0
 exec-timeout 0 0
 logging synchronous
!
end
```

Wireless Router Network Requirements

While troubleshooting WRS2 and WRS3, ensure that at least the following capabilities exist:

1. Connections via the IP addresses shown in the topology diagram.
2. More than 30 clients can get an IP address through DHCP at a single time.
3. A client can have a DHCP address for at least 2 hours.
4. Clients using both B and G wireless network modes can connect, but N clients cannot.
5. Wireless clients must be authenticated using WEP with a key of 5655545251.
6. Traffic between PC2 and PC3 must take the most efficient route possible.
7. Ping requests coming from outside WAN ports of the Linksys routers to their inside LAN/wireless IP addresses (192.168.30.1) must be successful.
8. DHCP must not give out IP addresses in a range that includes the addresses for PC2 and PC3.
9. The two wireless networks must not interfere with each other.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CLOUD COMPUTING

CODE	L	T	P/FW	CREDITS
MNT230	2	1	-	3

Course Objectives: This graduate-level course investigates cloud computing models, techniques, and architectures. Cloud computing has evolved as a very important computing model, which enables information, software, and other shared resources to be provisioned over the network as services in an on-demand manner. Students will be exposed to the current practices in cloud computing. Topics may include distributed computing models and technologies, Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS), virtualization, security and privacy issues, performance and systems issues, capacity planning, disaster recovery, Cloud OS, federated clouds, challenges in implementing clouds, data centers, hypervisor CPU and memory management, cloud hosted applications, and other advanced and research topics in cloud computing. Course work will include homework assignments, presentations, and a term project that will provide exposure to scientific research in cloud computing. Material may be covered from sources other than the text including research papers.

CONTENTS:

Module I: Overview of Computing Paradigm
Recent trends in Computing, Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing, Evolution of cloud computing, Business driver for adopting cloud computing

Module II: Introduction to Cloud Computing
Cloud Computing (NIST Model), Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers, Properties, Characteristics & Disadvantages, Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing, Role of Open Standards

Module III: Cloud Computing Architecture
Cloud computing stack, Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services ,Service Models (XaaS), Infrastructure as a Service(IaaS) Platform as a Service(PaaS), Software as a Service(SaaS), Deployment Models, Public cloud , Private cloud, Hybrid cloud, Community cloud

Module IV: Infrastructure as a Service(IaaS)
Introduction to IaaS, IaaS definition, Introduction to virtualization, Different approaches to virtualization, Hypervisors, Machine Image, Virtual Machine(VM), Resource Virtualization, Server
Storage, Network Virtual Machine(resource) provisioning and manageability, storage as a service, Data storage in cloud computing(storage as a service), Examples Amazon EC2, Renting, EC2 Compute Unit, Platform and Storage, pricing, customers, Eucalyptus

Module V: Platform as a Service(PaaS)
Introduction to PaaS, What is PaaS, Service Oriented Architecture (SOA), Cloud Platform and Management, Computation Storage, Examples Google App Engine, Microsoft Azure, Sales Force. coms Force.com platform

Module VI: Software as a Service(PaaS)
Introduction to SaaS, Web services, Web 2.0, Web OS, Case Study on SaaS

Module VII: Service Management in Cloud Computing
Service Level Agreements(SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling: Benefitting enormously, Managing Data, Looking at Data, Scalability & Cloud Services, Database & Data Stores in Cloud, Large Scale Data Processing

Module VIII: Cloud Security
Infrastructure Security, Network level security, Host level security, Application level security, Data security and Storage, Data privacy and security Issues, Jurisdictional issues raised by Data location
Identity &Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations

Module IX: Case Study on Open Source & Commercial Clouds
Eucalyptus, Microsoft Azure, Amazon EC2

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Test & References:
1. Distributed and Cloud Computing, 1st edition, Morgan Kaufmann, 2011
2. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
3. *Cloud Computing: Principles and Paradigms,* Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski*, Wile,* 2011
4. *Cloud Computing: Principles, Systems and Applications, Editors:* Nikos Antonopoulos, Lee Gillam*, Springer,* 2012
5. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010

Wireless Communication

CODE	L	T	P/FW	CREDITS
MNT231	2	1	-	3

Course Objective:

The course aims at giving the practical and theoretical concepts of Design, Implementation, Research and Invention of Wireless Communication System. It also gives the minute technical details of the many emerging wireless standards.

Course Contents:

Module I: Introduction to Cellular Mobile Systems
Overview of Ist generation (1G) & Second Generation (2G) Cellular Systems (global scenario), Evolution to 2.5 G & 3 G systems. Networks & Services particularly data transport services, Status of GSM & CDMA based Cellular networks in India. Architecture & Services derived from them (Tele/Bearer & supplementary services)

Module II: The Cellular System Design fundamentals
Frequency spectrum as a resource : Use of Frequency spectrum in early mobile systems (non Cellular), Need to Reuse Frequency in Cellular Systems, Channel Assignment Strategies, Various Hand off Strategies (Hard & Soft Handoff), Interference & System Capacity, Co – channel interference & system Capacity, Adjacent channel interference, Power control for reducing interference, Trunking & Grade Of Service(GOS) in Cellular Networks.

Module III: Modulation Techniques for Mobile Radio Communication
Linear Modulation Techniques, Binary Shift Keying (BPSK), Differential Phase Shift Keying (DPSK), Quadrature Phase Shift Keying (QPSK), Constant Envelope Modulation, Binary Frequency Shift Keying, Minimum Shift Keying (MSK), Gaussian Minimum Shift Keying (GMSK), Spread Spectrum Modulation Techniques, Pseudo - Noise (PN) Sequences, Direct Sequence Spread Spectrum (DS-SS), Frequency Hopped Spread Spectrum (FH-SS), Comparison of various Modulation Techniques & their performance in fading & multipath channel.

Module IV: Multiple Access techniques for wireless Communication
Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Spread Spectrum Multiple Access / Code Division Multiple Access (CDMA).

Module V: Mobile Propagation and Antennas
Point to point model, Propagation over terrains, Power requirement of Antennas, Smart antennas, Antennas at cell cite, Gain – and pattern – relationship mobile antennas, Tilting effect, parasite elements usage, Diversity Techniques.

Module VI: Packet Radio
Packet Radio Protocols, Pure ALOHA, Slotted ALOHA, Carrier Sense Multiple Access Protocols (CSMA)

Module VII: Wireless Data Services
Cellular Digital Packet Data (CDPD), Data Services derived from 2G(GSM/CDMA-one), 2.5G (GPRS/CDMA-2000) & 3G (UMTS/CDMA 1XEV) Systems.

Module VIII: Wireless in Local Loop Systems
Digital European Cordless Telephone (DECT) based WLL Systems, DECT Architecture, DECT & Cor DECT Systems, Data Services derived from Cor DECT Systems.

Module IX: Wireless Broadband
MMDS, LMDS

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

⟐ T.S. Rappapart Wireless communication Principles and Practices; Pearson Education.

References:

⟐ GSM, CDMA one & 3G system, Steele Lee and Gluis, J W 2001.
⟐ K. Feher, Wireless Digital Communication PH 1995.
⟐ W.C.Y. Lee Mobile communication Engineering, Tata McGraw Hill, 1998.
⟐ Vijay K. Garg & Joseph E Wilkes, Principles and Applications of GSM, Pearson Education
⟐ Jochen Schiller, Mobile Communication, Pearson Education

Emerging Technologies – I (VoIP & IPv6)

CODE	L	T	P/FW	CREDITS
MNT232	2	1	-	3

Course Objective:
In this subject students are expected to analyse the impact of emerging technologies on innovation and appraise the ecological, economic, social, ethical and legal implications of new and emerging technologies.

Course Contents:

Module I: Introduction to IPv6
Limitation of IPv6, Features of IPv6, Comparison of IPv4 and IPv6, IPv6 Terminology, The Case for IPv6 Deployment

Module II: Structure of IPv6 Protocol
General header structure, fields in IPV6 header, extension headers

Module III: IPv6 Addressing
Address types, address notation, prefix notation, format prefixes, address privacy, anycast address, multicast address, required address,

Module IV: Security in IPv6
Types of threats, basic security requirements and techniques, current solutions, IPsec framework, Ipv6 security elements, Internetworking of Ipv6 features with other services.

Module V: Quality of service in IPv6
QOS paradigms, QOS in Ipv6,QOS architectures, Mapping IP QOS to underlying transmission networks,issues in IP QOS.

Module VI: VOIP: Overview of PSTN and comparisons to VOIP
Beginning of the PSTN, Understanding PSTN services, PSTN services and applications, packet telephony network drivers, standards based packet infrastructure layer, new PSTN network infrastructure model.

Module VII: Seting up a phone system at home
Introduction to VOCAL, h/w requirements, s/w requirements, acquiring vocal s/w, installing and deploying VOCAL, testing installation, configuring s/w UA"s.

Module VIII: Setting up an internal trial system
Interfacing with PSTN, setting up a reduntant system, configuring a PSTN gateway, installing vocal on to a multihost system, working with vocal.

Module IX: Provisioning Users
Quick steps for provisioning users, logging into provisioning system, user configuration screen, adding /viewing/editing/deleting users

Module X: Configuring system parameters and dial plans
Login procedure, configuring servers, system folder.

Module XI: Provisioning servers
Servers folder, call detail record servers, redirect servers, user agent marshal server, gateway marshal server, conference bridge marshal server, internet work marshal server.

Module XII: Session Initiation Protocol and related protocol
SIP, sample message flows, message headers, SDP messages

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:
Text:
- IPv6 Essentials, Silvia Hagen, O"Reilly Publication
- Understanding Ipv6, Joseph Davies, Microsoft Press, PHI

References:
- Practical VOIP, Luan Dang, O"Reilly Publication

Network Management

CODE	L	T	P/FW	CREDITS
MNT233	2	1	-	3

Course Objective:

Network management means different things to different people. In some cases, it involves a solitary network consultant monitoring network activity with an outdated protocol analyzer. In other cases, network management involves a distributed database, auto polling of network devices, and high-end workstations generating real-time graphical views of network topology changes and traffic. In general, network management is a service that employs a variety of tools, applications, and devices to assist human network managers in monitoring and maintaining networks, so this subject will make students perfect in all these concepts of network management.

Course Contents:

Module I: Large Enterprise Networks
Managing Enterprise Networks, Why use network management, SNMP overview

Module II: SNMP v3 and Network Management
SNMP v3 structure, SNMP v3 applications, Message format overview, concept of MPLS.

Module III: Network Management Problem
Layer 2 VPN Scalability, Virtual Circuit status Monitoring, other enterprise network scalability issues, Expensive and scarse development skill sets, NMS development, MPLS and scalability issues.

Module IV
Solving the Network Management Problem filling the development skill gap, smarter MIB"s, smarter NMS, PBNM, DEN, IP QoS and the Enterprise.

Module V: Network Management Theory and Practice
Intelligence in the network, pushing FCAPS into the network, service level network components, need for end to end security, integration with OSS LAYERS, facilitating a solution mindset.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:
- Network management, MIB, MPLS, Stephen Morris, Pearson publication
- Network Management System, William Stallings, PHI

References:
- Network Management System, Mani Subramaniam, PHI

Ad-Hoc Networks

CODE	L	T	P/FW	CREDITS
MNT234	2	1	-	3

Course Contents:

Module I: Ad-hoc MAC
Introduction to adhoc network, its types, MAC Protocols – Misuse, classification of MAC Protocols, Multi channel MAC and power control MAC Control Protocol.

Module II : AD-hoc Routing and TCP
Ad-hoc Routing protocols – classifications of routing protocols – hierarchical and power aware. Multicast routing – classifications, tree based, Mesh based, AD Hoc Transport Layer Issues. TCP over Ad Hoc – Feedback based, TCP with explicit link, TCO – Bus, Ad Hoc TCP, and Split TCP.

Module III: WSN –MAC
Introduction – Sensor Network Architecture, Data dissemination, Gathering, MAC Protocols – Self – Organizing, Hybrid TDMA/FDMA and CSMA based MAC.

Module IV: WSN Routing, Localization & QOS
Routing protocols in WSN, Reactive, Proactive and Hybrid – OLSR, AODV, Localization – Indoor and Sensor network Localization. QOS in WSN.

