

LESSON PLAN 2025-26(SUMMER)**NAME OF THE TEACHER : ABHISEK MISHRA , LECT.(STAGE-I,ETC)**Subject: **COMPUTER NETWORKS (Course Code: CSEPC 206/TH3)**

Program: Diploma in Computer Science and Engineering

Semester: 4th

Total Contact Hours: 45

Total Marks: 100

Assessment: Internal Assessment – 30, End Term – 70

After completion of the course, the students will be able to:

CO1-Explain the basic concept about the CN

CO2- Explain various network media and topologies used in computer network

CO3- Exhibit LAN & VLAN concept related to datalink layer

CO4-Exhibit Routing algorithm and Routing Protocols

CO5-Explain Protocols related to Application Layer

CO6-Illustrate Networking Devices.

Lesson No.	UNIT	Topic/Sub-Topic	Learning Objective	Activity	Homework	COURSE OBJECTIVE
UNIT-1-Introduction to Networking & Layered Architecture (6 Hours)						
1	I	Introduction to Networks	Define a network and identify basic components (Hosts, Media, Protocols).	Network Mapping: Sketch a diagram of the classroom's local network (LAN).	Find the "Default Gateway" and "IP Address" of your home device.	CO1
2	I	Concept of Network Models	Explain why we use layered models (standardization & modularity).	Assembly Line Simulation: Group activity showing how specialized "stations" build a product.	Write a short paragraph on the disadvantages of a non-layered network.	CO1
3	I	OSI Model: Upper Layers	Detail the functions of the Application, Presentation, and Session layers.	Protocol Roleplay: Students act out "Translation" (Presentation) and "Dialog" (Session).	List 3 applications you use daily and the Layer 7 protocols they use.	CO1
4	I	OSI Model: Lower Layers	Detail the functions of the Transport, Network, Data Link, and Physical layers.	Visual Mapping: Draw the "Data Unit" (PDU) for each layer.	Research the difference between a Hub (L1) and a Switch (L2).	CO1
5	I	The Layer Architecture	Understand Encapsulation, Decapsulation, and Peer-to-Peer communication.	The Envelope Game: Nesting messages inside multiple "headers."	Explain the concept of "Horizontal Communication" between identical layers.	CO1

6	I	The TCP/IP Model Overview	Identify the 4 layers of TCP/IP and compare them to the OSI 7-layer model.	Comparison Table: Map the 7 OSI layers onto the 4 TCP/IP layers in a notebook.	Research why the TCP/IP model became the commercial standard over OSI.	CO1
7	I	The 4 Layers of TCP/IP Suite	Deep dive into Application, Transport, Internet, and Network Access layers.	Packet Sniffing Demo: Use Wireshark (or a screenshot) to identify a TCP segment vs. an IP packet.	Define the specific roles of the "Internet" layer in the TCP/IP suite.	CO1
8	I	End-to-End Data Delivery	Trace a web request from the browser to the wire and back up the stack.	The "Ping" Journey: Trace a packet from a laptop to a web server using command-line tools.	Final Review: Create a "Cheat Sheet" summarizing all 8 lessons for the unit exam.	CO1

UNIT-2:- Physical Layer & Transmission Media (8 hours)

9	II	Transmission Principles & Issues	Explain signal attenuation, noise, interference, and bandwidth.	Signal Loss Demo: Use a signal strength app to see how walls and distance affect Wi-Fi dBm.	Define "Signal-to-Noise Ratio" (SNR) and why it matters for speed.	CO2
10	II	Wired Media: Coaxial & Twisted Pair	Differentiate between UTP, STP, and Coaxial; understand "shielding."	Cable Lab: Strip a CAT6 cable to see the twists; compare it to a RG-6 coaxial cable.	Research why "Twisted Pair" wires are twisted (Cancellation effect).	CO2
11	II	Fiber Optic Cables (SMF vs MMF)	Compare Single Mode and Multimode fiber in terms of core size and distance.	Light Path Drawing: Sketch how light bounces in MMF vs SMF.	Create a table comparing the cost and range of OS2 (SMF) vs OM4 (MMF).	CO2
12	II	Wireless Media: HF, VHF, & UHF	Identify frequency ranges and their common uses (AM/FM, TV, Aviation).	Frequency Mapping: Match common devices (walkie-talkies, radio) to their spectrum band.	Explain why lower frequencies (HF) travel further than higher ones.	CO2

