

Course Code CSE3006	Computer Networks	Course Type	Credits
		LTP	4
Objectives			
<ul style="list-style-type: none">• Build an understanding of the fundamental concepts of computer networking, protocols, architectures, and applications• Gain expertise in design, implement and analyze performance perspective of ISO-OSI layered Architecture• Be familiar with the components required to build different types of networks• To learn and understand the principles of routing and protocols of networking• Learn the flow control and congestion control algorithms• Take advanced courses in Networking			
Expected Outcomes			
Students who complete this course will be able			
<ul style="list-style-type: none">• To understand the basic principles of Communication, Networks and Satellite Transponders.• To understand bit rate and baud rate.• To understand the concepts of CSMA/CD, ISDN.• To design sub-netting and enhance the performance of routing mechanisms.• To compare various congestion control mechanisms and identify suitable Transport layer protocol for real time applications.• To identify various Application layer protocols for specific applications.			
Student Outcomes (SO):		c, h, k, l	
Unit No.	Unit Description	No of Hours	SO
1	Introduction: Networking goals, Networking Topologies, Network Architecture - Interfaces and services, ISO-OSI Reference Model, TCP/IP Protocol suite. Comparison of OSI and TCP/IP. Signals: Analog Signals and Digital Signals, Characteristics of Analog Signals, Frequency Modulation (FM), Amplitude, Modulation (AM), Phase Modulation (PM), Quadrature Amplitude Modulation QAM. Encoding and Modulation: Digital to Digital signal conversion, Digital to Analog signal conversion, Analog to Analog signal conversion, Analog to Digital signal conversion	10	c
2	Physical Layer: Transmission Media - Guided Transmission Media – Twisted pair, Coaxial Cable, Fiber Optics , Unguided Media–Radio waves, Microwaves, Infrared. Switching: Packet and Circuit Switching Data Link Layer: Framing, Flow and Error Control, Error Detection and Correction - Types of Errors, Redundancy, LRC, CRC, Checksum. Flow and Error control Protocols: Stop and Wait, Stop and Wait ARQ, Go back-N ARQ, Selective repeat ARQ.	9	c
3	Local Area Network: Ethernet: Multiple Access Links and Protocols – ALOHA, CSMA, CSMA/CD, CSMA/CA. 802.3 IEEE standard, Token Bus: 802.4 IEEE standard, Token Ring: 802.5 IEEE standard, Wireless LAN Protocols.	9	l

	Logical Addressing: IPv4 Addresses, Ipv6 Addresses. INTER Networking Devices: Layer 1 connections- Repeater, Hubs, Layer 2 connections- Bridges, Switches, Layer 3 connections- Routers, Gateways. Unicast Routing Protocols: Distance Vector Routing, Link State Routing. Internet Protocols: Class A, B, C, D, E traffic, IPV4, IPV6. Address Mapping: ARP, RARP- ICMP- IGMP.		
4	Transport Layer: Services, Multiplexing and Demultiplexing, Process to process delivery –User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control Techniques– Congestion Prevention Policies - Quality of services (QoS) – Techniques to improve QoS - Integrated Services.	6	1
5	Principles of Networking Applications: Web, FTP, E-mail, DNS, Peer-to-Peer applications, Creating Networking Applications, Telnet, SNMP, Recent trends in Computer Networks. Recent Trends in Network Security: Cryptography, Substitution and Transposition Ciphers, Data encryption standard (DES), breaking DES, Public Key Cryptography, Network layer security (IPSec), Transport Layer Security (TLS/SSL, HTTPS)	9	c, l
6	Guest Lecture on Contemporary Topics in Data communication and Networks	2	h
	Total Lecture:	45	
Mode of Teaching and Learning: <i>Flipped Class Room, Activity Based Teaching/Learning, Digital/Computer based models, wherever possible to augment lecture for practice/tutorial and minimum 2 hours lectures by industry experts on contemporary topics.</i>			
Mode of Evaluation and Assessment: <i>The assessment and evaluation components may consist of unannounced open book examinations, quizzes, student's portfolio generation and assessment, and any other innovative assessment practices followed by faculty, in addition to the Continuous Assessment Tests and Term End Examination.</i>			
Text Book(s):			
1.	Larry L.Peterson, Bruce S.Davie, Computer Networks: A System Approach, Fifth Edition, 2012.		
2.	James F.Kurose and Keith W.Ross, Computer Networking: A Top-Down Approach, Sixth Edition, Pearson Education, 2013.		
Reference Book(s):			
1.	Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition, McGraw-Hill, 2012.		
2.	Behrouz A.Forouzan, TCP/IP Protocol Suite, 5th Edition, Tata McGraw-Hill, 2012		
3.	W.Richard Stevens, TCP/IP Illustrated, The Protocols, 2nd Edition, Prentice Hall 2012		
4.	Andrew S.Tenanbaum, Computer Networks, Fifth Edition, Prentice Hall, 2012		
No.	Indicative List of Experiments	SO - k	
1	Demo session of all networking hardware and Functionalities		

2	Introduction to Socket Programming, Basic Linux Commands	
3	To study various types of Connectors	
4	LAN installations and their Configuration	
5	To implement various type of error correcting techniques.	
6	To implement various types of DLL protocols.	
7	Imagine two processes communicate across a network. One process running in your local system is web browser and the other process running in the remote system is the web server. Once a connection is established between the web browser and web server, the server's current date and time has to be displayed in web browser. Write a suitable program for this scenario.	
8	A network communication model is created by establishing connection between a client and a server. The connection is also guaranteed by transferring client's IP address to the server and displays it in the server's premises. Write a program for the above situation.	
9	Consider two processes client and server communicates across a network. The client sends a message to the server in the request and the server responds with the same message. Write a Socket program for the above mentioned scenario.	
10	To study various TCL commands.	
11	The message entered in the client is sent to the server and the server encodes the message and returns it to the client. Encoding is done by replacing a character by the character next to it.(i.e.) a as b, b as c...z as a.	
12	Packet Tracer: Observing Packets across the network and Performance Analysis of Routing protocols	
Recommendation by the Board of Studies on		<i>18.06.2020</i>
Approval by Academic council on		<i>29.06.2020</i>
Compiled by		<i>Dr Sandip Mal</i>