Module V: Ad- hoc Networks applications:
Challenging issues in Ad- hoc Network and its applications – Mobile Ad-hoc network – Regular Ad-hoc Network – Vehicular Ad-hoc Network.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:
1. Daniel GAlin, Software quality assurance – from theory to implementation Pearson education, 2009
2. Aditya Mathur, Foundations of Software testing, Pearson Education, 2008.
3. Srinivasan Desikan and Gopalaswamy Ramesh, Software testing – Principles and practices, Pearson education, 2006.
4. Ron Patton, software testing, second edition, Pearson education, 2007.

High Performance Networks

CODE	L	T	P/FW	CREDITS
MNT235	2	1	-	3

Course Objective:
The course aims at providing the various high speed digital access and broadband technologies, switching techniques used for communication; congestion control, performance issues and quality of service required for better performance of high speed networks.

Course Contents:

Module I: Introduction
Communication networks, network principles, applications, QoS, (network and application), Traffic characterization, network services, elements, mechanisms.

Module II: High Speed Digital Access & Broadband Technologies
DSL Technologies: ADSL, other DSL Technologies; **Cable Modem**: Traditional Cable Networks, HFC Networks, Internet Over Cable, Spectrum Allocation, Sharing, Cable Modems, CM & CMTS, Data Transmission Schemes DOCSIS etc., ADSL versus Cable; **SONET**: SONET Devices, SONET Frame, Frame Transmission, Synchronous Transport Signals, STS-1, Virtual Tributaries, Higher-Rate Services; B–ISDN architecture;

Module III: Virtual Circuit Switching
Virtual Circuit Switching: Global Addressing, Virtual Circuit Identifier, Three Phases, Data Transfer Phase, Setup Phase, Teardown Phase; **Frame Relay**: Architecture, Frame Relay Layers, FRADs, VOFR, LMI, Congestion Control and Quality of Service; **ATM**: Design Goals, Problems, Main Features of ATM, Architecture, cell format & Switching Addressing, signalling and routing, ATM traffic and Congestion Control, Flow Control, Error Detection and Error Control, Quality of Service, Internetworking with ATM, ATM LANs. ATM networks performance measures – cell transfer delay, cell delay variation, CDV tolerance; cell loss ratio buffer over flow probability;

Module IV: Multicast Routing
Multicast Routing: IGMP, Multicast Trees, MBONE; **Multicast Routing Protocols:** DVMRP, MOSPF, CBT, PIM Applications

Module V: Congestion and Quality Control
General Principles of Congestion Control**;** Congestion Prevention Policies; **Data Traffic:** Traffic Descriptor, Traffic Profiles; **Congestion:** Network Performance; **Congestion Control:** Open-Loop Congestion Control, Closed-Loop Congestion Control, Congestion Control in TCP, Congestion Control in Frame Relay, Load Shedding, Jitter Control; **Quality of Service:** Requirements, Flow Characteristics, Flow Classes; **Techniques to improve QoS:** Scheduling, Traffic Shaping, Resource Reservation, Admission Control; **Integrated Services:** Signalling, Flow Specification, Admission, Service Classes, RSVP, Problems with Integrated Services; **Differentiated Services; Qos in Switched Networks:** QoS in Frame Relay, QoS in ATM, Label Switching and MPLS

Module VI: Performance Issues
Performance Problems in Computer Networks, Network Performance Measurement, System Design for Better Performance, Fast TPDU Processing, Protocols for Gigabit Networks

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:
- Jean Walrand and Pravin Varaiya, "High Performance Communication networks", HARCOURT Asia PTE Ltd., 2nd edition, 2001.
- William stallings, "ISDN and broadband ISDN with frame relay and ATM", Pearson Education Asia, Fourth Edition, 2001.

References:
- Walter Goralski, Optical Networking and WDM, Tata McGraw Hill, 2001.
- Neelakanta P.S., A textbook on ATM Telecommunication Principles and Implementation; CRC Press, First edition; 2000.
- John A. Vacca, Wireless Broadband Networks Handbook, Tata McGraw Hill, 2001.
- Tom Sheldon, Encyclopedia of Networking and Telecommunication, Tata McGraw Hill, 2001
- Andrew S. Tanenbaum, Computer Networks, Fourth Edition, Prentice Hall India
- Behrouz A. Forouzan, Data Communication and Networking, Third Edition, Tata McGraw-Hill

COMMUNICATION SKILLS - II

CODE	L	T	P/FW	CREDITS
BCS 211	1	-	-	1

Course Objective:

To enrich the understanding of English language and communication, structure, style, usage, and vocabulary for global business purposes.

Course Contents:

Module I: Fundamentals of Communication
Role and purpose of communication: *7 C's of communication*
Barriers to effective communication
Enhancing listening
Forms of Communication: one-to-one, informal and formal

Module II: Verbal Communication (Written)
Business Letter
Social correspondence
Writing resume and Job applications

Module III: Speaking skills
Conversational English
Guidelines to give an effective presentation
Activities to include:
Presentations by students
Just a minute

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Business Communication, Raman – Prakash, Oxford
- Textbook of Business Communication, Ramaswami S, Macmillan
- Speaking Personally, Porter-Ladousse, Cambridge

BEHAVIOURAL SCIENCE - II

CODE	L	T	P/FW	CREDITS
BSS 211	1	-	-	1

Course Objective:

This course aims at imparting an understanding of:
Process of Behavioural communication
Aspects of interpersonal communication and relationship
Management of individual differences as important dimension of IPR

Course Contents:

Module I: Behavioural Communication
Scope of Behavioural Communication
Process – Personal, Impersonal and Interpersonal Communication
Guidelines for developing Human Communication skills
Relevance of Behavioural Communication in relationship management

Module II: Managing Individual Differences in Relationships
Principles
Types of issues
Approaches
Understanding and importance of self disclosure
Guidelines for effective communication during conflicts

Module III: Communication Climate: Foundation of Interpersonal Relationships Elements of satisfying relationships
Conforming and Disconforming Communication
Culturally Relevant Communication
Guideline for Creating and Sustaining Healthy Climate

Module IV: Interpersonal Communication
Imperatives for Interpersonal Communication
Models – Linear, Interaction and Transaction
Patterns – Complementary, Symmetrical and Parallel
Types – Self and Other Oriented
Steps to improve Interpersonal Communication

Module V: Interpersonal Relationship Development
Relationship circle – Peer/ Colleague, Superior and Subordinate
Initiating and establishing IPR
Escalating, maintaining and terminating IPR
Direct and indirect strategies of terminating relationship
Model of ending relationship

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- Harvard Business School, Effective Communication: United States of America
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

FRENCH - II

CODE	L	T	P/FW	CREDITS
FLF 211	2	-	-	2

Course Objective:

- To enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French.
- To make them learn the basic rules of French Grammar.

Course Contents:

Module A: pp.38 – 47: Unité 3: Objectif 3, 4, 5. 6

Module B: pp. 47 to 75 Unité 4, 5

Contenu lexical: **Unité 3: Organiser son temps**
1. donner/demander des informations sur un emploi du temps, un horaire SNCF – Imaginer un dialogue
2. rédiger un message/ une lettre pour …
   i) prendre un rendez-vous/ accepter et confirmer/ annuler
   ii) inviter/accepter/refuser
3. Faire un programme d"activités
   imaginer une conversation téléphonique/un dialogue
   Propositions- interroger, répondre

1. situer un lieu
2. s"orienter, s"informer sur un itinéraire.
3. Chercher, décrire un logement
4. connaître les rythmes de la vie

1. demander/donner des informations sur un emploi du temps passé.
2. donner une explication, exprimer le doute ou la certitude.
3. découvrir les relations entre les mots
4. savoir s"informer

Contenu grammatical: 1. Adjectifs démonstratifs
2. Adjectifs possessifs/exprimer la possession à l"aide de:
   i. « de » ii. A+nom/pronom disjoint
3. Conjugaison pronominale – négative, interrogative
   - construction à l'infinitif
4. Impératif/exprimer l"obligation/l"interdiction à l"aide de «
   il faut…. »/ «il ne faut pas… »
5. passé composé
6. Questions directes/indirectes

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre: Campus: Tome 1

GERMAN – II

CODE	L	T	P/FW	CREDITS
FLG 211	2	-	-	2

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Introduction to Grammar to consolidate the language base learnt in Semester I

Course Contents:

Module I: Everything about Time and Time periods
Time and times of the day.
Weekdays, months, seasons.
Adverbs of time and time related prepositions

Module II: Irregular verbs
Introduction to irregular verbs like to be, and others, to learn the conjugations of the same, (fahren, essen, lessen, schlafen, sprechen und ähnliche).

Module III: Separable verbs
To comprehend the change in meaning that the verbs undergo when used as such
Treatment of such verbs with separable prefixes

Module IV: Reading and comprehension
Reading and deciphering railway schedules/school time table
Usage of separable verbs in the above context

Module V: Accusative case
Accusative case with the relevant articles
Introduction to 2 different kinds of sentences – Nominative and Accusative

Module VI: Accusative personal pronouns
Nominative and accusative in comparison
Emphasizing on the universal applicability of the pronouns to both persons and objects

Module VII: Accusative prepositions
Accusative propositions with their use
Both theoretical and figurative use

Module VIII: Dialogues
Dialogue reading: „In the market place"
                            „At the Hotel"

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – II

CODE	L	T	P/FW	CREDITS
FLS 211	2	-	-	2

Course Objective:

To enable students acquire more vocabulary, grammar, verbal phrases to understand simple texts and start describing any person or object in Simple Present Tense.

Course Contents:

Module I
Revision of earlier modules.

Module II
Some more AR/ER/IR verbs. Introduction to root changing and irregular AR/ER/IR ending verbs

Module III
More verbal phrases (eg, Dios Mio, Que lastima etc), adverbs *(bueno/malo, muy, mucho, bastante, poco)*. Simple texts based on grammar and vocabulary done in earlier modules.

Module IV
Possessive pronouns

Module V
Writing/speaking essays like my friend, my house, my school/institution, myself….descriptions of people, objects etc, computer/internet related vocabulary

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

CHINESE – II

CODE	L	T	P/FW	CREDITS
FLC 211	2	-	-	2

Course Objective:

Chinese is a tonal language where each syllable in isolation has its definite tone (flat, falling, rising and rising/falling), and same syllables with different tones mean different things. When you say, "ma" with a third tone, it mean horse and "ma" with the first tone is Mother. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Drills
Practice reading aloud
Observe Picture and answer the question.
Tone practice.
Practice using the language both by speaking and by taking notes.
Introduction of basic sentence patterns.
Measure words.
Glad to meet you.

Module II
Where do you live?
Learning different colors.
Tones of "bu"
Buying things and how muchit costs?
Dialogue on change of Money.
More sentence patterns on Days and Weekdays.
How to tell time. Saying the units of time in Chinese. Learning to say useful phrases like – 8:00, 11:25, 10:30 P.M. everyday, afternoon, evening, night, morning 3:58, one hour, to begin, to end ….. etc.
Morning, Afternoon, Evening, Night.

Module III
Use of words of location like-li, wais hang, xia
Furniture – table, chair, bed, bookshelf,.. etc.
Description of room, house or hostel room.. eg what is placed where and how many things are there in it? Review Lessons – Preview Lessons.
Expression „yao", "xiang" and "yaoshi" (if).
Days of week, months in a year etc.
I am learning Chinese. Is Chinese difficult?

Module IV
Counting from 1-1000
Use of "chang-chang".
Making an Inquiry – What time is it now? Where is the Post Office?
Days of the week. Months in a year.
Use of Preposition – "zai", "gen".
Use of interrogative pronoun – "duoshao" and "ji".
"Whose"??? Sweater etc is it?
Different Games and going out for exercise in the morning.

Module V
The verb "qu"
Going to the library issuing a book from the library
Going to the cinema hall, buying tickets
Going to the post office, buying stamps
Going to the market to buy things.. etc
Going to the buy clothes …. Etc.
Hobby. I also like swimming.
