Program	BACHELOR OF TECHNOLOGY (B.Tech)	**Semester - 4**
Type of Course	Professional Core Course	
Prerequisite		
Rationale	-	
Effective From A.Y.	2025-26	

Teaching Scheme (Contact Hours)				Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
Lecture	Tutorial	Lab	Credit	SEE TH	IAT	SEE P	CCE	
3	0	2	4	70	-	50	-	200

***SEE** - Semester End Examination, **IAT** - Internal Assessment Test, **CCE** - Continues & Comprehensive Evaluation*

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction to Computer Network:**	4	10
	Overview of Computer Networks and Data Communication, Computer Networking Protocols and Standards, Types of Computer Networks, Network Topology, Protocol Hierarchies and Design Issues, Interfaces and Services, Networking Devices, OSI and TCP/IP Reference Models.		
2	**Physical Layer:**	9	20
	Physical Layer Design Issues, Data Transmission Techniques, Multiplexing, Transmission Media, Asynchronous Communication, Wireless Transmission, ISDN, ATM, Cellular Radio, Switching Techniques and Issues.		
3	**Data Link Layer:**	9	20
	LLC Design Issues, Framing, Error and Flow Control, Framing Techniques, Error Control Methods, Flow Control Methods, PPP and HDLC.		
4	**Network Layer:**	9	20
	IPv4, IPv6, Subnetting, Supernetting ,Packet Switching, Datagram & Virtual Circuit,Routing Algorithms: Distance Vector, Link State,Routing Protocols: RIP, OSPF, BGP ,NAT, CIDR,,ICMP, ARP, DHCP,Latest Technologies:5G Network Architecture ,Network Virtualization (NFV)		
5	**Transport and Application Layer:**	9	20
	UDP vs TCP, Congestion Control (TCP Tahoe, Reno, Cubic),QoS Concepts .Socket Programming (intro),DNS, Email Protocols (SMTP, POP3, IMAP) .HTTP/1.1, HTTP/2, Introduction to HTTP/3 (QUIC protocol)Latest Technologies:Zero Trust Architecture ,Encrypted DNS (DNS-over-HTTPS / DNS-over-TLS) ,Modern Content Delivery Networks (CDNs: Cloudflare, Akamai).		
6	**Advance Computer Network Concepts:**	9	20
	Software Defined Networking (SDN),Network Function Virtualization (NFV),SD-WAN (Software Defined Wide Area Network)		
	Total	49	110

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	40	40	20	0	0	0

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

At the end of this course, students will be able to:	
CO1	Explain basic networking concepts, models, devices, and topologies
CO2	Understand transmission techniques, media, wireless communication, and switching.
CO3	Apply data link layer functions and protocols
CO4	Apply network layer concepts, including addressing and routing
CO5	Apply transport and application protocols and modern networking technologies.
CO6	Explain advanced networking technologies such as SDN, NFV, and SD-WAN

CO PO Mapping

CO	CO - 1	CO - 2	CO - 3	CO - 4	CO - 5	CO - 6
PO - 1						
PO - 2						
PO - 3						
PO - 4						
PO - 5						
PO - 6						
PO - 7						
PO - 8						
PO - 9						
PO - 10						
PO - 11						

Reference Books

1.	**"Computer Networking": A Top-Down Approach – James F. Kurose & Keith W. Ross ,9th Edition, 2025. (TextBook)**
2.	**"Data and Computer Communications" – William Stallings ,10th Edition. (TextBook)**
3.	**Computer Networks- A Top-Down Approach** By Behrouz Forouzan | Tata McGraw-Hill Education
4.	**Smart Generation Computing and Communication Networks-Springer, Cham,2025.**
5.	**Data Communications and Networking – Behrouz A. Forouzan, McGraw-Hill ,6th Edition (2022).**

List of Practical	
1.	Understand and identify networking devices (Switch, Router, Hub, Access Point) and simulate network topologies (Bus, Star, Mesh) in Cisco Packet Tracer.
2.	Analyze the functions of OSI and TCP/IP layers using real-life examples (email, web page access, file transfer).
3.	Compare properties of UTP, STP, Fiber, Coaxial cables, and measure transmission characteristics (bandwidth, attenuation).
4.	Implement CRC, checksum, and parity methods in C/Python to detect errors.
5.	To implement Stop-and-Wait and Go-Back-N ARQ mechanisms and demonstrate framing techniques in data communication.
6.	Solve subnetting, VLSM, and CIDR problems; configure IP addresses in Packet Tracer.
7.	Implement simple client-server communication using TCP sockets.
8.	Implement simple client-server communication using UDP sockets.
9.	Capture and analyze DNS queries, HTTP packets, SMTP/POP3 mail flow.
10.	Use a network simulation tool such as GNS3 or Mininet to create a small virtual network and test basic connectivity and routing..