Uka Tarsadia University

B. Tech.
Semester V

DATA COMMUNICATION AND NETWORKING
CE5018

EFFECTIVE FROM June-2023

Syllabus version: 1.00

Subject Code	Subject Title	Teaching Scheme			
		Hours		Credits	
		Theory	Practical	Theory	Practical
CE5018	Data Communication and Networking	3	2	3	1

Subject Code	Subject Title	Theory Examination Marks		Practical Examination Marks	Total Marks
		Internal	External	CIE	
CE5018	Data Communication and Networking	40	60	50	150

Objectives of the course:
- To understand the basic concepts of data communication and layered model.
- To understand working of protocols and interworking between computer networks and switching components in telecommunication systems.
- To understand security issues related to data communication in networks.

Course outcomes:

Upon completion of the course, the student shall be able to,

CO1: To understand the basics of data communication, networking, internet and their importance.

CO2: Analyze the services and features of various protocol layers in data networks.

CO3: To understand wired and wireless computer networks.

CO4: Analyze TCP/IP and their protocols and demonstrate the mechanism of routing the data in network layer.

CO5: Know the functioning of various protocols of transport layer.

CO6: To recognize the different internet devices and their functions.

Sr. No.	Topics	Hours
	Unit – I	
1	**Introduction of Data Communications:** Data communications, Networks, Network types,Internet history. Network Models-Protocol layering, TCP/IP protocol suite, The OSI model, need for layered/modular architecture.	5
	Unit – II	
2	**Physical Layer:** Introduction, Data and signals, Analog, Digital, Transmission impairment, Data rate limits, Performance, Digital Transmission – Line coding, Block coding, Analog to digital conversion, PCM, and Transmission modes, Analog Transmission – Digital to analog conversion (ASK, FSK, PSK, QAM), and Analog to Analog conversion (AM, FM, PM), Multiplexing – FDM, WDM, TDM, Spread spectrum – FHSS, and DSSS, Transmission Media – Guided and unguided, Switching – Switching, Circuit-switched networks, Datagram networks, Concept of virtual circuit networks, structure of circuit and packet switch.	7
	Unit – III	
3	**Data Link Layer:** Introduction, Types of addressing, ARP, Error detection and correction, Block coding, Cyclic codes, Checksum, Data Link Control-DLC services, DLL protocols, Media Access Control (MAC)- Random access, Controlled access, and Channelization, Wired LAN-Ethernet protocol, Standard Ethernet, Wireless LAN- Introduction , IEEE 802.11, Bluetooth architecture, Cellular telephony, Connecting devices.	6
	Unit – IV	
4	**Network Layer:** Introduction, Network layer services, Packet switching, Network layer performance, IPV4 addresses, and Forwarding of IP packets. Network layer protocols – IP, ICMPv4, Unicast routing-Introduction, Routing algorithms, Unicast routing protocols, Multicast routing-Introduction, Multicasting Basics, Next Generation IP- IPv6 addressing, IPv6 protocol.	7
	Unit – V	
5	**Transport Layer:** Introduction, Transport layer services, Transport layer protocols. Transport layer protocols- Introduction, User datagram protocol,	6

	Transmission control protocol, SCTP.	
Unit – VI		
6	**Application Layer:** Introduction, Client server programming, Standard client – server protocols – WWW and HTTP, FTP, Electronic mail, SSH, DNS, Compression-Lossless compression, Lossy compression.	5

Text book:
1. R Behrouz A. Forouzan "Data Communications and Networking" Fifth Edition, Tata McGraw Hill.

Reference books:
1. Achyut S Godbole- and Atul Kahate "Data Communications and Networks"- 2nd edition Tata McGraw-Hill.
2. Andrew S Tanenbaum "Computer Networks"- 4th Edition – Pearson Prentice Hall.

Course objectives and Course outcomes mapping:
- To understand the basic concepts of data communication and layered model: CO1, CO4
- To understand working of protocols and interworking between computer networks and switching components in telecommunication systems: CO2, CO3, CO4, CO5
- To understand security issues related to data communication in networks: CO4, CO6

Course units and Course outcomes mapping:

Unit No.	Unit Name	Course Outcomes					
		CO1	CO2	CO3	CO4	CO5	CO6
1	Introduction of Data Communications	✓					
2	Physical Layer		✓				
3	Data Link Layer			✓			
4	Network Layer				✓		
5	Transport Layer:					✓	
6	Application Layer						✓

Programme outcomes:

PO 1:   Engineering knowledge: An ability to apply knowledge of mathematics, science, and engineering.

PO 2:   Problem analysis: An ability to identify, formulates, and solves engineering problems.

PO 3:   Design/development of solutions: An ability to design a system, component, or process to meet desired needs within realistic constraints.

PO 4:   Conduct investigations of complex problems: An ability to use the techniques, skills, and modern engineering tools necessary for solving engineering problems.

PO 5:   Modern tool usage: The broad education and understanding of new engineering techniques necessary to solve engineering problems.

PO 6:   The engineer and society: Achieve professional success with an understanding and appreciation of ethical behavior, social responsibility, and diversity, both as individuals and in team environments.

PO 7:   Environment and sustainability: Articulate a comprehensive world view that integrates diverse approaches to sustainability.

PO 8:   Ethics: Identify and demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work.

PO 9:   Individual and team work: An ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10:   Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give/receive clear instructions.

PO 11:   Project management and finance: An ability to demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12:   Life-long learning: recognition of the need for, and an ability to engage in life-long learning.

Programme outcomes and Course outcomes mapping:

Programme Outcomes	Course Outcomes					
	CO1	CO2	CO3	CO4	CO5	CO6
PO1	✓					
PO2						
PO3		✓	✓	✓	✓	
PO4						
PO5		✓	✓	✓	✓	
PO6						
PO7						
PO8						
PO9						
PO10						
PO11						
PO12						