

COURSE TITLE	COMPUTER NETWORKS
COURSE CODE	01CT0503
COURSE CREDITS	4

Objective:

- 1 The main objective to give the course Computer Network is
 - 1.After successful completion of this course, student will be able to understand the significance and concepts of computer networks
 - 2.Conceptualize and appreciate the layered model for computer networking
 3. Identify basic protocols and design issues for layered model.
 - 4.design and implement protocols related to various networking layers
- 2 The main objective to give the course Computer Network is 1.After successful completion of this course, the student will be able to understand the significance and concepts of computer networks
 - 2.Conceptualize and appreciate the layered model for computer networking
 3. Identify basic protocols and design issues for layered model.
 - 4.design and implement protocols related to various networking layers
- 3 The main objective to give the course Computer Network is .After successful completion of this course, the student will be able to 1.understand the significance and concepts of computer networks 2.Conceptualize and appreciate the layered model for computer networking 3. Identify basic protocols and design issues for layered model. 4.design and implement protocols related to various networking layers
- 4 1. After successful completion of this course, student will be able to understand the significance and concepts of computer networks.
 2. Conceptualize and appreciate the layered model for computer networking.
 3. Identify basic protocols and design issues for layered model.
 4. design and implement protocols related to various networking layers.
- 5 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.
- 6 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 coursealso provides insights to basic protocols and design issues for layered model, leading to design and implementation of protocols related to various networking layers.

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

- 1 Understand the functionality of various protocols, models and networks.
- 2 Analyze various flow and error control algorithms
- 3 Analyze different medium access protocols and network hardware component.
- 4 compare various static and dynamic routing protocol.
- 5 Understand various transport services, protocol and application layer functionalities.

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

- Built and test various network topologies and routing protocols for various networks scenarios.

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

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Unit 1: Introduction: Use of Computer Networks, Network Hardware, Network Software, Example Networks and standards, OSI and TCP/IP Reference Model, Example Networks and standards.	3
2	Unit 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, Example of data link protocols continue..	7
3	Unit 3: Medium Access Control Sub layer Multiple Access Protocols, LANs, Ethernet, Wireless LANs, Local Area Networks, Connecting Devices, Backbone Network, Virtual LANs	9
4	Unit 4: Network Layer Network layer design issues, Network layer design issues (Conti..), Routing Algorithms, Routing Algorithms (Conti..), Congestion Control Algorithms, Congestion Control Algorithms (Conti..), QoS, QoS (Conti..), Internetworking, Network Layer in the Internet	9
5	Unit 5: Transport Layer The transport Service, The transport Service (Conti..), Elements of transport protocol, Elements of transport protocol (Conti..), congestion control, congestion control (Conti..), Internet transport protocol: UDP, TCP, Internet transport protocol: UDP, TCP (Cont..)	10
6	Unit 6: Application Layer Domain Name System, E-mail, World Wide Web, Multimedia	4
Total Hours		42

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Briefing of Network Simulator Briefing of Network Simulator Introduction , Features and Network supported by NS2 Platform required to run Network Simulator Backend Environment of Network Simulator Installation steps of NS-2 in Ubuntu 14.04LTS	2
2	To perform TCL Script using basic TCL Syntax, looping, conditional check, functions, execution of Mathematical Operations and Execution of Unix Command To perform TCL Script using basic TCL Syntax, looping, conditional check, functions, execution of Mathematical Operations and Execution of Unix Command	2
3	Introduction to TCL script in which it takes number N from user and prints factorial—use function call. Introduction to TCL script in which it takes number N from user and prints factorial—use function call.	2
4	Introduction to TCL script in which it Implement Basic Calculator operation in TCL-use function Call. Introduction to TCL script in which it Implement Basic Calculator operation in TCL-use function Call.	2
5	Simulation of Wired topology of 4 Node Simulation of Wired topology of 4 Node	2
6	Creating Output files for X-graph Analyzing and plotting received traffic from 3 nodes. -data rate -delay -speed of link -size of data Creating Output files for X-graph Analyzing and plotting received traffic from 3 nodes. -data rate -delay -speed of link -size of data	2
7	Creating Wireless Simulation on NS to analyze the effects error on one link v/s behavior of Sliding Window Size Creating Wireless Simulation on NS to analyze the effects error on one link v/s behavior of Sliding Window Size	2
8	Introduction to Cisco Packet Tracer and configuring various network devices, hosts & transmission media. Introduction to Cisco Packet Tracer and configuring various network devices, hosts & transmission media.	2
9	Configuration of DHCP Server in Packet Tracer Software and analysis of DHCP messages. Configuration of DHCP Server in Packet Tracer Software and analysis of DHCP messages.	2
10	Configuration of HTTP Server in Packet Tracer Software and analysis of HTTP request & response messages. Configuration of HTTP Server in Packet Tracer Software and analysis of HTTP request & response messages.	2
11	Study of basic network commands. Study of basic network commands.	2
12	Study of Network devices configuration commands. Study of Network devices configuration commands.	2

