

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Computer Engineering) (Full Time)				
Subject Code & Name		Instructions Hours per Week			Credits			
5CERC3		L	T	P	L	T	P	Total
COMPUTER NETWORK		3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours								

Course Objective

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer Networking area.
- Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Prerequisite:

Basic knowledge of programming and Data Structures.

Course Outcome:

Students earned credits will develop ability to:

CO. No.	CO.	PO.
CO1.	Explain the fundamental concepts of computer networks, including network architectures, protocols, and reference models such as OSI and TCP/IP	PO1, PO2
CO2.	Analyze the working of various networking devices (router, switch, hub, gateway) and communication technologies used in wired and wireless networks	PO1,PO2,PO3,PO6,PO10,PO12
CO3.	Apply error detection, error correction, and flow control techniques to ensure reliable data transmission across networks.	PO4,PO5,PO6,PO7,PO9
CO4	Evaluate routing algorithms (Dijkstra, Distance Vector, Link State) and compare different routing protocols such as RIP, OSPF, and BGP.	PO3,PO4,PO5,PO9,PO11
CO5	Design small-scale network topologies for homes, labs, or enterprises using IP addressing, subnetting, Investigate transport-layer protocols (TCP, UDP) and examine how	PO6,PO7,PO8,PO11

	congestion control, quality of service (QoS), and reliability mechanisms operate.basic network security techniques	
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CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	2	2										
CO2	2	2	3			3				3		3
CO3				2	3	3	2	3				
CO4			3	3	3				2		3	
CO5						2	2	3			3	

1. * CO (rows) mention nil/very small/insignificant contribution to the PO(column)
2. 1 → relevant and small significance 2 → medium or moderate and 3 → strong

COURSE CONTENTS

UNIT-I

Introduction: Definition and goals, Design issues, Network architecture-broadcast & point to point, Models-OSI reference & TCP/IP and their comparative study, Network classification-LAN, WAN & MAN, protocols & services, types of service-connection oriented and connectionless, different protocols. Transmission Media: Twisted Pair, Coaxial cable, Fiber optic cable, Wireless transmission, telephone system, multiplexing, switching-circuit, packet & message switching, Virtual circuit switch. Network devices-repeater, bridge, router, gateways, network interface cards, cabling system.

UNIT-II

Data Link Layer: Framing, Error Control-Bit Error, causes of error, control methods, Flow control: Stop & wait, sliding window concept, piggybacking. Local Area Network Technology: Protocols-Aloha, CSMA, CSMA/CD, Collision free protocols, IEEE 802 protocols, standard- topologies, cabling system, Network management, MAC addressing frame format. Ethernet.

UNIT-III

Network Layer: Introduction, features & design issues, Routing- different routing algorithms, congestion control, Internetworking- Concepts and architecture. Addressing-IP Addressing and subnet masking, IP protocols, Network Address Translation, Address resolution protocol (ARP).

UNIT-IV

Transport Layer: Introduction, design issues, Transport layer addressing, buffering, multiplexing, recovery, TCP/IP suit of protocols- TCP & UDP Network applications, Connection establishment, Connection release, TCP Header.

UNIT-IV

Application Layer: Introduction to Application Layer, Application Layer Protocols: Electronic Mail, File Transfer Protocols, Remote Login, WWW, Multimedia, Firewalls etc.

Learning Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

1. Understand and explain Data Communications System and its components.
2. Identify the different types of network topologies and protocols.
3. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
4. Identify the different types of network devices and their functions within a network.
5. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.
6. Understand and building the skills of subnetting and routing mechanisms.

Books Recommended:

- [1]. Computer Networks, Andrew. S. Tanenbaum, 4/e, Prentice Hall of India Private Ltd, 2003.
- [2]. Data Communications and Networking, Behrouz A Forouzan, 4/e, Tata McGraw Hill Education Private Limited.
- [3]. Data Communications & Networks, Achyut S. Godbole, Tata McGraw Hill Education Private Limited, 2002.

List of Practical Assignments:

- 1) Study of various network devices in detail.
- 2) Study of basic network commands and network configuration commands.
- 3) Installation of LAN card.
- 4) Implementation of Bit Stuffing.
- 5) Implementation of Byte stuffing.
- 6) Implementation of error correcting codes.
- 7) Implementation of error detection codes.
- 8) Study of network IP.
- 9) Implementation of various routing protocols.
- 10) Programming with Sockets.