Comprehension and answer questions based on it.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- ◼ "Elementary Chinese Reader Part I" Lesson 11

SYSTEM ADMINISTRATION – III (INCLUDING LINUX/UNIX)

CODE	L	T	P/FW	CREDITS
MNT301	3	1	-	4

Course Objective:

This subject is aimed at providing a detailed knowledge of working of Linux Operating System. The subject starts with basic operations by means of commands, and gradually involves System Administration and Network Administration Concepts. The purpose of this subject is to give a detailed insight of working of Linux operating systems along with Managing and maintaining various server and client machines in a network environment. Upon completion of this subject the students will become familiar with working with Linux operating systems along with thorough knowledge of configuring and maintaining various servers such as Mail Servers, Web Servers, DNS, DHCP, Samba Servers and configuring CUPS, RAID, LVM, etc.

Course Contents:

Module I: Linux Installation & Basic Commands
Introduction to OS (Brief Introduction to Unix Operating System), Understanding Red Hat Linux Installation Basic Commands (cal, ls, cp mv etc), Editors (vi & ed), Redirection & piping, Filters Linux utilities: grep, etc., Shells (C & Bourne, Korne, R Shell), Variables, Script, Metacharacters & Environment variable, concating command, indirection, redirection, foreground and background process.

Module II: The Boot Process
Virtual Consoles, The Boot Process, Kernel Initialization, init and /etc/inittab, Exploration of the, init Process, The GRUB Boot Loader

Module III: Filesystem and Software Administration
Partitioning Utilities, Journaling Filesystems, Formatting Filesystems, mount, The Automounter/ etc/ fstab, Red Hat Network Implementation, Maintaining Software with RPM, Performing RPM Queries, RPM Related Utilities

Module IV: User Administration
PAM, Creating User Accounts, Maintaining User Accounts, Creating/Maintaining Groups, The User Private Group Model, SGID Directories, The Initial User Environment, Configuring Quotas NIS Server and Client Configuration

Module V: System Administration Tools
Installing with Kickstart, cron Scheduling, Daily cron Scripts, Network Interface Configuration, CUPS Configuration and Administration, LPRng Configuration and Administration, syslog Configuration

Module VI: Kernel Services and Configuration
Linux LVM Configuration and Administration, Managing Kernel Modules, Examining and Setting Kernel Parameters in /proc, Software RAID Configuration and Recovery

Module VII: Apache and Squid
Squid Proxy Server Overview, Apache Configuration, Implementing Apache Virtual Hosts

Module VIII: NFS and Samba
Configuring an NFS Server, Samba Client Tools, Samba Server Configuration, Windows Passwords and Samba, Sharing Files, Directories and Printers with Samba

Module IX: DNS and Electronic Mail
Sendmail Configuration Files, m4 Macro Language and the sendmail.mc File, Additional sendmail Configuration Files, Postfix Configuration Files, Configuring BIND, named.conf, Configuring Forward and Reverse Lookup Zones, Special Zones, Zone Files

Module X: FTP, xinetd, and Open SSH
vsftpd Configuration, DHCP Server Configuration, OpenSSH Client Utilities, OpenSSH Server Configuration, OpenSSH Authentication Methods, xinetd.conf, xinetd Service Files

Module XI: The X Window System
Configuring XFree86, The X Protocol Overview, X Protocol Network Transparency, X Window System and ssh, Window Managers, Display Managers, X Window System Security, X Window System Modularity, XFree86 Startup, The X Font Server

Module XII: Securing Services

tcp wrappers Configuration, netfilter Configuration, Maintaining netfilter Rules, netfilter Example netfilter Network Address Translation, netfilter Connection Tracking

Module XIII: Troubleshooting

Filesytem Corruption, Filesytem Recovery, Things to Check: The X Window System, Things to Check: Services, Things to Check: Networking, Things to Check: Booting, The Rescue Environment, Recovery Runlevels, Boot Floppies

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:
- Yashwant Kanetkar, Unix Shell Programming, BPB Publications

References:
- Sumitabadas, Unix Concept and Applications, Tata McGraw Hill
- Unleashed Unix, Tata McGraw Hill

ACCESSING THE WAN

CODE	L	T	P/FW	CREDITS
MNT302	3	1	-	4

Course Objective:

The goal of CCNA Exploration Network Fundamentals course is to introduce you to introduce you to fundamental networking concepts and technologies. This course will assist you in developing the skills necessary to plan and implement small networks across a range of applications

Course Contents:

Module I: Introduction to WAN
Providing Integrated Services to Enterprise, WAN Technology Concept, WAN Connection Option

Module II: PPP
Serial Point to Point Links, PPP Concept, Configuring PPP, Configuring PPP with Authentication,

Module III: Frame Relay
Basic Frame Relay Concepts, Configuring Frame Relay, Advanced Frame Relay Concept, Configuring Advanced Frame Relay Concept

Module IV: Network Security
Introduction to Network Security, Securing Cisco Routers, Secure Router Network Services, Using Cisco SDM, Secure Router Management

Module V: ACLs
Using ACL to Secure Network, Configuring Standard ACLs, Configuring Extended ACLs, Configuring Complex ACLs

Module VI: Teleworker Services
Business Requirement for Teleworker Services, Broadband Services, VPN Technology

Module VII: IP addressing Services
DHCP, Scaling Network with NAT, Ipv6

Module VIII: Network Troubleshooting
Establishing Network Performance Base Line, Troubleshooting Methodology and Tools, Common WAN Implementation Issues, Network Troubleshooting

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text
- Cisco Networking Academy Programme CCNA 3 & 4 Companion Guide, 3rd Edn by Pearson Education
- Cisco Networking Academy Programme CCNA 3 & 4 Lab Companion, 3rd Edn by Pearson Education

References:
- Cisco Networking Academy Programme CCNA 3 & 4 Engineering General, 3rd Edn by Pearson Education
- Data Communicatios and Networking by Behrouz Forouzan, 3e, Tata McGraw-Hill
- Computer Networks by Andrews S. Tanenbaum, 4e, Pearson Education

SUMMER PROJECT
(Evaluation)

CODE	L	T	P/FW	CREDITS
MNT360	-	-	-	6

Guidelines:

There are certain phases of every Intern"s professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.

The File will assess the student"s analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project & Seminar Report:

1. File should be in the following specification
• A4 size paper
• Font: Arial (10 points) or Times New Roman (12 points)
• Line spacing: 1.5
• Top & bottom margins: 1 inch/ 2.5 cm
• Left & right margins: 1.25 inches/ 3 cm

2. Report Layout: The report should contain the following components Front Page
Table of Content
Acknowledgement Student
Certificate Company
Profile (optional)
Introduction
Main Body
References / Bibliography

The File will include *five sections* in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:

1. **The Title Page**--Title - An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content**--an outline of the contents by topics and subtopics with the page number and location of each section.
3. **Introduction**--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.
4. **Main Body**--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.
5. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system

ASSESSMENT OF THE INTERNSHIP FILE

The student will be provided with the Student Assessment Record (SAR) to be placed in front of the Internship File. Each item in the SAR is ticked off when it is completed successfully. The faculty will also assess each item as it is completed. The SAR will be signed by the student and by the faculty to indicate that the File is the student"s own work. It will also ensure regularity and meeting the delaines.

STUDENT ASSESSMENT RECORD (SAR)

1. **Range of Research Methods used to obtain information**

2. **Execution of Research**

3. **Data Analysis**
   - Analyse Quantitative/ Qualitative information
   - Control Quality

4. **Draw Conclusions**

Examination Scheme:

Components	V	S	R	FP
Weightage (%)	20	20	20	40

V – Viva, S – Synopsis, FP – Final Presentation, R - Report

SYSTEM ADMINISTRATION-III (INCLUDING LINUX/UNIX) LAB

CODE	L	T	P/FW	CREDITS
MNT320	-	-	2	1

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

SNo	Lab Exercise- Name	Lab Exercise -Details
1	Hardware, Device Configuration and Installation of Linux/ UNIX	Steps wise - How to Install Linux/ UNIX
2	System Initialization and Services	Exploring UNIX and Linux Console Configuration GUI Configuration Modifying User Environments Exploring File system Using Utilities to Manage Files
3	User Administration	Creating/ Deleting new User Accounts Modifying User accounts Managing Files and Directories
4	Network Configuration	DNS Configuration Network Configuration Utilities Configuring the Internet Settings Network Diagnostics
5	Printing and Administration Tools	Printer Configuration tool Networked CUPS (Common Unix Printing System) overview Networked UNIX (LPD)
6	DCHP Administration	DHCP Server Configuration DHCP Client Configuration
7	System Backup	Backup Administration
8	RPM and Boot loaders	RPM Package Manager Adding and Removing Software MultiBoot systems
9	SAMBA Server/Client Administration	File and Print sharing from UNIX to Windows Network Windows (SMB)
10	NFS Server/Client Setup	Allow to share directories between UNIX systems
11	Apache Web Server Administration	Apache Server Configuration Basic settings Virtual Hosting
12	Squid Proxy server Administration	Basic Settings File Squid.conf Configuration
13	Mail Server Administration	Mail Server configuration POP3 Server IMAP Server
14	The X Window System	Configuration Utilities
15	Troubleshooting	Things to check: Services Things to check: Networking File System Recovery Rescue Environment utilities

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.
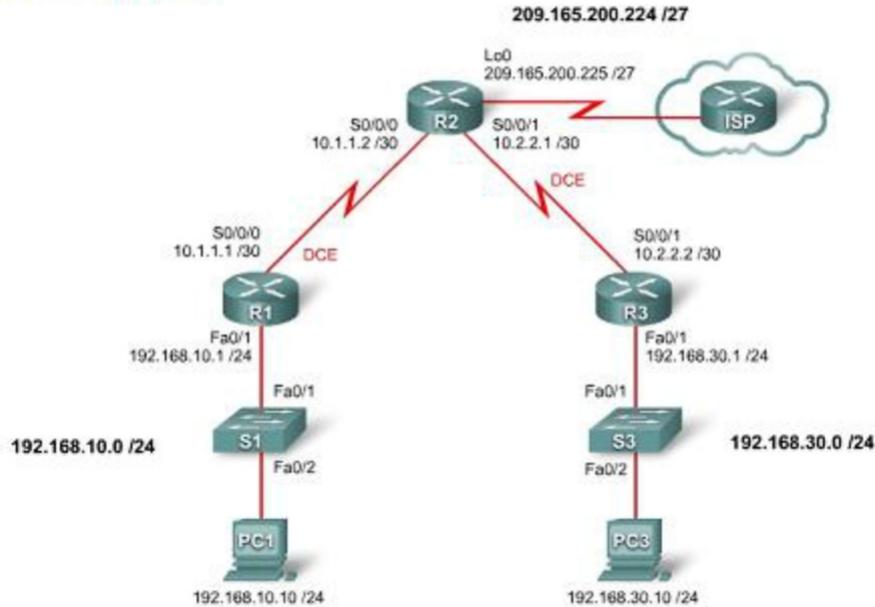
ACCESSING THE WAN LAB

CODE	L	T	P/FW	CREDITS
MNT321	-	-	2	1

List of Practical – Accessing the WAN

1. **Basic PPP Configuration Lab**

Topology Diagram

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/1	192.168.10.1	255.255.255.0	N/A
R1	S0/0/0	10.1.1.1	255.255.255.252	N/A
R2	Lo0	209.165.200.225	255.255.255.224	N/A
R2	S0/0/0	10.1.1.2	255.255.255.252	N/A
R2	S0/0/1	10.2.2.1	255.255.255.252	N/A
R3	Fa0/1	192.168.30.1	255.255.255.0	N/A
R3	S0/0/1	10.2.2.2	255.255.255.252	N/A
PC1	NIC	192.168.10.10	255.255.255.0	192.168.10.1
PC3	NIC	192.168.30.10	255.255.255.0	192.168.30.1

- Cable a network according to the topology diagram.
- Erase the startup configuration and reload a router to the default state.
- Perform basic configuration tasks on a router.
- Configure and activate interfaces.
- Configure OSPF routing on all routers.
- Configure PPP encapsulation on all serial interfaces.
- Learn about the debug ppp negotiation and debug ppp packet commands.
- Learn how to change the encapsulation on the serial interfaces from PPP to HDLC.
- Intentionally break and restore PPP encapsulation.
- Configure PPP PAP and CHAP authentication.