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
13	Configure Link State Vector Routing (e.g. OSPF) in Packet Tracer Software. Configure Link State Vector Routing (e.g. OSPF) in Packet Tracer Software.	2
14	Configure Distance Vector Routing (e.g. RIP) in Packet Tracer Software. Configure Distance Vector Routing (e.g. RIP) in Packet Tracer Software.	2
15	Installation of NS3 in Linux. Program in NS3 to connect two nodes. Program in NS3 for connecting three nodes considering one node as a central node. Installation of NS3 in Linux. Program in NS3 to connect two nodes. Program in NS3 for connecting three nodes considering one node as a central node.	2
16	Program in NS3 to implement star topology. Program in NS3 to implement a bus topology. Program in NS3 to implement star topology. Program in NS3 to implement a bus topology.	2
17	Perform dynamic routing protocol (RIP) and analyse the results. Perform dynamic routing protocol (RIP) and analyse the results.	2
18	Perform dynamic routing protocol (OSPF) and analyse the results. Perform dynamic routing protocol (OSPF) and analyse the results.	2
19	Design WAN with subnetting. Design WAN with subnetting.	2
20	Configure DHCP server. Configure DHCP server.	2
21	Simulate VLAN and verify the VLAN concepts the results. Simulate VLAN and verify the VLAN concepts the results.	2
22	Monitor the live/real time network and analyse the concepts of various networking protocols like IP, TCP, UDP, etc. Monitor the live/real time network and analyse the concepts of various networking protocols like IP, TCP, UDP, etc.	2
23	Monitor the live/real time network and analyse the concepts of various networking protocols like ARP, RARP, DHCP, HTTP, etc. Monitor the live/real time network and analyse the concepts of various networking protocols like ARP, RARP, DHCP, HTTP, etc.	2
24	Design and simulate IoT scenario. Design and simulate IoT scenario.	2
Total Hours		48

Textbook :

- 1 Data Communication Networking, Forouzan, Behrouz A., Tata McGraw-Hill Publishing Company Limited, 2007

References:

- 1 Computer Networks, Computer Networks, Andrew S. Tanenbaum, PHI Publication, 2010
- 2 Computer Networking- A Top-Down approach, Computer Networking- A Top-Down approach, Kurose and Ross, Pearson, 2022
- 3 TCP/IP Protocol suit, TCP/IP Protocol suit, Forouzan, Behrouz A., McGraw Hill Education, 2017
- 4 data and computer communications, data and computer communications, William Stallings, Pearson, 2017

Suggested Theory Distribution:

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

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
25.00	20.00	30.00	15.00	5.00	5.00

Instructional Method:

- 1 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- 2 Practical examination will be conducted at the end of the semester for evaluation of performance of students in laboratory.
- 3 Students may use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory, etc.
- 4 The course delivery method will depend upon the requirement of content and need of the students. The teacher in addition to conventional teaching method (Chalk and Talk) may use any of the tools such as demonstration, role play, Quiz, brainstorming, Flipped class, Project based learning, Collaborative learning, MOOCs etc. for effective teaching.

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/>
- 5 <https://nptel.ac.in/courses/106/105/106105081/>