

NIRMA UNIVERSITY

	Institute of Technology
Programme:	BTech CSE, Integrated BTech (CSE)-MBA
Course Code:	XXXX
Course Title:	Computer Networks
Course Type:	Core
Year of Introduction:	2024-25

L	T	Practical Component				C
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Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. summarise the functionalities of different layers of computer network architectures (BL2)
2. analyse protocols related to various network architecture layers (BL4)
3. simulate various protocols for different types of networks (BL5)
4. design computer network configurations. (BL6)

Unit	Contents	Teaching Hours (Total 45)
Unit-I	Introduction to Computer Networks: Use of Computer Networks, Connecting devices, Networks and its types, network standards. Network Hardware, Network Software, OSI and TCP/IP Reference Model.	04
Unit-II	Data Link Layer: Introduction and link layer services, two sublayers, link layer addressing, data link layer protocols, multiple-access protocols: Random-access Protocols, Controlled-access Protocols, Channelization protocols, Ethernet protocols and types of Ethernets, Data Link Layer Switching.	15
Unit-III	Network Layer: Design Issues, packet switching, network layer performance, Routing Algorithms: Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Broadcast, multicast, anycast routing; Congestion Control Algorithms, Quality of Service, Internetworking, Example protocols: IPv4 and IPv6, classfull addressing, classless addressing, subnetting, IP Datagram Format, Fragmentation, NAT.	14
Unit-IV	Transport Layer: Transport Service, transport layer protocols for flow control, Elements of Transport Protocols, Congestion Control, Example protocols: UDP, TCP.	09
Unit-V	Application Layer: The Domain Name System, Electronic Mail, World Wide Web, HTTP, FTP, Content delivery.	03

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents

perform 10 experiments to be

d Applications, OXFORD
PHI
Ranka, Elements of Scene Ana
Classification and Springer
arning, Springer

Suggested Readings/ References:

1. Andrew S. Tanenbaum, Computer Networks, PHI Publication
2. Behrouz Forouzan, Data Communication Networking, TMH Publication
3. Behrouz Forouzan, TCP/IP Protocol Suite, TMH Publication
4. William Stallings, Data and Computer Communication, Pearson
5. Jim Kurose, Computer Networking: A top-down approach, Pearson

Laboratory Work:

Laboratory work will be based on the above syllabus with a minimum of 10 experiments to be incorporated. The students in a suitable group size will design and perform one experiment as a part of Laboratory work.

Sr. No.	List of Experiments/Exercises	Hours
1	Experiments on Simulation Tools: (CISCO PACKET TRACER): To understand the environment of CISCO PACKET TRACER to design a simple network and perform experiments.	02
2	Experiments on Packet capture tool: Wireshark To understand the features of Wireshark as a packet capture tool and understand the encapsulation of information. Also study the effect of a few network commands	04
3	To study the behaviour of generic devices used for networking: (CISCO PACKET TRACER) Design a simple network with multiple nodes and connect via generic devices available in the library. Perform a simulation and trace the communication behaviour of specified network devices. a. Use only HUB to design a small network having 4 to 6 hosts b. Use only a Switch to design a small network with 4 to 6 hosts. c. Use both the device (HUB and SWITCH) for a network and find out the functioning difference between the switch and the hub.	02
4	Data Link Layer (Error Correction): Write a program to implement error detection and correction using the HAMMING code concept. Make a test run to input the data stream and verify the error correction feature.	04
5	Virtual LAN: Simulate Virtual LAN configuration using CISCO Packet Tracer Simulation.	02
6	Wireless LAN: Configuration of Wireless LAN using CISCO Packet Tracer.	02
7	Internetworking with routers: Design a three or four-host network (with 3 to 4 hosts) and connect via a Router. Perform a simulation and trace how routing is done in packet transmission. a. Experiment on the same subnet b. Perform an Experiment across the subnet and observe the functioning of the Router by selecting a suitable pair of Source and destination.	04
8	Implementation of SUBNETTING: Design multiple subnets with a suitable number of hosts. Make a plan to assign static IP addressing across all subnets to explain the implementation of SUBNETTING.	04
9	Routing at Network Layer: Simulate Static and Dynamic Routing Protocol Configuration using CISCO Packet Tracer.	04
10	Experiment on Transport Layer: Implement an echo client-server using TCP/UDP sockets.	02

