

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COMPUTER NETWORKS

Course Code: 22CSE103

Credits: 03

L: T: P: 2:0:2

Contact Hours: 60

Prerequisite: “Basics of data structures and Programming for problem solving”.

CA: UE: 50:50

Course Objectives:

- To make the students comfortable with a general overview and fundamentals of computer networks.
- Familiarize with the standard models for the layered approach in a network and the protocols of the various layers.

Course Outcomes

| Course Outcome | Description | Blooms Taxonomy Level |
|----------------|---|-----------------------|
| CO1 | understand general overview of the concepts and fundamentals of computer networks | Understanding (2) |
| CO2 | Explain the standard models for the layered approach and the protocols of the various layers. | Understanding (2) |
| CO3 | Understanding of subnetting and routing mechanisms | Understanding (2) |
| CO4 | Demonstrate the various protocols at network layer. | Applying (3) |
| CO5 | Comparison between TCP and UDP protocols at transport layer | Analysing (4) |
| CO6 | Design of an application layer protocol. | Create (6) |

Course Contents:

UNIT – I

[12hr]

Basics of computer network like hardware, software, OSI model, TCP/IP Reference models, ARPANET, Internet.

Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wireless transmission.

UNIT – II

[12hr]

Data link layer: Various Design issues, Error detection and correction. Data link protocols, Example data link protocols. Medium Access sub layer: The channel allocation problem, Multiple access protocols: ALOHA, CSMA/CDMA protocols, collision free protocols. Wireless LANs, Data link layer switching.

UNIT – III

[12 hr]

Network Layer: Various Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet.

UNIT – IV

[12hr]

Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

UNIT – V

[12hr]

Application Layer –Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

TEXT BOOK:

1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.
3. Behrouz A. Forouzan (2006), Data communication and Networking, 4th Edition, Mc Graw-Hill, India.
4. Kurose, Ross (2010), Computer Networking: A top down approach, Pearson Education, India

Tools

NS3, Packet Tracer/ GNS3

List of Experiments

1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
3. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.
4. Implement Dijkstra's algorithm to compute the shortest path through a network
5. Implement distance vector routing algorithm for obtaining routing tables at each node.
6. Write a program for congestion control using Leaky bucket algorithm.
7. Write a program for frame sorting technique used in buffers.
8. Wireshark

- a) Packet Capture Using Wire shark
 - b) Starting Wire shark
 - c) Viewing Captured Traffic
 - d) Analysis and Statistics & Filters.
9. Explain and run Nmap scan
 10. Operating System Detection using Nmap
 11. Do the following using NS3 Simulator
 - a) NS3 Simulator-Introduction
 - b) Simulate to Find the Number of Packets Dropped
 - c) Simulate to Find the Number of Packets Dropped by TCP/UDP
 - d) Simulate to Find the Number of Packets Dropped due to Congestion
 - e) Simulate to Compare Data Rate& Throughput.
 - f) Simulate to Plot Congestion for Different Source/Destination
 - g) Simulate to Determine the Performance with respect to Transmission of Packets

Bloom's Taxonomy-Revised

| LEVEL | DESCRIPTION | MEANING | ACTION VERBS |
|-------|---------------|--|---|
| 6 | Creating | Can the student create a new product or POV? | Assemble, construct, create, change, combine, compose, design, develop, formulate, invent, modify, organize, propose, theorize, write |
| 5 | Evaluating | Can the student justify a stand or decision? | Appraise, agree, assess, argue, conclude, decide, defend, judge, prioritize, prove, rate, recommend, select, support, value |
| 4 | Analyzing | Can the student distinguish between different parts? | Contrast, compare, criticize, differentiate, discriminate, dissect, distinguish, examine, experiment, operate, question, simplify, test |
| 3 | Applying | Can the student use information in a new way? | Choose, demonstrate, dramatize, employ, illustrate, interpret, schedule, sketch, solve, use |
| 2 | Understanding | Can the student explain ideas and concepts? | Classify, describe, discuss, explain, identify, infer, locate, outline paraphrase, recognize, report, summarize, select, translate |
| 1 | Remembering | Can the student recall or remember information? | Define, duplicate, find, list, label, match, memorize, name, omit, recall, repeat, state, spell, tell |