- Intentionally break and restore PPP PAP and CHAP authentication.
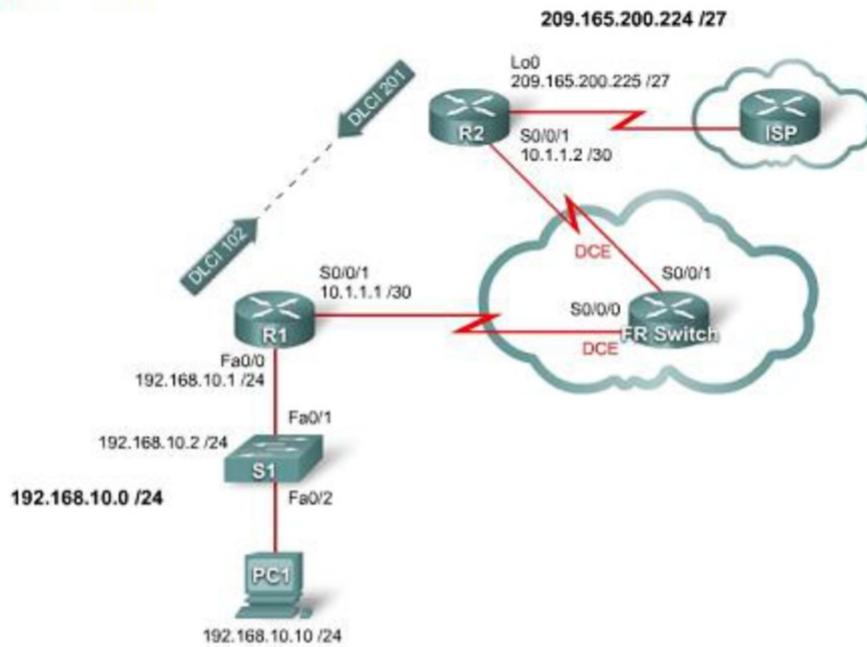
2. **Challenge PPP Configuration**
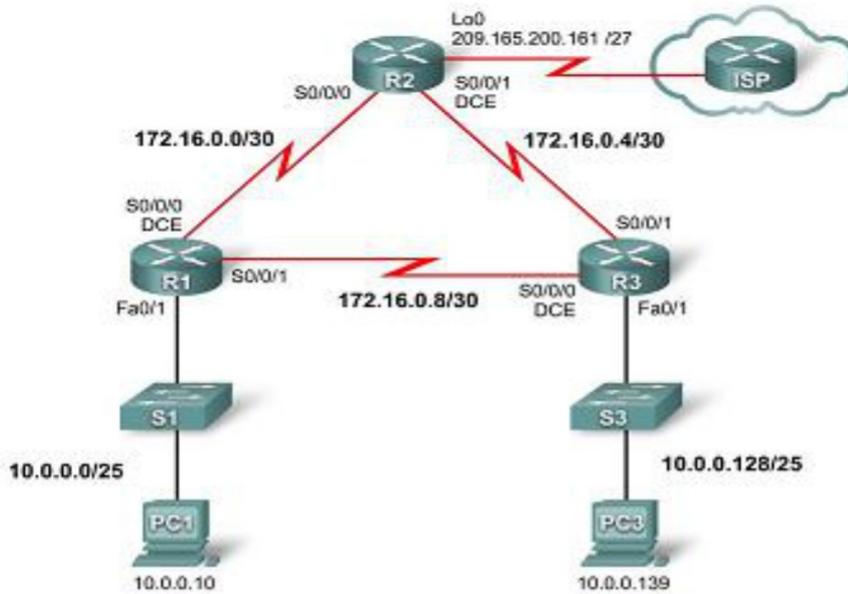
Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/1	10.0.0.1	255.255.255.128	N/A
	S0/0/0	172.16.0.1	255.255.255.252	N/A
	S0/0/1	172.16.0.9	255.255.255.252	N/A
R2	Lo0	209.165.200.161	255.255.255.224	N/A
	S0/0/0	172.16.0.2	255.255.255.252	N/A
	S0/0/1	172.16.0.5	255.255.255.252	N/A
R3	Fa0/1	10.0.0.129	255.255.255.128	N/A

	S0/0/0	172.16.0.10	255.255.255.252	N/A
	S0/0/1	172.16.0.6	255.255.255.252	N/A
PC1	NIC	10.0.0.10	255.255.255.128	10.0.0.1
PC3	NIC	10.0.0.139	255.255.255.128	10.0.0.129

☛ Cable a network according to the topology diagram.
  - Erase the startup configuration and reload a router to the default state.
  - Perform basic configuration tasks on a router.
  - Configure and activate interfaces.
  - Configure OSPF routing on all routers.
  - Configure PPP encapsulation on all serial interfaces.
  - Change the encapsulation on the serial interfaces from PPP to HDLC.
  - Intentionally break and restore PPP encapsulation.
  - Configure PPP CHAP authentication.
  - Intentionally break and restore PPP CHAP authentication.
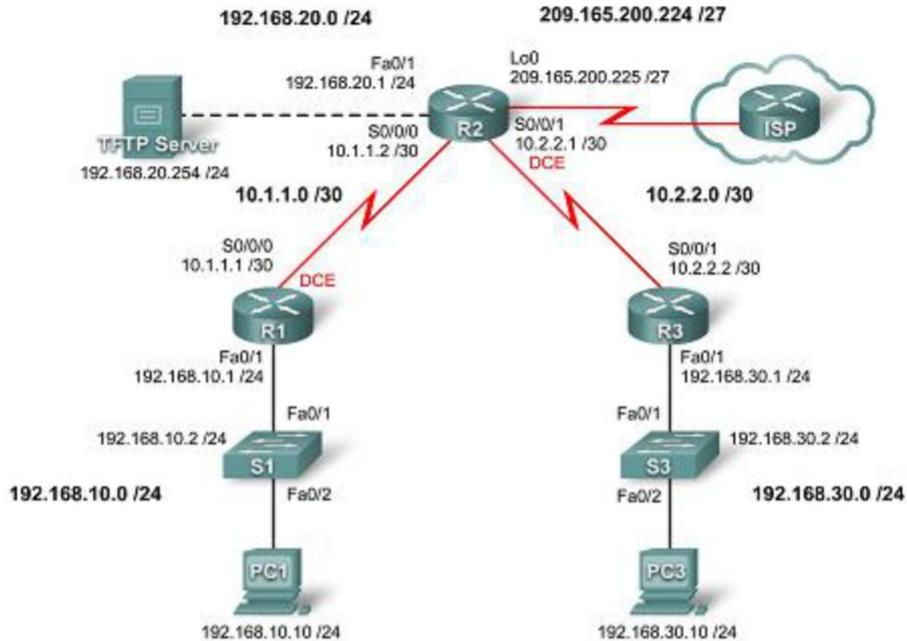
3. **Basic Frame Relay**

Topology Diagram

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0	192.168.10.1	255.255.255.0	N/A
	S0/0/1	10.1.1.1	255.255.255.252	N/A
R2	S0/0/1	10.1.1.2	255.255.255.252	N/A
	Lo 0	209.165.200.225	255.255.255.224	N/A
S1	VLAN1	192.168.10.2	255.255.255.0	192.168.10.1
PC1	NIC	192.168.10.10	255.255.255.0	192.168.10.1

- Cable a network according to the topology diagram.
- Erase the startup configuration and reload a router to the default state.
- Perform basic configuration tasks on a router.
- Configure and activate interfaces.
- Configure EIGRP routing on all routers.
- Configure Frame Relay encapsulation on all serial interfaces.
- Configure a router as a Frame Relay switch.
- Understand the output of the show frame-relay commands.
- Learn the effects of the debug frame-relay lmi command.
- Intentionally break and restore a Frame Relay link.
- Change the Frame Relay encapsulation type from the Cisco default to IETF.
- Change the Frame Relay LMI type from Cisco to ANSI.
- Configure a Frame Relay subinterface.

4. Basic Security Configuration

Topology Diagram

Addressing Table

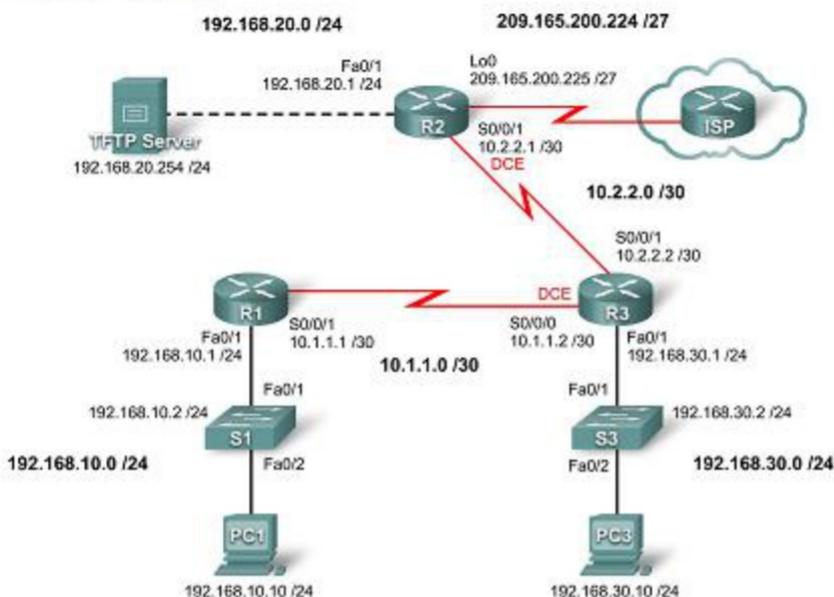| Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/1	192.168.10.1	255.255.255.0	N/A
R1	S0/0/0	10.1.1.1	255.255.255.252	N/A
R2	Fa0/1	192.168.20.1	255.255.255.0	N/A
R2	S0/0/0	10.1.1.2	255.255.255.252	N/A
R2	S0/0/1	10.2.2.1	255.255.255.252	N/A
R2	Lo0	209.165.200.225	255.255.255.224	N/A
R3	Fa0/1	192.168.30.1	255.255.255.0	N/A
R3	S0/0/1	10.2.2.2	255.255.255.252	N/A
S1	VLAN10	192.168.10.2	255.255.255.0	N/A
S3	VLAN20	192.168.30.2	255.255.255.0	N/A
PC1	NIC	192.168.10.10	255.255.255.0	192.168.10.1
PC3	NIC	192.168.30.10	255.255.255.0	192.168.30.1
TFTP Server	NIC	192.168.20.254	255.255.255.0	192.168.20.1

Cable a network according to the topology diagram.

o Erase the startup configuration and reload a router to the default state. o Perform basic configuration tasks on a router.

o Configure basic router security.

o Disable unused Cisco services and interfaces.

o Protect enterprise networks from basic external and internal attacks.

o Understand and manage Cisco IOS configuration files and Cisco file system.

o Set up and use Cisco SDM (Security Device Manager) and SDM Express to configure basic router security.

o Configure VLANs on the switches.
