

Subject Code: 01CT0503

Subject Name: Computer Networks

B. Tech. Year – III (Semester V)

Objectives: The objective of this course is to understand the significance and concepts of computer networks, to conceptualize and appreciate the layered model for computer networking. The course also provides insights to basic protocols and design issues for layered model, leading to design and implementation of protocols related to various networking layers.

Credits Earned: 04 Credits

Course Outcomes: After completion of this course, student will be able to:

1. Understand the functionality of various protocols, models and networks (Understand).
2. Analyze various flow and error control algorithms (Analyze).
3. Analyze different medium access protocols and network hardware component (Analyze).
4. Compare various static and dynamic routing protocol (Analyze).
5. Understand various transport services, protocols and application layer functionalities (Understand).
6. Built and test various network topologies and routing protocols for various networks scenarios (Apply).

Pre-requisite of course: Introduction to Communication Engineering, Analog and Digital Communication

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
3	0	2	4	50	30	20	25	25	150

Contents:

Unit	Topics	Contact Hours
1	Introduction Use of Computer Networks, Network Hardware, Network Software, OSI and TCP/IP Reference Model, Example Networks and standards.	03

2	Data Link Layer Types of error, Error-Detection and correction, Flow and Error Control, Elementary Data link Protocols, Sliding window Protocols, HDLC, Example of data link protocols.	07
3	Medium Access Control Sub layer Multiple Access Protocols, LANs Ethernet, Wireless LANs, Local Area Networks, Connecting Devices, Backbone Network, Virtual LANs.	09
4	Network Layer Network layer design issues, Routing Algorithms, Congestion Control Algorithms, QoS, Internetworking, Network Layer in the Internet.	09
5	Transport Layer The transport Service, Elements of transport protocol, congestion control, Internet transport protocol UDP, TCP.	10
6	Application Layer Domain Name System, E -mail, World Wide Web, Multimedia.	04
Total Hours		42

Suggested Text books / Reference books:

1. Andrew S. Tanenbaum, 1st edition, Computer Networks PHI **Total Hours** Publication
2. Computer Networking- A Top-Down approach, 5th edition, Kurose and Ross, Pearson
3. Forouzan, Data Communication Networking, Reprint, TMH Publication
4. Forouzan, TCP/IP Protocol suit, Reprint, TMH Publication
5. William Stallings, Data and computer Communication, Reprint, Pearson

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
25%	20%	30%	15%	5%	5%

Suggested List of Experiments:

Minimum 12 experiments to be performed during the semester

1. Briefing of Network Simulator
 - a) Introduction, Features and Network supported by NS2
 - b) Platform required to run Network Simulator



- c) Backend Environment of Network Simulator
 - d) Installation steps of NS-2 in Ubuntu 14.04LTS
2. To perform TCL Script using basic TCL Syntax, looping, conditional check, functions, execution of Mathematical Operations and Execution of Unix Command
3. Introduction to TCL script in which it takes number N from user and prints factorial— use function call.
4. Introduction to TCL script in which it Implement Basic Calculator operation in TCL- use function Call.
5. Simulation of Wired topology of 4 Node
6. Creating Output files for X-graph, analyze and plot received traffic from 3 nodes.
 - a) data rate
 - b) delay
 - c) speed of link
 - d) size of data
7. Creating Wireless Simulation on NS to analyze the effects error on one link v/s behavior of Sliding Window Size
8. Introduction to Cisco Packet Tracer and configuring various network devices, hosts & transmission media.
9. Configuration of DHCP Server in Packet Tracer Software and analysis of DHCP messages.
10. Configuration of HTTP Server in Packet Tracer Software and analysis of HTTP request & response messages.
11. Study of basic network commands.
12. Study of Network devices configuration commands.
13. Configure Link State Vector Routing (e.g., OSPF) in Packet Tracer Software.
14. Configure Distance Vector Routing (e.g., RIP) in Packet Tracer Software.
15. Installation of NS3 in Linux and
 - a) Program in NS3 to connect two nodes.
 - b) Program in NS3 for connecting three nodes considering one node as a central node.
16. Program in NS3 to implement star topology. Program in NS3 to implement a bus topology.
17. Perform dynamic routing protocol (RIP) and analyse the results.

Supplementary Resources:

1. <https://study-ccna.com/eigrp-overview/>
2. <https://www.netacad.com/>
3. <https://www.computernetworkingnotes.com/>
4. <https://www.isi.edu/nsnam/ns/>