13	II	Microwave, Ku Band, & Satellite	Understand line-of-sight transmission and satellite communication bands.	Dish Alignment Sim: Discuss the precision needed for point-to-point microwave links.	Research what "Rain Fade" is and how it affects the Ku Band.	CO2
14	II	WIFI Standards (802.11 a/b/g/n/ac)	Map the evolution of Wi-Fi speeds and frequency bands (2.4GHz vs 5GHz).	Standard Sorting: Create a timeline of Wi-Fi generations from 1997 to 2014.	Which Wi-Fi standard introduced "MIMO" technology? Explain its benefit.	CO2
15	II	Cellular Data: 2G to 5G	Contrast the technical jumps from analog voice (1G/2G) to massive IoT (5G).	Speed Comparison: Discuss the latency differences between a 3G and 5G network.	Define "Network Slicing" and how it is used in 5G architecture.	CO2
16	II	Network Topologies	Compare Star, Bus, Ring, Mesh, and Hybrid layouts.	Build a Map: Design a redundant topology for a hospital.	List the "Single Point of Failure" for each of the 5 main topologies.	CO2
UNIT-3:-Data Link Layer & Layer 2 Technologies(5 hours)						
17	III	DLL Fundamentals & Design Issues	Understand Framing, Flow Control, and Error Detection (CRC/Checksum)	Frame Detective: Students manually calculate a simple parity bit or Checksum for a binary string.	Research the difference between "Stop-and-Wait" and "Sliding Window" flow control.	CO3
18	III	Ethernet (802.3) & MAC Addressing	Explain CSMA/CD, MAC address structure, and Ethernet frame formats.	OUI Lookup: Use a MAC address database to identify the manufacturer of classroom devices.	Explain why Ethernet is considered a "Best Effort" delivery protocol.	CO3
19	III	WLAN (802.11) & Bluetooth (802.15)	Contrast CSMA/CA with CSMA/CD; understand Piconets and Scatternets.	Scenario Debate: Why doesn't Wi-Fi use collision detection like Ethernet?	List the 3 specific frequency bands used by Bluetooth and Wi-Fi.	CO3
20	III	Switching Techniques	Compare Circuit vs. Packet switching; detail Store-and-Forward vs. Cut-through.	Speed Test: Calculate latency for different switching methods.	Write a 1-page summary on why Packet Switching is the foundation of the Internet.	CO3

21	III	VLANs & Trunking (802.1Q)	Understand broadcast domains, VLAN tagging, and the 802.1Q standard.	Logical Mapping: Design a network diagram that separates "Accounting" and "Guest" traffic via VLANs.	Define a "Trunk Port" and explain why it is necessary for inter-switch communication.	CO3
UNIT-4:- NETWORK LAYER (8 Hour)						
22	IV	Network Layer Design Issues	Understand Store-and-Forward switching and Connectionless vs. Connection-oriented services.	Pathfinding: Students act as routers to pass a message across a "human network" without a central map.	Research the difference between "Datagram" and "Virtual Circuit" subnets.	CO4
23	IV	IPv4 Addressing & Subnetting	Master the IPv4 header structure, dotted-decimal notation, and Classless addressing.	Subnetting Lab: Calculate usable IP ranges and Subnet Masks for a small office of 30 hosts.	Convert 192.168.10.5 into binary and identify the Network vs Host portions.	CO4
24	IV	The Transition to IPv6	Explain the "IPv4 Exhaustion" problem and the benefits of the 128-bit IPv6 address.	Address Shortening: Practice compressing long IPv6 addresses using "Double Colon" and "Leading Zero"	Explain the concept of "Dual Stacking" used during IPv4 to IPv6 migration.	CO4
25	IV	Routing Principles & Issues	Understand the Routing Table, Default Gateways, and the "Next Hop" concept.	Table Mapping: Manually build a static routing table for a 3-router diagram.	Define "Convergence Time" and why it is critical for network stability.	CO4
26	IV	Distance-Vector Algorithms	Learn the Bellman-Ford algorithm and how routers share "distance" info with neighbors.	Step-by-Step Simulation: Update neighbor tables as a new link is added to a simulated topology.	Explain the "Count-to-Infinity" problem and how Split Horizon solves it.	CO4
27	IV	Link-State Algorithms	Master Dijkstra's Algorithm (Shortest Path First) and Link-State Advertisements (LSAs).	Shortest Path Lab: Find the lowest-cost path in a complex weighted graph.	Compare the CPU/Memory usage of Distance-Vector vs. Link-State algorithms.	CO4