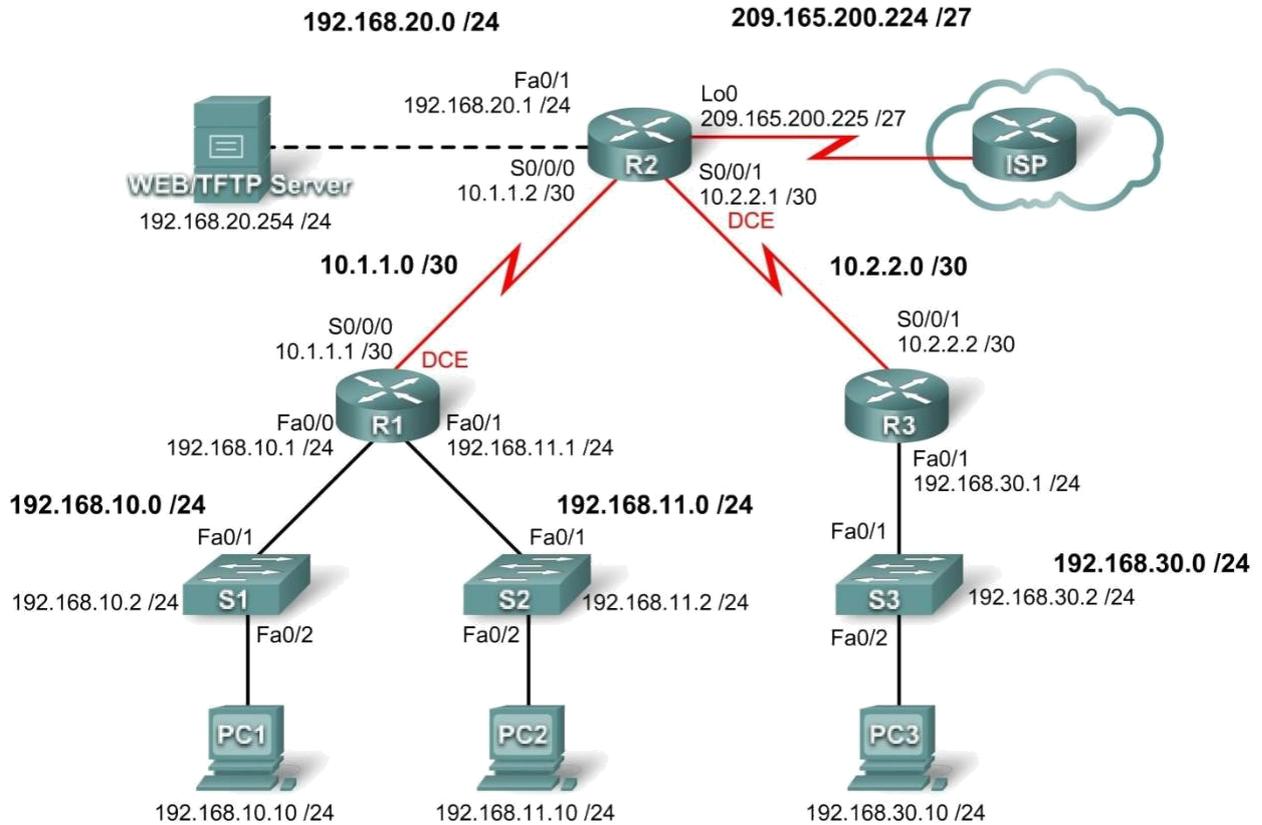
5. Challenge Security Configuration

Topology Diagram

192.168.20.0 /24

209.165.200.224 /27

Fa0/1
192.168.20.1 /24

Lo0
209.165.200.225 /27

TFTP Server
192.168.20.254 /24

R2

S0/0/1
10.2.2.1 /30
DCE

ISP

10.2.2.0 /30

S0/0/1
10.2.2.2 /30

DCE

R3

S0/0/0
10.1.1.2 /30

S0/0/1
10.1.1.1 /30

R1

Fa0/1
192.168.10.1 /24

10.1.1.0 /30

Fa0/1
192.168.30.1 /24

Fa0/1
192.168.10.2 /24

S1

Fa0/2

192.168.10.0 /24

Fa0/1

S3

192.168.30.2 /24

Fa0/2

192.168.30.0 /24

PC1

192.168.10.10 /24

PC3

192.168.30.10 /24

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/1	192.168.10.1	255.255.255.0	N/A
	S0/0/1	10.1.1.1	255.255.255.252	N/A
R2	Fa0/1	192.168.20.1	255.255.255.0	N/A
	S0/0/1	10.2.2.1	255.255.255.252	N/A
	Lo0	209.165.200.225	255.255.255.224	N/A
R3	Fa0/1	192.168.30.1	255.255.255.0	N/A
	S0/0/1	10.2.2.2	255.255.255.252	N/A
	S0/0/0	10.1.1.2	255.255.255.252	N/A
S1	VLAN10	192.168.10.2	255.255.255.0	N/A
S3	VLAN30	192.168.30.2	255.255.255.0	N/A
PC1	NIC	192.168.10.10	255.255.255.0	192.168.10.1
PC3	NIC	192.168.30.10	255.255.255.0	192.168.30.1
TFTP Server	NIC	192.168.20.254	255.255.255.0	192.168.20.1

- Cable a network according to the topology diagram.
  - Erase the startup configuration and reload a router to the default state.
  - Perform basic configuration tasks on a router.
  - Configure and activate interfaces.
  - Configuring basic router security.
  - Disable unused Cisco services and interfaces.
  - Protect enterprise networks from basic external and internal attacks.
  - Understand and manage Cisco IOS configuration files and Cisco file system.
  - Set up and use Cisco SDM (Security Device Manager) to configure basic router security.

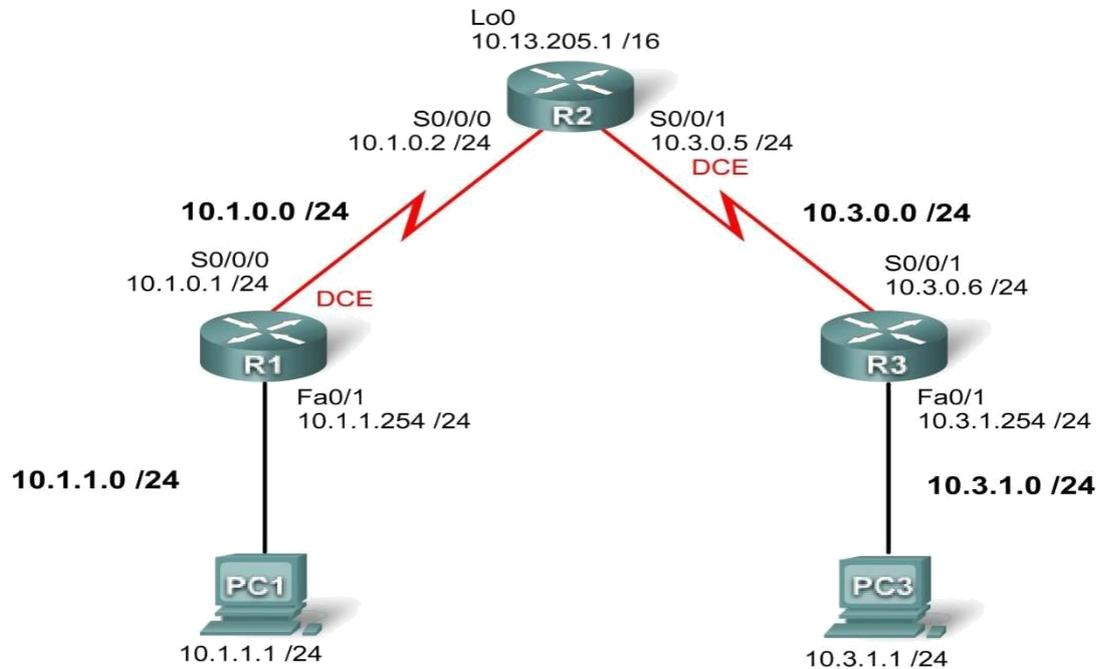Lab 6 Basic Access Control Lists
Topology Diagram

192.168.20.0 /24   **209.165.200.224 /27**

Addressing Table

	Interface			
R1	**Fa0/0**	192.168.10.1	255.255.255.0	N/A
	Fa0/1	192.168.11.1	255.255.255.0	N/A
	S0/0/0	10.1.1.1	255.255.255.252	N/A
R2	**Fa0/1**	192.168.20.1	255.255.255.0	N/A
	S0/0/0	10.1.1.2	255.255.255.252	N/A
	S0/0/1	10.2.2.1	255.255.255.252	N/A
	Lo0	209.165.200.225	255.255.255.224	N/A
R3	**Fa0/1**	192.168.30.1	255.255.255.0	N/A
	S0/0/1	10.2.2.2	255.255.255.252	N/A
S1	**Vlan1**	192.168.10.2	255.255.255.0	192.168.10.1
S2	**Vlan1**	192.168.11.2	255.255.255.0	192.168.11.1
S3	**Vlan1**	192.168.30.2	255.255.255.0	192.168.30.1
PC1	**NIC**	192.168.10.10	255.255.255.0	192.168.10.1
PC2	**NIC**	192.168.11.10	255.255.255.0	192.168.11.1
PC3	**NIC**	192.168.30.10	255.255.255.0	192.168.30.1
Web Server	**NIC**	192.168.20.254	255.255.255.0	192.168.20.1

- Design named standard and named extended ACLs.
- Apply named standard and named extended ACLs.
- Test named standard and named extended ACLs.
- Troubleshoot named standard and named extended ACLs.

Lab 7 Troubleshooting Access Control Lists
Topology Diagram

Lo0
10.13.205.1 /16

S0/0/0
10.1.0.2 /24
S0/0/1
10.3.0.5 /24
DCE

10.1.0.0 /24

10.3.0.0 /24

S0/0/0
10.1.0.1 /24
DCE

S0/0/1
10.3.0.6 /24

Fa0/1
10.1.1.254 /24

Fa0/1
10.3.1.254 /24

10.1.1.0 /24

10.3.1.0 /24

PC1
10.1.1.1 /24

PC3
10.3.1.1 /24

Addressing Table

	Interface			
R1	**S0/0/0**	10.1.0.1	255.255.255.0	N/A
	Fa0/1	10.1.1.254	255.255.255.0	N/A
R2	**S0/0/0**	10.1.0.2	255.255.255.0	N/A
	S0/0/1	10.3.0.5	255.255.255.0	N/A
	Lo 0	10.13.205.1	255.255.0.0	N/A
R3	**S0/0/1**	10.3.0.6	255.255.255.0	N/A
	Fa0/1	10.3.1.254	255.255.255.0	N/A
PC 1	**NIC**	10.1.1.1	255.255.255.0	10.1.1.254
PC 3	**NIC**	10.3.1.1	255.255.255.0	10.3.1.254

- Cable a network according to the topology diagram
- Erase the startup configuration and reload a router to the default state
- Load routers with scripts
- Find and correct network errors
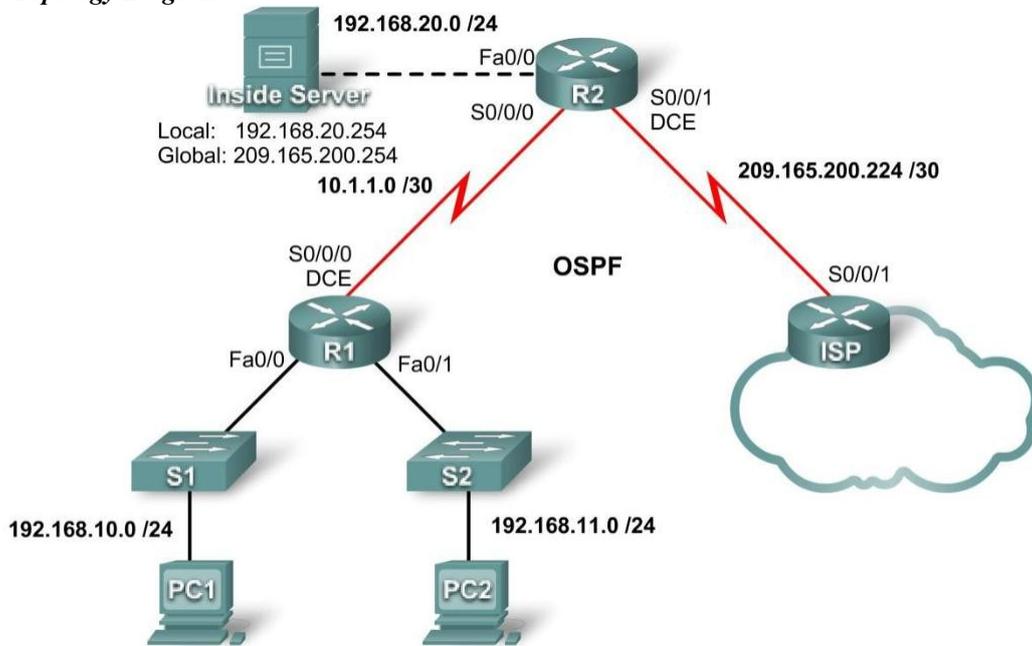- Document the corrected network

You work for a regional service provider that has customers who have recently experienced several security breaches. Some security policies have been implemented that haven"t addressed the specific needs of the customers. Your department has been asked to examine the configuration, conduct tests and change the configuration as necessary to secure the customer routers.

Ensure that your final configurations implement the following security policies:

- R1 and R3 customers request that only local PCs are able to access VTY lines. Log any attempts by other devices to access the VTY lines.
