



AMITY UNIVERSITY
— UTTAR PRADESH —

Course Title: Introduction to Networks

Course Level: PG/PE2

Course Code: CSIT626

Credit Units: 4

L	T	P/S	TOTAL CREDIT UNITS
3	-	2	4

Course Objectives: The objective of the course is:

- To introduce the fundamental networking concepts and technologies
- To understand the architecture, structure, functions and components of the Internet
- To understand the architecture, structure, functions and components of the computer networks
- To connect the various segments of LAN
- To understand the configuration of routers and switches
- To understand the ip addressing scheme.

Pre-requisites: Fundamentals of Computers

Student Learning Outcomes: The student will be able to:

- Plan and effectively build simple LANs
- Deploy and effectively perform basic configurations for routers and switches
- Implement the IP addressing schemes
- Describe the key components and technologies related to internet.

Course Contents/Syllabus:

	Weightage (%)
Module I: Exploring the Network	5%
Networking Today, LAN, WAN & Internet, The Network as Platform, The changing network environment	
Module II: Configuring a Network Operating System	10%
Introduction to CISCO IOS, Navigating the IOS, The command structure, Accessing a CISCO IOS device, Saving configuration, Addressing devices	
Module III: Network Protocols and Communications	10%
Rules of communication, Protocol, Protocol suites, Data Encapsulation, Accessing local resource, Accessing remote resource	
Module IV: Network Access	10%
Connecting to the network, Purpose of the physical layer, Network media, Data Link layer, Layer 2 frame structure, Layer 2 standard, Media Access Control	
Module V: Ethernet	10%
Ethernet Protocol, Ethernet Standard, Ethernet MAC, ARP, ARP issue, LAN Switches, Switching, Layer 3 switching, Cisco Express forward	
Module VI: Network Layer	10%
Network Layer Protocol, Network communication, IPv4, IPv6, Routing, Routers	
Module VII: Transport Layer	10%
Transport Layer Protocol, Transportation of Data, Introduction to TCP & UDP, TCP & UDP port Addressing, TCP Communication, UDP Communication	
Module VIII: IP Addressing	10%
IPv4 Network Addresses, IPv4 subnet mask, Types of IPv4 addresses, IPv6 Network addresses, Types of IPv6 Network addresses, ICMP	
Module IX: Subnetting IP Networks	10%
Subnetting an IPv4 network, Network segmentation, Addressing Scheme, Design considerations for IPv6	
Module X: Application Layer	10%
Application Layer Protocol, Well-Known Application Layer Protocols and Services	
Module XI: It's a Network	5%
Create and Grow, Keeping the network safe, Basic Network Performance, Managing IOS configuration files, Integrated Routing services	

List of Practicals:

Introduction to Networks Lab

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

Pedagogy for Course Delivery:

The method of the course delivery will be lecture – based, assisted by power point presentations. The hands –on practice of various configurations such as router configuration commands, switch configuration commands, addressing scheme for the network would be taught using Packet Tracer Activity.

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total
75	25	100

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	ATTN	CT	Case Study	Viva	
Weightage (%)	05	10	10	05	70

Practical (P)

	Continuous Assessment/Internal Assessment	End Term Examination
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Components (Drop down)	Mid-Term Exam	Lab Record	Continuous Performance	Internal Viva	Attendance	
Weightage (%)	10	10	10	5	5	60

Text Books:

- 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
- CISCO CCNA-Exploration 4.0, Module 1 , Pearson Education.

References:

- Data Communicatios and Networking by Behrouz Forouzan, 3e, Tata McGraw-Hill
- Computer Networks by Andrews S. Tanenbaum, 4e, Pearson Education
- Note: This is an online course of Cisco. Online materials provided by Cisco are studied.

Web Portal:

- <https://learningnetwork.cisco.com/index.jspa>
- <https://learningspace.cisco.com/>