NIRMA UNIVERSITY

Institute:	Institute of Technology, School of Technology
Name of Programme:	B.Tech. in Electronics & Communication Engineering
Course Code:	4EC301CC25
Course Title:	Data Communication and Network
Course Type:	Core
Year of Introduction:	2025-26

L	T	Practical Component				C
		LPW	PW	W	S	
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Course Learning Outcomes (CLOs):

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

1	comprehend OSI layer architecture and protocols for wired and wireless networks	(BL2)
2	apply computer networking standards for network design	(BL3)
3	evaluate the networking protocols	(BL4)
4	conduct simulation for networking protocols and standards.	(BL5)

Unit	Contents	Teaching hours (Total 45)
Unit I	**Introduction to Data Communication and Networking:** Data communication, use of Networks, Internet Protocols, and standards, layering of Models, OSI model, Internet model.	03
Unit II	**Physical Layer:** Transmission media – Wire and Wireless Medium, DSL technology, Cable modem.	04
Unit III	**Data Link Layer:** Services to N/W layer, Framing, Bit Stuffing, Character Stuffing, Error control, Flow control mechanism, Data Link Layer protocols.	09
Unit IV	**Medium Access Layer:** Channel allocation problem, Multiple Access, CSMA, CSMA/CD, CSMA/CA	04
Unit V	**Example Networks:** Ethernet, Wireless LAN, Blue tooth, ZigBee, Connecting devices- Repeaters, Hub, Bridges, Switch, Router, Gateways, Broadband Wireless Networks.	09
Unit VI	**Network Layer:** Packet Switching, Virtual circuits, and datagram, Static and Dynamic Routing Algorithms (Optimality principle, Static Routing Algorithms: Shortest Path, Flooding, Dynamic routing Algorithms: Distance Vector, Link state routing.), Congestion Control, IP Addressing, CIDR, NAT, IP layer protocols (ICMP, ARP, RARP, DHCP, BOOTP), IPv4 and IPv6.	10
Unit VII	**Transport Layer:** Elements of Transport protocols - TCP & UDP	03

Unit VIII   **Application Layer and Security:** DNS- Domain Name System, E-mail, FTP, HTTP, WWW, Firewall, Network Security   **03**

Self Study:
The self-study contents will be declared at the commencement of the semester. Around 10% of the question will be asked from self-study contents.

Laboratory Work:
Laboratory work will be based on the above syllabus with a minimum of 10 experiments to be incorporated.

Suggested Readings/ Reference:
1. Andrew S. Tanenbaum, *Computer Networks*, Prentice-Hall Publication
2. Behrouz Forouzan, *Data Communication and Networking*, Tata McGraw-Hill Publication
3. William Stallings, *Data and Computer Communication*, Prentice-Hall Publication
4. Bhushan Trivedi, *Computer Networks*, Oxford Publication
5. James F. Kurose, Keith W. Ross, *Computer networking: A top-down approach featuring the internet*, Pearson Education India

Suggested List of Experiments

Sr. No.	Name of Experiments/Exercises	Hours
1.	Explore the serial and parallel port of PC.	02
2.	Configuring Peer to Peer network using Window/Linux Operating Systems.	02
3.	Explore networking commands in Linux environment.	02
4.	Install and explore NS2 Simulator	02
5.	Install and explore NS3 Simulator	02
6.	Implement, analyse and evaluate network topologies in NS3 simulator	02
7.	Implement Data Link Layer Protocols in NS2.	02
8.	Implementing Client Server Communication using NS3.	02
9.	Introduction to Cisco Packet Tracer for Network simulations	02
10.	Exploring static and dynamic routing protocol in CISCO Packet Tracer.	02
11.	Implementing wire network in Cisco Packet Tracer	02
12.	Implementing wireless network in Cisco Packet Tracer	02
13.	Implementing static and dynamic IP assignment in Cisco Packet Tracer	02
14.	Configure FTP and DHCP Server in windows environment	02
15.	Explore Wireshark tool for Network Protocol Analysis	02