NIRMA UNIVERSITY

Institute:	Institute of Technology, School of Technology
Name of Programme:	BTech CSE
Course Code:	4CS203ME25
Course Title:	High Speed Networks
Course Type:	Department Elective-III
Year of Introduction:	2025-26

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

At the end of the course, the students will be able to –
1. outline design issues involved in different wireless networks (BL2)
2. analyse the evolution of wireless network architectures with the growing needs (BL4)
3. evaluate the available technologies to satisfy various application requirements (BL5)
4. propose technological solutions to satisfy various application requirements. (BL6)

Unit	Contents	Teaching Hours (Total 45)
Unit-I	**Introduction:** Overview of network performance issues, need for high-speed networks, Historical development and future trends, Layered architecture, Switching and routing, Network topologies	08
Unit-II	**High-Speed LAN and WAN Technologies:** Ethernet evolution (Fast Ethernet, Gigabit Ethernet, 10 Gigabit Ethernet), Token Ring and FDDI, Wireless LANs, SONET/SDH, Frame Relay, ATM	09
Unit-III	**Congestion Control, QoS and performance analysis:** Principles of congestion control, Traffic shaping and policing, Admission control, QoS fundamentals, QoS mechanisms and protocols (DiffServ, IntServ), QoS in IP networks, Network performance metrics, Tools and techniques for performance analysis, Designing high-performance networks	09
Unit-IV	**Example High Speed Networks:** MPLS architecture and protocols, Virtual Private Networks, Optical networks, Wavelength Division Multiplexing, Optical network components, 3G, 4G, and 5G networks Wi-Fi, WiMAX, and LTE, Mobile ad hoc networks	09
Unit-V	**High-Speed Network Security:** Security issues in high-speed networks, Protocols, and mechanisms for network security	03
Unit-VI	**Emerging Technologies in High-Speed Networks:** Next Generation Networks, Convergence of services, NGN architecture and protocols, Software-Defined Networking, Network Function Virtualization, IoT and its impact on high-speed networking	07

Self-Study:

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

Suggested Readings/ References:

1. William Stallings, *High-Speed Networks and Internets: Performance and Quality of Service*, Pearson.
2. Behrouz A. Forouzan, *Data Communications and Networking*, McGraw-Hill.
3. James F. Kurose, Keith W. Ross, *Computer Networking: A Top-Down Approach*, Pearson.
4. Raj Jain, *The Art of Computer Systems Performance Analysis*, Wiley.
5. William Stallings, *Wireless Communications and Networks*, Pearson

Suggested List of Experiments:

Sr. No.	Name of Experiments/Exercises	Hours
1	Introduction to Network Performance Measurement Tools	02
2	Ethernet Configuration and Performance Testing	02
3	Configuring VLANs and Analyzing Traffic	02
4	Frame Relay Configuration and Testing	04
5	Configuring and Analyzing MPLS Networks	02
6	Quality of Service (QoS) Implementation on Simulator	04
7	Wireless LAN Setup and Performance Analysis	02
8	Optical Network Simulation	04
9	Implementing and Testing SDN	04
10	High-Speed Network Security Testing	04