UNIT-6:-Application Layer Services & Protocols (7 Hours)

34	VI	DNS (Domain Name System)	Explain how domain names map to IP addresses and the hierarchy of DNS.	Nslookup Lab: Use the nslookup command to find IP addresses for websites and identify Mail Servers (MX records).	Research the difference between "Recursive" and "Iterative" DNS queries.	CO6
35	VI	DHCP (Dynamic Host Config)	Understand the DORA process (Discover, Offer, Request, Ack).	Lease Analysis: Check ipconfig /all to see your DHCP server and lease expiration.	Define "DHCP Reservation" and "DHCP Exclusion."	CO6
36	VI	FTP & TFTP	Contrast reliable file transfer (FTP) with simple, fast transfer (TFTP).	FTP Session: Use a command-line FTP client to connect to a public test server and download a file.	Compare the port numbers and security risks of FTP vs. SFTP.	CO6
37	VI	SMTP & Email Protocols	Explain how SMTP sends mail and how POP3/IMAP retrieve it.	Header Analysis: Open the "Original Source" of an email and trace the path it took through various servers.	Create a table comparing POP3 vs. IMAP (Syncing vs. Downloading).	CO6
38	VI	WWW: HTTP & HTTPS	Learn the request/response cycle and the role of SSL/TLS in HTTPS.	Browser DevTools: Use "Inspect" -> "Network" tab to view HTTP Status Codes (200, 404, 500).	Explain the 3-way handshake that happens during an HTTPS connection.	CO6
39	VI	Telnet & SSH	Contrast clear-text (Telnet) with encrypted (SSH) remote access.	Security Demo: Discuss why Telnet is "dangerous" by explaining how passwords can be sniffed in plain text.	Find the default port for SSH and research "Key-based authentication."	CO6
40	VI	SNMP & App Design Issues	Understand network monitoring using Agents and Managers.	Design Review: List the pros/cons of Client-Server vs. P2P architectures.	Research what an "OID" (Object Identifier) is in the context of SNMP MIBs.	CO6

UNIT-7:- Illustrate Networking Devices(5 hours)

41	VII	NIC & Hubs	Understand how individual devices connect to a network and why Hubs are legacy tech.	Collision Simulation: Use a "talking stick" to show how Hubs cause data collisions.	Research the MAC address of 3 devices at home (Phone, PC, Console).	CO7
42	VII	The Switch (Layer 2)	Explain how Switches use MAC addresses to direct traffic efficiently.	The Postman Game: Students act as a Switch, mapping "Port Numbers" to "Student Names."	Write a 1-paragraph comparison: Why is a Switch better than a Hub?	CO7
43	VII	Core, Distribution & Access Switches	Differentiate the three layers of the Cisco Hierarchical Model.	Campus Mapping: Label a diagram of a school network identifying where each switch type lives.	Find a diagram of a "Three-Tier Network Architecture" and label the layers.	CO7
44	VII	Routers (Layer 3)	Understand how Routers connect different networks using IP addresses.	Trace the Route: Use the tracert command in a CMD prompt to see jumps to a website.	Define "Default Gateway" and find your router's local IP address.	CO7
45	VII	WiFi AP & WLC	Explain the role of Access Points and how Controllers manage them at scale.	Heatmap Design: Sketch a floor plan and place APs to ensure 100% signal coverage.	Explain why a large office needs a WLC instead of just "Home Routers."	CO7

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