COURSE CONTENT

DATA COMMUNICATIONS AND PROTOCOLS								
VI Semester: CSE (CS)								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
ACCD24	**Elective**	3	0	0	3	40	60	100
Contact Classes: 48	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 48**		
Prerequisites: Computer Networking, Operating System								

I. COURSE OVERVIEW:

This course explores the fundamentals of data communication systems and network protocols. It covers topics like communication techniques, error detection, network layers, and the role of protocols in enabling reliable data exchange in networks. The course aims to provide an in-depth understanding of communication standards and emerging trends in networking technologies.

II. COURSE OBJECTIVES:

The students will try to learn:

I	The fundamental concepts of data communication and its components.
II	The Key network protocols and their functions in communication systems.
III	The Error detection and correction techniques for reliable data transmission.
IV	The role of network layers in the OSI and TCP/IP models.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO1	Understand the basic principles of data communication and network architectures.
CO2	Identify and analyze various protocols across different network layers.
CO3	Apply error detection and correction techniques to ensure data integrity.
CO4	Develop and troubleshoot communication protocols for network systems.
CO5	Evaluate emerging technologies and standards in data communication.
CO6	Demonstrate practical knowledge in designing and implementing network solutions.

IV. COURSE CONTENT:

MODULE – I: BASICS OF DATA COMMUNICATION (10)

Components of Data Communication Systems, Transmission Media (Wired and Wireless), Analog and Digital Signals, Bandwidth and Data Rate, Multiplexing Techniques.

MODULE – II: COMMUNICATION PROTOCOLS (09)

Role of Protocols in Communication, Data Link Layer Protocols (HDLC, PPP), Network Layer Protocols (IP, ICMP), Transport Layer Protocols (TCP, UDP).

MODULE – III: ERROR DETECTION AND CORRECTION (10)

Error Detection Techniques (Parity Check, Checksum, Cyclic Redundancy Check), Error Correction Mechanisms (Hamming Codes, Linear Block Codes, Convolutional Codes, Forward Error Correction).

Automatic Repeat Request (Stop-and-Wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ), Advanced Coding Techniques (Reed–Solomon Codes, Turbo Codes, Low-Density Parity-Check Codes), Applications in Digital Communication and Data Storage.

MODULE - IV: NETWORK ARCHITECTURES AND STANDARDS (10)

OSI and TCP/IP Models, Protocol Stack, Addressing Mechanisms (IP Addressing, Subnetting), Routing Concepts, Switching Techniques, IEEE Standards (802.11, 802.15, 802.3).

MODULE – V: ADVANCED TOPICS AND EMERGING TRENDS (09)

Quality of Service (QoS), IPv6, Voice over IP (VoIP), Software-Defined Networking (SDN), Internet of Things (IoT) Communication Protocols, Wireless Sensor Networks (WSNs).

V. TEXTBOOKS:

1. Behrouz A. Forouzan," *Data Communications and Networking"*, McGraw-Hill, 5th Edition , 2017.
2. Andrew S. Tanenbaum, "*Computer Networks"*, Pearson, 6th Edition, 2021.

VI. REFERENCE BOOKS:

1. William Stallings, "Data and Computer Communications", Pearson, 11th Edition, 2020.
2. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach*"*, Pearson, 7th Edition, 2017.

VII, ELECTRONIC RESOURCES:

1. https://www.cisco.com/c/en/us/solutions/index.html
2. https://www.ietf.org/
3. https://www.w3schools.com/computer-networking/

VIII. MATERIALS ONLINE:

1. Course template
2. Tutorial question bank
3. Tech-talk topics
4. Definitions and terminology
5. Assignments
6. Model question paper – I
7. Model question paper – II
8. Lecture notes
9. PowerPoint presentation
10. E-Learning Readiness Videos (ELRV)