



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

INTRODUCTION TO COMMUNICATION SYSTEM								
V Semester: IT								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AITD08	PE-1	L	T	P	C	CIA	SEE	Total
		3	-	-	3	40	60	100
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 48			
Prerequisite:								

I. COURSE OVERVIEW:

This course explores the fundamental and advanced concepts of data communication and networking, emphasizing both theoretical principles and practical applications. It is designed to provide a comprehensive understanding of modern communication systems, protocols, and technologies.

II. COURSE OBJECTIVES:

The students will try to learn:

- I The data transmission, protocol layering (TCP/IP and OSI models), and network architectures.
- II How to implement reliable communication using error-handling mechanisms and analyze MAC protocols like CSMA and controlled access methods.
- III The switching techniques, resource allocation via multiplexing, and the roles of devices like routers, switches, and gateways in modern networks.
- IV The IPv4 addressing, packet forwarding, and routing algorithms, including protocols.

III. COURSE OUTCOMES:

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

- CO1 Explain the fundamentals of data communication and networking models, including protocol layering, the OSI and TCP/IP models, and the role of standards and administration.
- CO2 Identify and apply error detection and correction techniques such as parity checks, CRC, checksum, and Hamming codes in data link layer protocols.
- CO3 Analyze and compare media access control methods (e.g., ALOHA, CSMA/CD, CSMA/CA) and LAN technologies like Ethernet and its variants.
- CO4 Demonstrate understanding of switching techniques and multiplexing methods, and classify networking devices and their functions within a network.
- CO5 Describe IPv4 addressing schemes and explain network layer operations such as packet forwarding, DHCP, NAT, and IP routing strategies.
- CO6 Implement and evaluate routing algorithms and protocols, including Distance Vector, Link State, and Path Vector, as well as protocols like RIP and OSPF.

IV. COURSE CONTENT:

MODULE – I: FUNDAMENTALS OF DATA COMMUNICATION AND NETWORKING (10)

Data Communications, Networks and Network Types, Internet History, Standards and Administration, Protocol Layering, TCP/IP protocol suite, OSI Model. Digital Data Transmission, DTE-DCE interface.

Data Link Layer: Introduction, Data Link Layer, Nodes and Links, Services, Categories of Links, sublayers, Link Layer Addressing, Address Resolution Protocol.

MODULE – II: ERROR HANDLING (09)

Error Detection and Correction: Types of Errors, Redundancy, detection versus correction, Coding Block Coding: Error Detection, Vertical redundancy checks, longitudinal redundancy checks, Error Correction, Error correction single bit, Hamming code.

Cyclic Codes: Cyclic Redundancy Check, Polynomials, Cyclic Code Encoder Using Polynomials, Cyclic Code Analysis, Advantage of Cyclic Codes, Checksum

Data Link Control: DLC Services, Data Link Layer Protocols, HDLC, Point to Point Protocol

MODULE – III: MEDIA ACCESS CONTROL AND LAN TECHNOLOGIES (10)

Media Access Control (MAC) Sub Layer: Random Access, ALOHA, Carrier Sense Multiple Access (CSMA), Carrier Sense Multiple Access with Collision Detection (CSMA/CD), Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA), Controlled Access- Reservation, Polling- Token Passing, Channelization - Frequency Division Multiple Access (FDMA), Time - Division Multiple Access (TDMA), Code - Division Multiple Access (CDMA).

Wired LANS: Ethernet Protocol, Standard Ethernet, Fast Ethernet, Gigabit Ethernet, 10 Giga bit Ethernet

MODULE – IV: SWITCHING, MULTIPLEXING, AND NETWORKING DEVICES (10)

Switching: Introduction to Switching, Circuit Switched Networks, Packet Switching, Structure of switch

Multiplexing: Multiplexing, Frequency Division Multiplexing, Time Division Multiplexing.

Spectrum Spreading: Spread Spectrum-Frequency Hopping Spread Spectrum and Direct Sequence Spread Spectrum

Connecting devices: Passive Hubs, Repeaters, Active Hubs, Bridges, Two Layer Switches, Routers, Three Layer Switches, Gateway, Backbone Networks.

MODULE – V: NETWORK LAYER OPERATIONS AND ROUTING (09)

Networks Layer: Packetizing, Routing and Forwarding, Packet Switching, Network Layer Performance, IPv4 Address, Address Space, Classful Addressing, Classless Addressing, Dynamic Host Configuration Protocol (DHCP), Network Address Resolution (NATF), Forwarding of IP Packets, Forwarding based on Destination Address, Forwarding based on Label, Routing as Packet Switches. Unicast Routing: Introduction, Routing Algorithms-Distance Vector Routing, Link State Routing, Path Vector Routing, Unicast Routing Protocols-Routing Information Protocol (RIP), Open Short Path First.

V. TEXT BOOKS:

1. B. A. Forouzan, “Data Communications and Networking”, TMH, 5th Edition, 2013.
2. William Stallings, “Data and Computer Communications”, PHI, 8th Edition, 2007.

VI. REFERENCE BOOKS:

1. Prakash C. Gupta, “Data Communications and Computer Networks”, PHI, 2006.
2. B. A. Forouzan, “Data Communications and Networking”, TMH, 2nd Edition, 2013

VII. ELECTRONICS RESOURCES:

1. <https://inl.info.ucl.ac.be/CNP3>
2. <https://www.netacad.com/>
3. <https://www.edx.org/>
4. <https://www.coursera.org/>

VIII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Tech talk topics
4. Open end experiments
5. Definitions and terminology
6. Assignments
7. Model question paper – I
8. Model question paper - II
9. Lecture notes
10. E-learning readiness videos (ELRV)
11. Power point presentation