- R1 and R3 LANs should not be allowed to send or receive traffic to each other. All other traffic should be allowed to and from R1 and R3.

A minimum of ACL statements should be used and applied inbound on the R2 serial interfaces. OSPF is used to distribute routing information. All passwords, except the enable secret password, are set to cisco. The enable secret password is set to **class**.

Lab 8 Basic DHCP and NAT Configuration

Addressing Table

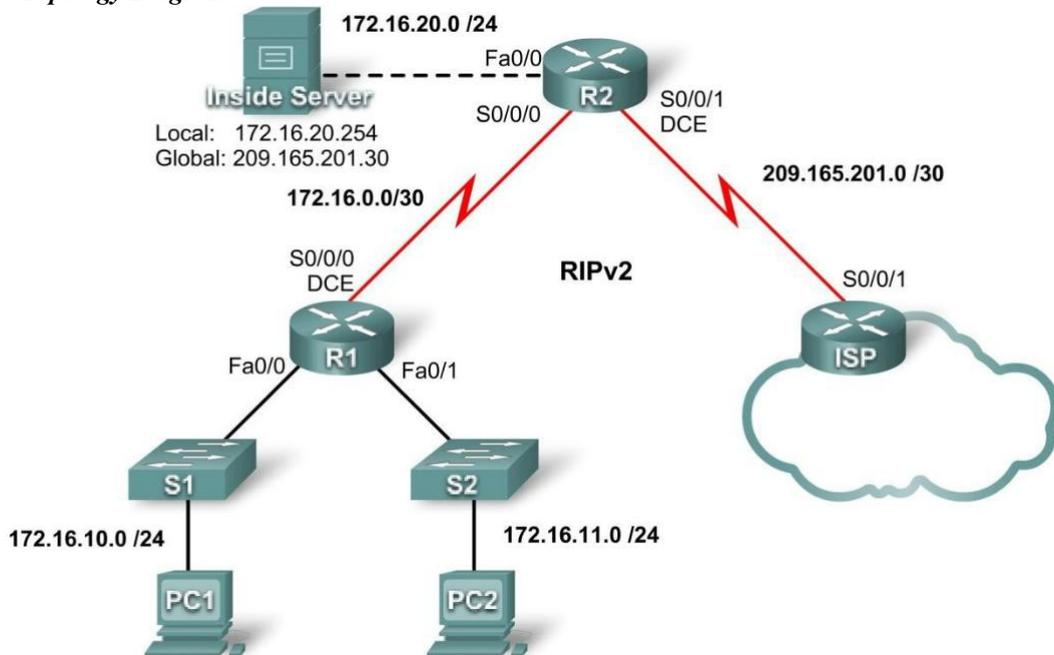|	Interface		
	S0/0/0	10.1.1.1	255.255.255.252
R1	**Fa0/0**	192.168.10.1	255.255.255.0
	Fa0/1	192.168.11.1	255.255.255.0
	S0/0/0	10.1.1.2	255.255.255.252
R2	**S0/0/1**	209.165.200.225	255.255.255.252
	Fa0/0	192.168.20.1	255.255.255.0
ISP	**S0/0/1**	209.165.200.226	255.255.255.252

- Prepare the network.
- Perform basic router configurations.
- Configure a Cisco IOS DHCP server.
- Configure static and default routing.
- Configure static NAT.
- Configure dynamic NAT with a pool of addresses.
- Configure NAT overload.

Scenario

In this lab, you will configure the DHCP and NAT IP services. One router is the DHCP server. The other router forwards DHCP requests to the server. You will also configure both static and dynamic NAT configurations, including NAT overload. When you have completed the configurations, verify the connectivity between the inside and outside addresses.

Lab 9 Troubleshooting DHCP and NAT

172.16.20.0 /24

Inside Server
Local: 172.16.20.254
Global: 209.165.201.30

172.16.0.0/30

RIPv2

209.165.201.0 /30

172.16.10.0 /24

172.16.11.0 /24

Addressing Table

R1	**S0/0/0**	172.16.0.1	255.255.255.252
	Fa0/0	172.16.10.1	255.255.255.0
	Fa0/1	172.16.11.1	255.255.255.0
R2	**S0/0/0**	172.16.0.2	255.255.255.252
	S0/0/1	209.165.201.1	255.255.255.252
	Fa0/0	172.16.20.1	255.255.255.0
ISP	**S0/0/1**	209.165.201.2	255.255.255.252

- Prepare the network.
- Load routers with scripts.
- Find and correct network errors.
- Document the corrected network.

The routers, R1 and R2, at your company were configured by an inexperienced network engineer. Several errors in the configuration have resulted in connectivity issues. Your boss has asked you to troubleshoot and correct the configuration errors and document your work. Using your knowledge of DHCP, NAT, and standard testing methods, find and correct the errors. Make sure all clients have full connectivity. The ISP has been configured correctly.

Ensure that the network supports the following:

1. The router R2 should serve as the DHCP server for the 172.16.10.0/24 and 172.16.11.0/24 networks connected to R1.
2. All PCs connected to R1 should receive an IP address in the correct network via DHCP.
3. Traffic from the R1 LANs entering the Serial 0/0/0 interface on R2 and exiting the Serial 0/0/1 interface on R2 should receive NAT translation with a pool of addresses provided by the ISP.
   The Inside Server should be reachable from outside networks using IP address 209.165.201.30, and to inside networks using IP address 172.16.20.254

Lab 10: Troubleshooting Enterprise Networks 1

   Topology Diagram
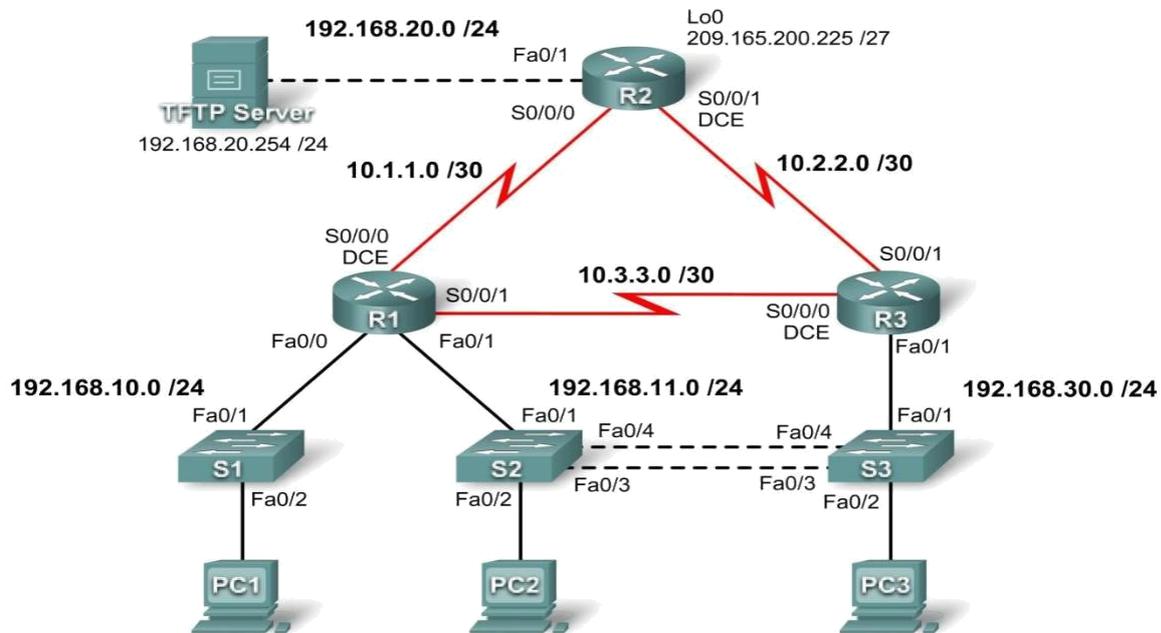
Addressing Table

	Interface			
R1	**Fa0/0**	192.168.10.1	255.255.255.0	N/A
	Fa0/1	192.168.11.1	255.255.255.0	N/A
	S0/0/0	10.1.1.1	255.255.255.252	N/A
	S0/0/1	10.3.3.1	255.255.255.252	N/A
R2	**Fa0/1**	192.168.20.1	255.255.255.0	N/A
	S0/0/0	10.1.1.2	255.255.255.252	N/A
	S0/0/1	10.2.2.1	255.255.255.252	N/A
	Lo0	209.165.200.225	255.255.255.224	209.165.200.226
R3	**Fa0/1**	N/A	N/A	N/A
	Fa0/1.11	192.168.11.3	255.255.255.0	N/A
	Fa0/1.30	192.168.30.1	255.255.255.0	N/A
	S0/0/0	10.3.3.2	255.255.255.252	N/A
	S0/0/1	10.2.2.2	255.255.255.252	N/A
S1	**VLAN10**	DHCP	255.255.255.0	N/A
S2	**VLAN11**	192.168.11.2	255.255.255.0	N/A
S3	**VLAN30**	192.168.30.2	255.255.255.0	N/A
PC1	**NIC**	192.168.10.10	255.255.255.0	192.168.10.1
PC2	**NIC**	192.168.11.10	255.255.255.0	192.168.11.1
PC3	**NIC**	192.168.30.10	255.255.255.0	192.168.30.1
TFTP Server	**NIC**	192.168.20.254	255.255.255.0	192.168.20.1

Learning Objectives

Upon completion of this lab, you will be able to:

- Cable a network according to the topology diagram
- Erase the startup configuration and reload a router to the default state
- Load the routers and switches with supplied scripts
- Find and correct all network errors
- Document the corrected network

Scenario

You have been asked to correct configuration errors in the company network. For this lab, do not use login or password protection on any console lines to prevent accidental lockout. Use **ciscoccna** for all passwords in this scenario.

Note: Because this lab is cumulative, you will be using all the knowledge and troubleshooting techniques that you have acquired from the previous material to successfully complete this lab.

Requirements

- S2 is the spanning-tree root for VLAN 11, and S3 is the spanning-tree root for VLAN 30.
- S3 is a VTP server with S2 as a client.
- The serial link between R1 and R2 is Frame Relay. Make sure that each router can ping their own Frame Relay interface.

- The serial link between R2 and R3 uses HDLC encapsulation.
- The serial link between R1 and R3 uses PPP.
- The serial link between R1 and R3 is authenticated using CHAP.
- R2 must have secure login procedures because it is the Internet edge router.
- All vty lines, except those belonging to R2, allow connections only from the subnets shown in the topology diagram, excluding the public address.

Hint:

R2# **telnet 10.1.1.1 /source-interface loopback 0**

Trying 10.1.1.1...

% Connection refused by remote host

- Source IP address spoofing should be prevented on all links that do not connect to other routers.
- Routing protocols must be secured. All RIP routers must use MD5 authentication.
- R3 must not be able to telnet to R2 through the directly connected serial link.
- R3 has access to both VLAN 11 and 30 via its Fast Ethernet port 0/0.
- The TFTP server should not get any traffic that has a source address outside the subnet. All devices have access to the TFTP server.
- All devices on the 192.168.10.0 subnet must be able to get their IP addresses from DHCP on R1. This includes S1.
- R1 must be accessible via SDM.
- All addresses shown in the diagram must be reachable from every device.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

INFORMATION SECURITY SYSTEM

CODE	L	T	P/FW	CREDITS
MNT330	2	1	-	3

Course Objective:

This subject is very important for students because Security of data in transit over the Internet becomes increasingly necessary because of steadily growing data volume and importance. Nowadays, every user of a public network sends various types of data, from email to credit card details daily, and he would therefore like them to be protected when in transit over a public network. To this end, a practical SSL protocol has been adopted for protection of data in transit that encompasses all network services that use TCP/IP to support typical application tasks of communication between servers and clients. In this subject student will learn all security method for securing public & private network by configuring different protocols.

Course Contents:

Module I: Threats and Cryptography
Introduction: Attacks, Services and Mechanism, Model for Internetwork Security.
Cryptography: Notion of Plain Text, Encryption, Key, Cipher Text, Decryption and cryptanalysis; Public Key Encryption, Conventional Encryption Techniques, Steganography, Modern Techniques – DES, DES chaining, Triple DES, RSA Algorithm.

