

Gujarat University
K. S. School of Business Management and Information Technology
[Five Years' (Full – Time) M.Sc. (CA&IT) Integrated Degree Course]
Second Year M.Sc. (CA&IT) (Semester - III)

Course Name: Data Communication and Networking

Course Code: DSC-C-IMSCIT-231T

Course Credit: 4

Objective:

To provide students with a comprehensive understanding of the fundamental concepts of data communication and networking, including network models, protocols, and hardware. This course aims to equip students with the skills needed to design, analyze, and troubleshoot various types of networks and to understand the functionality of different network layers and services.

Course Outcomes:

Upon successful completion of the Data Communication and Networking course, students will be able to:

- Students will be able to understand key concepts and terminology in data communication and networking, including the different types of networks (LAN, MAN, WAN) and their applications.
- Students will be able to understand the OSI and TCP/IP models, including their layers and the functions of each layer.
- Students will be able to Understand the characteristics of data and signals and the various methods of data transmission.
- Students will be able to Understand and implement different types of switching networks, including circuit-switched, datagram, and virtual circuit networks.
- Students will be able to Understand the role and configuration of different network devices such as hubs, switches, routers, bridges, and gateways
- Students will be able to Understand network layer services and the principles of packet switching.
- Students will be able to Understand the architecture and protocols of the application layer, including HTTP, FTP, and SMTP.

Contents:

Unit No.	Course Content	Hours	Credits
1	Data communication: Data communication component computer network, Network hardware – LAN, MAN, WAN. Network software – protocol hierarchies, Design issues for layers, Connection oriented and connectionless services, OSI model, TCP/IP model, Physical Layer: Data and Signals, Periodic Analog Signals, Digital Signals, Transmission Impairment. Data Rate Limits, Performance, Multiplexing, Spread Spectrum, Guided Media. Switching: Circuit Switched Networks, Datagram Networks, Virtual circuit networks.	15	1

2	The Data Link Layer: Introduction, Error Detection and Correction, Data link control services, Data Link Layer Protocols The Medium Access Control (MAC): Random Access, Controlled Access, Channelization Connecting Devices	15	1
3	The Network Layer: Introduction, Network Layer services, Packet switching, Network Layer performance, IPv4 Addressing, Forwarding of IP packet, introduction of Unicast routing, Unicast routing algorithms, introduction of Multicast routing.	15	1
4	The Transport Layer and The Application layer: The transport service - Services provided to the upper layers, Transport service primitives, Elements of transport protocol – addressing, Connection establishment, Connection release, Flow control, Multiplexing, Domain name space, DNS in internet, electronic mail, SMTP, FTP, World Wide Web Architectural , HTTP .	15	1

Reference Books:

1. Data Communications and Networking By Behrouz A. Forouzan, Tata McGraw-Hill, Fifth Edition
2. Computer Networks By Bhushan H Trivedi, Oxford University Press
3. Computer Networking By Andrew S. Tanenbaum, Prentice Hall, Fourth Edition

Accomplishments of the student after completing the Course:-

Upon completing this course, students will be able to:

- Understand and explain the fundamental concepts of data communication and networking.
- Describe the functions and characteristics of different network hardware and software.
- Analyze and compare the OSI and TCP/IP network models.
- Implement and evaluate physical layer technologies and data transmission methods.
- Design and analyze various types of switching networks.
- Understand and apply error detection and correction techniques in data link layer protocols.
- Implement and evaluate medium access control (MAC) methods and connecting devices.
- Design, configure, and troubleshoot network layer services and protocols, including IP addressing and routing algorithms.
- Understand the services and protocols of the transport layer and application layer.
- Apply the knowledge gained to real-world networking problems and scenarios.