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Course Code: CSE322

COMPUTER NETWORKING PRINCIPLES & COMPONENTS

Course Objective:

This course will help the learner to identify types of network topologies & protocols and to gain expertise in specific areas of networking such as design and maintenance of individual networks

UNIT - I

12 Periods

Introduction: Uses of computer networks - Transmission Modes: Serial and Parallel - Synchronous, Asynchronous and Isochronous - Simplex, Half duplex and full duplex - **Data communication Components:** Representation of data and its flow, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media - **LAN:** Wired LAN, Wireless LAN, Virtual LAN - **Techniques for Bandwidth utilization:** Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

UNIT - II

11 Periods

Data Link Layer: Fundamentals of Error Detection and Error Correction, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go-back-N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols - Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA

UNIT - III

11 Periods

Network Layer: Switching, Logical addressing - IPV4, IPV6; Address mapping - ARP, RARP, BOOTP and DHCP-Delivery, Forwarding and Unicast Routing protocols - **Transport Layer:** Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service (QoS), QoS improving techniques - Leaky Bucket and Token Bucket algorithms

UNIT - IV

11 Periods

Application Layer: DNS, DDNS, TELNET, EMAIL, FTP, WWW, HTTP, SNMP, Bluetooth, Firewalls - **Network Security:** Electronic mail, directory services and network management, Basic concepts of Cryptography.

TEXT BOOKS

1. Andrew S Tanenbaum, David J. Wetherall, *Computer Networks*, Pearson Education, Fifth Edition, 2010.
2. Charlie Kaufman, Radia Perlman, Mike Speciner, *Network Security: Private Communication in a Public World*, Prentice Hall Series in Computer Networking and Distributed Systems, 2002.

REFERENCES

1. Larry L Peterson, Bruce S. Davie, *Computer Networks: A Systematic Approach*, Elsevier, Fifth Edition, 2011.
2. William Stallings, *Data and Computer Communications*, Pearson Education, Tenth Edition, 2014.

ONLINE MATERIALS

1. http://nptel.ac.in/courses/IIT-MADRAS/Computer_Networks/index.php
2. [http://nptel.ac.in/courses/Webcourse - contents/IIT%20Kharagpur/Computer%20networks/ New_index1.html](http://nptel.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Computer%20networks/New_index1.html)
3. <http://nptel.ac.in/courses/106105081/>

LEARNING OUTCOMES

The learner will be able to

Unit I	<ul style="list-style-type: none">• Discuss about the networking principles and its Quality of Service parameters• Demonstrate the physical layer functionalities
Unit II	<ul style="list-style-type: none">• Describe link layer functionalities and classify various multiple link access protocols• Demonstrate the appropriate MAC layer protocol for a given medium
Unit III	<ul style="list-style-type: none">• Discuss the issues in designing network layer protocols with QoS support.• Assemble Internet- Transport layer services and its significance in networking
Unit IV	<ul style="list-style-type: none">• Demonstrate the application layer functionalities• Discuss about the basic network security concepts

COURSE LEARNING OUTCOMES

Upon successful completion of this course, the learner will be able to

- Analyse the networking principles and various network QoS metrics
- Demonstrate link layer functionalities and multiple link access methods
- Compare various routing protocols in the network layer and evaluate Internet packet formatting and forwarding
- Criticise Transport layer services in Internet and evaluate TCP congestion and flow control mechanisms
- Discuss about various application layer protocols
- Discuss about the basic network security concepts