Module II: Network Security
Authentication Application: Kerberos, X.509, Directory Authentication Service, Pretty Good Privacy, S/Mime, Digital Signature & Digital Signature Standard.

Module III: Network Security Applications
IP security Architecture: Overview, Authentication header, Encapsulating Security Pay Load, combining Security Associations, Key Distribution & Management.
Web Security: Requirements, Secure Socket Layer, Transport Layer Security, and Secure Electronic Transactions.

Module IV: System Security
Firewalls and protocols, Design Principles of Firewalls, Trusted systems, Virus & Intruders, IT act and cyber laws (Global Standards), Virtual Private Network – Issues relating to network security, Recent attacks on networks.

Examination Scheme:

Components	CT1	PR.	ATTD.	EE
Weightage (%)	10	15	5	70

Text & References:

Text:
- W. Stallings, Networks Security Essentials: Application & Standards, Pearson Education, 2000
- W. Stallings, Cryptography and Network Security, Principles and Practice, Pearson Education, 2000.

References:
- Network Security: The Complete Reference by Roberta Bragg, Mark Rhodes-Ousley, Keith Strassberg, et al - Tata McGraw-Hill presents
- Network Security: The Complete Reference by Roberta Bragg, Mark Rhodes-Ousley, Keith Strassberg, et al - Tata McGraw-Hill presents

OPTICAL TECHNOLOGIES

CODE	L	T	P/FW	CREDITS
MNT331	2	1	-	3

Course Objective:

This course gives a comprehensive concept of theory and behaviour of optical fiber links, its interaction with others devices; basic design principle of digital and analog optical fiber transmission links, WDM, architecture and performance characteristics of complex optical network and advanced optical communications techniques such as optical CDMA and OTDM.

Course Contents:

Module I: Optical Fibers

Basic optical fibres communication system; Fibers types – SI, GI, MM, SM; fiber waveguides – modes and rays – dispersion and attenuation – absorption and scattering, Fiber Material & Fabrication, Power density distribution – special fibres – DSF, DFF, Ultra low loss fiber types – HE_{11} mode propagation – Unguided system – beam divergence – Merits – Digital fiber optic link.

Module II: Optical Sources, Transmitters and Receivers

LEDs, LDs, Semiconductor devices, Types of lasers, BH cavity, Quantum wells and quantum dot lasers – SLM and STM operation – Transmitter design – receiver – PIN and APD devices noise sensitivity and degradation – receiver amplifiers – heterodyne and homodyne detection systems – ISI and eye diagrams – effects of noises on error probability.

Module III: Optical Amplifiers and Networks

Basic applications and types – SLA – external pumping and pain – EDFA – Mechanism and architecture – Parameters – System applications – Basic networks – SONET / SDH – WDM networks – Optical CDMA – Ultra high capacity networks - OTDM

Module IV: Optical WDM and Components

Principles of WDM – components – fiber couplers – interferometers – Mach-Zehnder and Michaleson interferometric techniques – phased array based WDM devices – Tenable cources and filters – Splicing – Fusion splicers – Fiber connectors – FDDI – FC types.

Module V: Fiber Optic Measurements

Standards and testive – power meters – attenuators – attenuation measurement – Dispersion measurement techniques – OTDR and its applications – Fiber fault location – OSA – Characteristics of sources.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:
- G. Keiser, "Optical Fiber Communication", 3rd edition, McGraw Hill, 2000
- Walterr Gorkski, "Optical Networking & WDM", Tata McGraw Hill, 2001

References:
- Franz & Jain, "Optical Communication System & Components", Narvsa Publications 2000
- "Fiber Optical communication systems", 2nd edition, John Wiley & sons, New York, 1997.
- D.K. Myan Baev and L. lscheiner, Fiber Optic Communication Technology, Pearson education Asia, 2001.

SATELLITE COMMUNICATION

CODE	L	T	P/FW	CREDITS
MNT332	2	1	-	3

Course Objective:

This subject explores another avenue in data transmission and information broadcasting which is necessary to develop an advanced scientific attitude towards the field of network technology. The subject deals with various topics such as basics of satellite communication, rockets, several telecommunication techniques such as VSAT, CDMA, GSM, etc., Channel allocation and Multiplexing Techniques like TDMA, FDMA, etc. Upon completion of this course the students will have a thorough understanding of communication by means of Satellites.

Course Contents:

Module I: Basic Concepts
Geo synchronous Orbit, Kepler"s laws, Newton"s law, Orbital parameters, Orbital perturbations, Frequency allocations, sun outage, launching missions, Types of Rockets, Rocket launching, Different orbits. LEO (Low earth orbit), MEO (Medium earth orbit), HEO (Highly elliptical orbit).

Module II: Space Segment
Subsystems: Attitude control. Station keeping, Telemetry Tracking and Command, Transponder, Antenna subsystem, Space link equation, EIRP, Path Loss, Link power budget, Satellite Up and Down link, Noise Temperature, System noise.

Module III: Muliplexing and Multiple Access
FDM Telephony, FM, Video, TDMA data, FDMA-TDMA-CDMA.

Module IV: Earth Segment
Transmitters, Receivers, Antenna, Terrestrial interface, TVRO-MATV-CATV, Test equipment.

Module V: Satellite Application
Mobile Satellite Service (MSS), Terrestrial cellular system, Direct Broadcast Satellite Service (DBS) - Digital Audio Broadcast (DAS), Direct to Home TV (DTH), Digital Audio Broadcast, Business TV (BTV), Very small Aperture Terminal systems(VSAT), GRAMSAT, Search and Rescue Satellite (SARSAT), INMERSAT, Radarsat, Satellite Telephone, E-Mail, Video conferencing, The internet, Clobal Positioning satellite system (GPS)

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:
- Dennis Roddy, " Satellite Communications", second Edition, McGraw-Hill International edition, 1996.
- 2.M.Richharia, Mobile Satellite Communications Principles and Trends, Pearson Education Limited, 2001

References:
- Harold Kolimbiris, "Digital Communication systems with satellite and Fiber Optics", Pearson Education Asia, 2001.
- Wilbur L. Pritchard, Hendri G. Synderhoud, Rober A. Nelson, "Satellite Communication System Engineering", Prentice Hall, Second Edition 1993.
- Brij N. Agarwal, "Design of Geosynchronous Spacecraft" Prentice Hall Inc. 1986.
- Dr. Kamilio Feher, "Wireless Digital Communications Modulation and Spread Spectrum Applications", Prentice Hall of India Private Limited, 2001.

IT ENABLED SERVICES

CODE	L	T	P/FW	CREDITS
MNT333	2	1	-	3

Course Objective:

It gives the introduction and concepts of the IT enabled Services. The world is going global and the technical know how of latest advancements needed for Business outsourcing is necessary for the students.

Course Contents:

Module I: Introduction

What is IT Enabled Services (ITeS), The need for ITeS, Application Areas for ITeS, Types of ITeS: Voice Based, Data Based, Web Based, The Market Dynamics of ITeS, Types of Call Centres: Captive & Non-Captive, Inbound and outbound, Domestic and International, driving factors of ITeS, Building Blocks of ITeS, technology, case study.

Module II: The Technology: Technology Options

TDM Based, VoIP Based, Return on Investment (ROTI)

Module III: Components of a TDM Based Inbound Call Centre

International Private Leased Circuit (IPLC), Multiplexer & De-Multiplexer, Automatic Call Distribution (ACD), Interactive Voice Response System (IVRS), CRM Database, Agent Connection (PC &/or Headphone)

Module IV: Components of a TDM Based Outbound Call Centre

Agents PC/Headphone, Dialer (Progressive or Predictive), CRM Database, Multiplexer/De-Multiplexer, IPLC

Module V: Voice over IP (VoIP) Based Call Centres

H 323 based VoIP Technology, SIP Based VoIP Technology, Internet Bandwidth Considerations and Management, QoS Considerations, Security aspects of a VoIP Based Call Centre, Cost Benefit Analysis for VoIP based Call Centres

Module VI

Call Handling features, Call Transfer, Call Conferencing, 3rd Party Verification, Voice logging, Monitoring &Agent quality management, Call Detail Record (CDR) and reporting, Administration, Provisioning and maintenance, Queuing Theory, Call Dynamics, Call Dynamics, PBX, CTI (Computer Telephone Interface) Critical Success factors of ITeS, Integrated approach to customer service, mapping business needs to technical specifications

Module VII: The Tools for ITES

IT Infrastructure Management Tools, Network Management Tools, Bandwidth Management Tools, Security Audit Tools, Quality Management Tools, Best Practice Tools for IT Services
The Operational Aspects of a Call Center: Regulatory Issues, Business Projections ROI analysis, Network Infrastructure Planning, Product Selection & Implementation, Process Identification & Process Training, Quality Certification, HR Management

Module VIII: Implementation of a call centre

Operations aspects, why a call centre? (needs), 3R"s of call centres, effective implementation of call centre solutions, call centre solutions, typical CTI call centre, call centre tools, Skill based routing, Call centre Technology and equipment, What is ACD? ACD Overview.

Module IX: Case Studies

Domestic Call Center (Voice &/or Data Based), International Call Center (Voice &/or Data Based).

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:
- Outsourcing to India: The Offshore Advantage, Mark Kobayashi, Hillary

References:
- Voice-Enabling the Data Network: H323, Mgep, Slip, Qos, Slas, and Security, James Durkin, Computers

Network Simulation & Modeling

CODE	L	T	P/FW	CREDITS
MNT334	2	1	-	3

Course Contents:

Module I: Introduction
Course Logistics, Definitions of Modeling and Simulation, When to apply these techniques, Applications, Terminology & Components, Discrete vs. Continuous time, Process flow in simulation study.

Module II: General Principles of Simulation and Software
Queuing systems, Communications networks, Event-driven simulation, Simulation software –History, Selection process, Simulation in High Level Language, Simulation packages (Matlab/Simulink) , Interpreted vs. compiled simulators, Future trends.

Module III: SIMULATION OF COMPUTER NETWORKS
Overview of Simulation, Simulation definition, Layering concept, System Modeling, Elements of simulation, Time dependent simulation.

Module IV: INTRODUCTION TO NETWORK SIMULATOR-2
History of ns-2, Application, Basic architecture, ns-2 goals, ns-2 functionalities, languages used, why two languages?, TCL/OTCL PROGRAMMING.

Module V: COMPONENTS AND TOOLS OF NS-2
About NAM, About Xgraph, Trace files, Commands in ns-2, Simulator Class, Trace the events, Node creation, Link between nodes, Communication Agent, Traffic agent, How to run the simulation, Example program.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

- Bernard P. Zeigler, Herbert Praehofer, Tag Gon Kim , Theory of Modeling and Simulation: Integrating Discrete Event and Continuous Complex Dynamic Systems, Academic Press, 2000
- Frank L. Severance, System Modeling And Simulation An Introduction, Wiley India Pvt Ltd
- Tutorial for the network simulator "ns", http://www.isi.edu/nsnam/ns/tutorial/

COMMUNICATION SKILLS - III

CODE	L	T	P/FW	CREDITS
BCS311	1	-	-	1

Course Objective:

To initiate the learners with the basic mechanics of writing skills and facilitate them with the core skills required for communication in the professional world.

Course Contents:

Module I: Mechanics and Semantics of Sentences
Writing effective sentences
Style and Structure

Module II: Developing writing skills Inter - office
communication: Business Letter; E mails; Netiquette Intra – office
communication: Memos, Notices, Circulars, Minutes Report
Writing

Module III: Business Presentations
Planning, design and layout of presentation
Information Packaging
Audience analysis
Audio visual aids
Speaking with confidence
Case Studies

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.

BEHAVIOURAL SCIENCE - III

CODE	L	T	P/FW	CREDITS
BSS311	1	-	-	1

Course Objective:
This course aims to enable students to:
Understand the concept and building of teams
Manage conflict and stress within team
Facilitate better team management and organizational effectiveness through universal human values.

