

Devi Ahilya Vishwavidhyalaya, Indore, India Institute of Engineering & Technology					III Year B.Tech. (Electronics and Instrumentation Engineering)	
Course Code & Name		Instructions Hours per Semester and Credits				
5REOE1 COMPUTER NETWORKS	Classroom Instruction (CI)		Lab Instruction (LI)	Term Work (TW) and Self Learning (SL)	Total no. of Hours Per semester	Total Credits (Total Hours/30)
	L	T	P	TW+SL	120	4
	30	10	20	60		

Course Learning Objectives:

The course is designed

1. To understand the basics of Data Communication.
2. To understand the principles of computer networking, including protocol design, protocol layering, algorithm design, and performance evaluation.
3. To study and understand TCP/IP Protocol suite designed for the application layer, transport layer, network layer, Data link layer and Physical Layer.
4. To implement various Algorithms of TCP/IP suite and analyse their performance.

Prerequisite(s): Fundamental knowledge of data transmission

COURSE CONTENTS

Unit I

Computer network – Hardware, Software, Reference model, physical layer

Network and application, categories of network-LAN, MAN, WAN, Wireless Network, Internetwork, Reference models.– OSI,TCP/IP model and their comparison, Line configuration-point to point, multicast ,broadcast ,Network Topology – Mesh , Star ,Tree , Bus , Ring , Hybrid

Physical Layer – Shannon’s maximum data rate of a channel, Transmission media – Guided as Magnetic, Twisted Pair, coaxial cable, fiber optics etc., wireless as radio wave, microwave, infrared

Unit II

Data Link Layer

Framing techniques , Error detection-correction , Multiplexing-TDM ,FDM,WDM ; switching – circuit , message , packet switching , Repeaters, Hubs , Bridges ,switches ,routers and gateways ;Data link protocols-- unrestricted simplex protocol, stop & wait , sliding window ,Go-back- n ,selective repeat, data link layer in internet

Unit III

Medium Access control sublayer

Channel allocation, Multiple access protocols – ALOHA, CSMA, CSMA /CD, collision-free protocol

Ethernet- frame format, cabling, encoding, performance, fast Ethernet, gigabit Ethernet, Broadband and wireless LAN, Bluetooth

Unit IV

Network layer

Connectionless – connection oriented service, comparison of virtual circuit and datagram subnet, Routing algorithms- shortest path , flooding ,distance vector , hierarchical routing , congestion control and prevention ,Quality of service , network layer in internet- IP protocol and IP address, IPv6, OSPF, BGP routing protocol.

Unit V

Transport layer and Application layer

Elements of transport protocol, internet transport protocol-UDP / TCP protocol, performance issues-Network performance measurement, system design for better performance

Domain name system, email, world wide web- architecture, HTTP

Course Outcome:

Students earned credits will develop ability to

CO.No.	CO
CO1	To analyze the classification of network services, protocols and architectures.
CO2	To understand key Internet applications and their protocols.
CO3	To learn basic concepts of MAC protocols and demonstrates wireless LAN.
CO4	To design and analysis of the routing Protocols
CO5	To understand various design issues in Application layer.

Books Recommended:

- [1] Anand Kumar, “Fundamentals of Digital circuits”, PHI Publication, 2016
- [2] Mano M. Morris, “Digital Design”, 3rd edition, Pearson Education 2006.
- [3] William H.Gothmann,*Digital Electronics: An Introduction to Theory and Practice*, Eastern Economy Edition , Prentice-Hall of India Private Limited,NewDelhi.,2001
- [4] William I. Fletcher, *An Engineering Approach to Digital Design*, Pearson Education
- [5] S Salivahan,S Arivazhagan "Digital Circuit and Design" , fourth edition,Vikas Publication

CO-PO-PSO Relationship

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	PSO 1	PSO 2	PSO 3
5REOE1.CO1	3	2	1									3	2	1
5REOE1.CO2	3	3	2		1							3	3	2
5REOE1.CO3	3	3	3	2	3							3	3	3
5REOE1.CO4	3	3	3		2							2	3	3
5REOE1.CO5	3	2	2		2							2	2	3

List of Practical Assignments :

During the learning of course, students need to do assignments:

1. Study of Network Devices

Objective: Understand the functions of networking devices.

Tasks:

- (i) Study Router, Switch, Hub, Bridge, Repeater, Gateway, and Modem.
- (ii) Compare their features and applications.
- (iii) Draw block diagrams of each device.

Outcome: Understand the role of networking hardware.

2. Identification of Network Cables

Objective: Learn different networking cables and connectors.

Tasks:

- (i) Identify UTP, STP, Coaxial, and Fiber Optic cables.
- (ii) Study RJ-45 and RJ-11 connectors.
- (iii) Compare transmission speed, distance, and applications.

Outcome: Identify various transmission media.

Assignment 3: Crimping of Ethernet Cable

3. Objective: Prepare Ethernet cables.

Tasks:

- (i) Learn T568A and T568B standards.
- (ii) Prepare Straight-through cable.
- (iii) Prepare Crossover cable.
- (iv) Test cables using a cable tester.

Outcome: Develop cable crimping skills.

4. Objective: Configure IPv4 addresses.

Tasks:

- (i) Assign static IP addresses.
- (ii) Configure subnet mask and default gateway.
- (iii) Verify connectivity using Ping command.

Outcome: Configure and troubleshoot IP settings.

5. Objective: Learn basic networking diagnostic commands.

Commands:

- (i) ipconfig / ifconfig
- (ii) ping
- (iii) tracert / traceroute
- (iv) netstat
- (v) arp
- (vi) nslookup

Outcome: Analyze network connectivity.

6. Objective: Study of OSI and TCP/IP Models and understanding networking layers.

Tasks:

- (i) Draw OSI and TCP/IP models.
- (ii) Explain functions of each layer.
- (iii) Compare both models.

Outcome: Understand protocol architecture.

7. Objective: Packet Analysis using Wireshar; Capture and analyze network packets.

Tasks:

- (i) Install Wireshark.
- (ii) Capture HTTP, DNS, ICMP, and TCP packets.
- (iii) Identify source IP, destination IP, MAC address, and protocol.

Outcome: Analyze real network traffic.

8. Objective: Create a Local Area Network.

Tasks:

- (i) Connect multiple PCs through a switch.
- (ii) Assign IP addresses.
- (iii) Verify communication using Ping.

Outcome: Configure a basic LAN.

9 Objective : Network Simulation using Cisco Packet Tracer and simulate a LAN

Tasks:

- (i) Create a network with one switch and four PCs.
- (ii) Configure IP addresses.
- (iii) Test connectivity.

Outcome: Learn network simulation.

10: Configure a router.

Tasks:

- (i) Assign interface IP addresses.
- (ii) Configure routing.
- (iii) Verify communication between two networks.

Outcome: Understand basic router configuration.