

Branch: B.Sc.(IT)	Semester-III
Subject Code: 3103	Lecture: 04 Credit: 04
Course Opted	Core Course - 9
Subject Title	COMPUTER NETWORKS

Course Objectives:

- To study TCP/IP & OSI protocol suites
- To develop an understanding of computer networking basics
- Learn how computer network hardware and software operate
- Investigate the fundamental issues of network design
- To develop an understanding of different components of computer networks, various protocols, modern technologies and their application
- Students will be able to describe and execute network administrator duties and utilities.

Course Outcomes:

- Characterize and appreciate computer networks from the view point of components and from the view point of services
- Display good understanding of the flow of a protocol in general and a network protocol in particular
- Model a problem or situation in terms of layering concept and map it to the TCI/IP stack
- Select the most suitable Application Layer protocol (such as HTTP, FTP, SMTP, DNS, Bit torrent) as per the requirements of the network application and work with available tools to demonstrate the working of these protocols.
- Design a Reliable Data Transfer Protocol and incrementally develop solutions for the requirements of Transport Layer.
- Recognize transport layer services and infer UDP and TCP protocols
- Classify routers, IP and Routing Algorithms in network layer
- Describe the essential principles of Network Layers and use IP addressing to create subnets for any specific requirements
- Understand the Wireless and Mobile Networks covering IEEE 802.11 Standard
- Describe Networking and Network Management
- To understand various protocols for network security to protect against the threats in the networks.

Modules	Sr. No.	Topic and Details	No of Lectures Assigned	Marks Weightage %
UNIT - I	1	Introduction to Computer Networks: Introduction: Definition of a Computer Network; What is a Network? Components of a computer network: Use of Computer networks; Networks for companies, Networks for people, Social Issues: Classification of networks; Based on transmission technology, Based on their scale, Local area networks, Metropolitan area networks, Wide area networks, Wireless network.	4	8
	2	Data Communications: Introduction: basis for communication, Transmission impairments; Attenuation distortion, Delay distortion, Dispersion, Noise: Data transmission modes; Serial & Parallel, Simplex, Half duplex & full duplex, Synchronous & Asynchronous transmission	3	6

	3	Network Software & Network Standardization: Introduction: Networks Software; Protocol hierarchy, Design issues for the layers, Merits and De-merits of Layered Architecture, Reference models; The OSI Reference Model, The TCP/IP Reference Model, Comparison of the OSI & the TCP/IP Reference Models	5	10
UNIT - II	4	Physical layer- Transmission media-guided and Unguided, Switching systems- Circuit switching, Datagram Switching & Virtual circuit switching, Example of networks- X.25, Frame Relay & ATM, cable modem and DSL technologies	4	8
	5	Data link layer: Framing, Flow & Error control Protocols, Multiple access techniques-random access, controlled access & Channelization, Ethernet types-bridged, Switched, Full duplex, Fast & gigabit Ethernet. Introduction to Data link layer in 802.11 LAN, Connecting devices like passive hubs, repeaters, Active hubs, Bridges, Two-layer Switches, Routers, three layer switches, Gateway etc., Backbone networks, Virtual LANs. MAC Sub layer: MAC Addressing	5	10
	6	Network Layer and Transport Layer Network Layer: IPv4 address, IPv6 address, Address mapping-ARP, RARP & DHCP, IPv4 datagram detail format, IPv6 datagram detail format, ICMP, Network layer issues like Delivery, forwarding, Intradomain and Interdomain routing, Routing algorithms like Shortest path routing, Flooding, Distance Vector Routing, Link State Routing, Path vector routing etc., IP address security threats : Social engineering, Online stalking. Transport layer-Process to process delivery, Connection oriented & Connectionless Transport, UDP, TCP, congestion control and Quality of Service	5	10
	7	Application layer Application layer protocols and applications like Ping, FTP, telnet, http (www), SMTP, SNMP, Trace route, TFTP, BOOTP, DNS, X-server, E-mail, Introduction to streaming Audio/Video, P2P file sharing, Introduction to socket	3	6
UNIT - III	8	Basics of Network Security: Network security: Introduction to Cryptography, Secret key algorithm, public key algorithm, Basics of Security Requirements/Services/Dimensions, Basics of Security attacks, Basics of Security mechanisms / solutions	5	10
	9	Network Administration: UTP Cabling for PC-to-PC communication, Network tester, network monitoring, internet access through Dialup/DSL/Leased Line/Mobile handset.	3	6
	10	Overview of Network Security: Elements of Network Security , Classification of Network Attacks ,Security Methods ,Symmetric-Key Cryptography :Data Encryption Standard (DES),Advanced Encryption Standard (AES) , Public-	5	10

		Key Cryptography ,Hash Function , Secure Hash Algorithm (SHA) , Digital Signatures , Firewalls and Packet Filtering ,Packet Filtering , Proxy Serve		
UNIT - IV	11	Wireless and Mobile Networks: Introduction, Wireless Links and Network Characteristics: CDMA, iFi:802.11 Wireless LANs: The 802.11 Architecture, The 802.11 MAC Protocol, The IEEE 802.11 Frame, Mobility in the Same IP Subnet, Advanced Features in 802.11, Personal Area Networks: Bluetooth and Zigbee, Cellular Internet Access	8	16
	12	Case Study Study of Different Type of LAN& Network Equipment, Implementation of ipv4 and v6 design on the college network and Study and Verification of standard Network topologies i.e. Star, Bus, Ring etc.		
TOTAL			50	100

Text Book:

1. A.S. Tannenbaum ,”Computer Networks”, 4th edition Prentice hall of India

Reference Books:

1. Behrouz A. Forouzan (2006), Data communication and Networking, 4th Edition, Mc Graw-Hill, India
2. Wireless Communications & Networks , William Stallings
3. Cryptography and Network Security , Atul Kahate