Course Contents:

Module I: Teams: An Overview
Team Design Features: team vs. group
Effective Team Mission and Vision
Life Cycle of a Project Team
Rationale of a Team, Goal Analysis and Team Roles

Module II: Team & Sociometry
Patterns of Interaction in a Team
Sociometry: Method of studying attractions and repulsions in groups
Construction of sociogram for studying interpersonal relations in a Team

Module III: Team Building
Types and Development of Team Building
Stages of team growth
Team performance curve
Profiling your Team: Internal & External Dynamics
Team Strategies for organizational vision
Team communication

Module IV: Team Leadership & Conflict Management
Leadership styles in organizations
Self Authorized team leadership
Causes of team conflict
Conflict management strategies
Stress and Coping in teams

Module V: Global Teams and Universal Values
Management by values
Pragmatic spirituality in life and organization
Building global teams through universal human values
Learning based on project work on Scriptures like Ramayana, Mahabharata, Gita etc.

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:
- Organizational Behaviour, Davis, K.
- Hoover, Judith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

FRENCH - III

CODE	L	T	P/FW	CREDITS
FLF 311	2	1	-	2

Course Objective:

To provide the students with the know-how
- To master the current social communication skills in oral and   in written.
- To enrich the formulations, the linguistic tools and vary the sentence construction without repetition.

Course Contents:

Module B: pp. 76 – 88 Unité 6

Module C: pp. 89 to103 Unité 7

Contenu lexical:	**Unité 6: se faire plaisir**

1. acheter: exprimer ses choix, décrire un objet (forme, dimension, poids et matières) payer
2. parler de la nourriture, deux façons d"exprimer la quantité, commander un repas au restaurant
3. parler des différentes occasions de faire la fête

Unité 7: Cultiver ses relations

    maîtriser les actes de la communication sociale courante (Salutations, présentations, invitations, remerciements) annoncer un événement, exprimer un souhait, remercier, s"excuser par écrit.
caractériser une personne (aspect physique et caractère)

Contenu grammatical:

1. accord des adjectifs qualificatifs
2. articles partitifs
3. Négations avec de, ne…rien/personne/plus
4. Questions avec combien, quel…
5. expressions de la quantité
6. ne…plus/toujours - encore
7. pronoms compléments directs et indirects
8. accord du participe passé (auxiliaire « avoir ») avec l"objet direct
9. Impératif avec un pronom complément direct ou indirect
10. construction avec « que » - Je crois que/ Je pense que/ Je sais que

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre: Campus: Tome 1

GERMAN - III

CODE	L	T	P/FW	CREDITS
FLG 311	2	1	-	2

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Course Contents:

Module I: Modal verbs
Modal verbs with conjugations and usage
Imparting the finer nuances of the language

Module II: Information about Germany (ongoing)
Information about Germany in the form of presentations or "Referat"– neighbors, states and capitals, important cities and towns and characteristic features of the same, and also a few other topics related to Germany.

Module III: Dative case
Dative case, comparison with accusative case
Dative case with the relevant articles
Introduction to 3 different kinds of sentences – nominative, accusative and dative

Module IV: Dative personal pronouns
Nominative, accusative and dative pronouns in comparison

Module V: Dative prepositions
Dative preposition with their usage both theoretical and figurative use

Module VI: Dialogues
In the Restaurant,
At the Tourist Information Office,
A telephone conversation

Module VII: Directions
Names of the directions
Asking and telling the directions with the help of a roadmap

Module VIII: Conjunctions
To assimilate the knowledge of the conjunctions learnt indirectly so far

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – III

CODE	L	T	P/FW	CREDITS
FLS 311	2	1	-	2

Course Objective:

To enable students acquire knowledge of the Set/definite expressions (idiomatic expressions) in Spanish language and to handle some Spanish situations with ease.

Course Contents:

Module I
Revision of earlier semester modules
Set expressions (idiomatic expressions) with the verb *Tener*, *Poner, Ir....*
Weather

Module II
Introduction to *Gustar…*and all its forms. Revision of *Gustar* and usage of it

Module III
Translation of Spanish-English; English-Spanish. Practice sentences.
How to ask for directions (using estar)
Introduction to IR + A + INFINITIVE FORM OF A VERB

Module IV
Simple conversation with help of texts and vocabulary
En el restaurante
En el instituto
En el aeropuerto

Module V
Reflexives

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras -Nivel Elemental

CHINESE – III

CODE	L	T	P/FW	CREDITS
FLC 311	2	1	-	2

Course Objective:

Foreign words are usually imported by translating the concept into Chinese, the emphasis is on the meaning rather than the sound. But the system runs into a problem because the underlying name of personal name is often obscure so they are almost always transcribed according to their pronciation alone. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Drills
Dialogue practice
Observe picture and answer the question.
Introduction of written characters.
Practice reading aloud
Practice using the language both by speaking and by taking notes.
Character writing and stroke order

Module II
Measure words
Position words e.g. inside, outside, middle, in front, behind, top, bottom, side, left, right, straight.
Directional words – beibian, xibian, nanbian, dongbian, zhongjian.
Our school and its different building locations.
What game do you like?
Difference between "hii" and "neng", "keyi".

Module III
Changing affirmative sentences to negative ones and vice versa
Human body parts.
Not feeling well words e.g.; fever, cold, stomach ache, head ache.
Use of the modal particle "le"
Making a telephone call
Use of "jiu" and "cal" (Grammar portion)
Automobiles e.g. Bus, train, boat, car, bike etc.
Traveling, by train, by airplane, by bus, on the bike, by boat.. etc.

Module IV
The ordinal number "di"
"Mei" the demonstrative pronoun e.g. mei tian, mei nian etc.
use of to enter to exit
Structural particle "de" (Compliment of degree).
Going to the Park.
Description about class schedule during a week in school.
Grammar use of "li" and "cong".
Comprehension reading followed by questions.

Module V
Persuasion-Please don"t smoke.
Please speak slowly
Praise – This pictorial is very beautiful
Opposites e.g. Clean-Dirty, Little-More, Old-New, Young-Old, Easy-Difficult, Boy-Girl, Black-White, Big-Small, Slow-Fast … etc.
Talking about studies and classmates
Use of "it doesn"t matter"
Enquiring about a student, description about study method.
Grammar: Negation of a sentence with a verbal predicate.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I, Part-2" Lesson 21-30

NETWORK SECURITY

CODE	L	T	P/FW	CREDITS
MNT401	3	1	-	4

Course Objectives

To understand the principles of encryption algorithms; conventional and public key cryptography. To have a detailed knowledge about authentication, hash functions and application level security mechanisms.

Course Contents

Module I: INTRODUCTION
OSI Security Architecture - Classical Encryption techniques – Cipher Principles – Data Encryption Standard – Block Cipher Design Principles and Modes of Operation - Evaluation criteria for AES – AES Cipher – Triple DES – Placement of Encryption Function – Traffic Confidentiality

Module II: PUBLIC KEY CRYPTOGRAPHY
Key Management - Diffie-Hellman key Exchange – Elliptic Curve Architecture and Cryptography - Introduction to Number Theory – Confidentiality using Symmetric Encryption – Public Key Cryptography and RSA.

Module III: AUTHENTICATION AND HASH FUNCTION
Authentication requirements – Authentication functions – Message Authentication Codes – Hash Functions – Security of Hash Functions and MACs – MD5 message Digest algorithm - Secure Hash Algorithm – RIPEMD – HMAC Digital Signatures – Authentication Protocols – Digital Signature Standard

Module IV: NETWORK SECURITY
Authentication Applications: Kerberos – X.509 Authentication Service – Electronic Mail Security – PGP – S/MIME - IP Security – Web Security.

Module V: SYSTEM LEVEL SECURITY
Intrusion detection – password management – Viruses and related Threats – Virus Counter measures – Firewall Design Principles – Trusted Systems.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

1. William Stallings, "Cryptography And Network Security – Principles and Practices", Pearson Education, Third Edition, 2003.
2. Behrouz A. Foruzan, "Cryptography and Network Security", Tata McGraw-Hill, 2007

EMERGING TECHNOLOGIES – II
(DATA STORAGE SOLUTIONS)

CODE	L	T	P/FW	CREDITS
MNT402	3	1	-	4

Course Objective:

To keep the pace with the exponential growth of information, there is a growing need for the skilled information management professionals. This course gives insight into: Challenges and solutions for data storage and data management, intelligent storage systems, Storage networking environments (FC-SAN, IP-SAN, NAS, CAS, and DAS), Business continuity and disaster recovery, Storage security and virtualization, Managing and monitoring the storage infrastructures.

Course Contents:

Module I: Introduction to Storage Technology and Management
Meeting Today's Data Storage Needs, Evolution of Storage Technology and Architecture, Data Storage Solutions, Data Center Infrastructures, Key challenges in managing Information

Module II: Storage Systems Architecture Intro
Host Environment, Components of a Host, Connectivity, Physical Disks, RAID Arrays (RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 6, RAID 0+1, RAID 1+ 0), Disk Storage Systems, Data Flow Exercise

Module III: Networked Storage Environments
Direct Attached Storage (DAS) and Introduction to SCSI, Storage Area Network (SAN) and Introduction to Fiber Channel, Zoning, FC Topologies, Network Attached Storage (NAS) and its Protocols, NAS implementations, IP SAN, Content – Addressed Storage (CAS), Storage Virtualization

Module IV: Business Continuity
Introduction to Business Continuity, Backup & Recovery, BC Local Replication, BC Remote Replication

Module V: Monitoring & Managing the Storage Infrastructure
Managing the Data Center, Monitoring the Storage Infrastructure, Storage Management Activities, Storage Infrastructure Management Challenges, Developing the Ideal Solution

Module VI: Securing Storage & Virtualization
Securing the Storage Infrastructures, Security Implementations in Storage Networking, Virtualization Technologies.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:
- Information Storage and Management – Storing, Managing and Protecting Digital Information By G. Somasundaram, Alok Shrivastava, EMC Education Services, Wiley Publishing, Inc.

References:
- Storage Technology Foundations, EMC Education Services.
- Network Security: The Complete Reference, Roberta Bragg, Mark Rhodes-Ousley, Keith Strassberg, et al - Tata McGraw-Hill presents.

Dissertation

CODE	L	T	P/FW	CREDITS
MNT450	-	-	-	26

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Research is genuine exploration of the unknown that leads to new knowledge, which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components

1. File should be in the following specification
- A4 size paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top & bottom margins: 1 inch/ 2.5 cm
- Left & right margins: 1.25 inches/ 3 cm

2. Report Layout: The report should contain the following
components Front Page
Table of Contents
Acknowledgement
Student Certificate
Company Profile
Introduction Chapters
Appendices References /
Bibliography

▲ Title or Cover Page or Front Page
The title page should contain the following information: Project Title; Student‟s Name; Course; Year; Supervisor‟s Name.

▲ Table of Contents
Titles and subtitles are to correspond exactly with those in the text.

▲ Acknowledgement
Acknowledgment to any advisory or financial assistance received in the course of work may be given.

▲ Student Certificate
Given by the Institute.

▲ Company Certificate & Profile
This is a certificate, which the company gives to the students. A Company Profile corresponds to a file with company-specific data. Company data can be stored there and included in a booking when needed.

▲ Introduction

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

▲ Chapters

All chapters and sections must be appropriately numbered, titled and should neither be too long nor too short in length.

The first chapter should be introductory in nature and should outline the background of the project, the problem being solved, the importance, other related works and literature survey. The other chapters would form the body of the report. The last chapter should be concluding in nature and should also discuss the future prospect of the project.

▲ Appendices

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

▲ References / Bibliography

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in. The File should fulfill the following *assessment objectives:*

1. Writing a critical literature review
   - Search for literature
   - Summarizing and presenting the literature
   - Evaluating key content and theories

2. Collecting and analyzing research material
   - Choosing and designing research method
   - Conducting the research
   - Analyzing, sorting and classifying the data to make decision

3. Interpreting research method and draw conclusion
   - Findings
   - Recommendation

4. Assigning the theories and writing the project report
   - Structuring the project in accordance with the given style

5. Bibliography
   - This refer to the books, Journals and other documents consulting while working on the project

Examination Scheme:

Components	MRP	V	S	FP	R
Weightage (%)	20	20	20	20	20

MRP – Mid Report Presentation, V – Viva, S – Synopsis, FP – Final Presentation, R - Report