Data Communication and Networking

Course Code: CS44 **Credits: 4:0:0**
Prerequisites: Nil **Contact Hours: 56**
Course Coordinator/s: Sanjeetha R
Course Contents:

Unit 1

Data Communications, Networks, Network Types, Network Models: TCP/IP Protocol Suite, The OSI Model.

Application Layer: The Web and HTTP: Overview of HTTP, Non-Persistent and Persistent Connections, HTTP Message Format, User-Server Interaction-Cookies, Web Caching, The Conditional GET. File Transfer- FTP: FTP Commands and Replies, Electronic Mail in the Internet: SMTP, Comparison with HTTP, Mail Access Protocols. DNS—The Internet's Directory Service: Services Provided by DNS, Overview of How DNS Works, DNS Records and Messages, Peer-to Peer Applications: P2P File Distribution.

Unit 2

Transport layer: Multiplexing and Demultiplexing, Connectionless Transport-UDP: UDP Segment Structure, UDP Checksum, Go-Back-N, Selective Repeat, Connection-Oriented Transport-TCP: The TCP Connection, TCP Segment Structure, Round-Trip Time Estimation and Timeout, Reliable Data Transfer, Flow Control, TCP Connection Management, TCP congestion control.

Unit 3

Network Layer: Internet Protocol Version 4: IPv4 Addressing, Main and Auxiliary protocols, **Routing Algorithms:** Distance-Vector (DV) Routing, Link-State Routing. Unicast Routing Protocols: Internet Structure, Routing Information Protocol, Open Shortest Path First, Border Gateway Protocol version 4.

Unit 4

Data-Link Control: Framing: Character-Oriented Framing, Bit-Oriented Framing. Error Control: Types of Errors, Block Coding: Error Detection, Hamming Distance, Linear Block Codes: Parity-Check Code. Cyclic Codes: Cyclic Redundancy Check. Two DLC Protocols: Point-to-Point Protocol, Link Control Protocol Media Access Control – Random Access-CSMA/CD, CSMA/CA, Controlled access.

Local Area Network: Ethernet: Standard Ethernet, WIFI, IEEE 802.11 project.

Unit 5

Physical layer: Signals - Analog signals, Digital signals. Signal Impairment -Attenuation and Amplification, Distortion, Data Rate Limits, Performance. Digital Transmission - Digital-to-Digital Conversion, Analog-to-Digital Conversion. Analog Transmission- Digital-to-Analog Conversion, Analog-to-Analog Conversion. Multiplexing: Frequency-Division Multiplexing, Time-Division Multiplexing.

Text Books:

1. Data Communications and Networking with TCP/IP Protocol Suite, Behrouz A.Forouzan, McGraw Hill, 6th Edition, 2021.
2. James F. Kurose and Keith W. Ross: Computer Networking: A Top-Down Approach, 8th edition, Addison-Wesley, 2021.

Reference Books:

1. Data and Computer Communication, William Stallings, 10th Edition, Pearson Education, 2017.

2. Larry L. Peterson and Bruce S Davie: Computer Networks: A Systems Approach, Fifth Edition, Elsevier, 2011.
3. Tanenbaum: Computer Networks, 4th Ed, Pearson Education/PHI, 2018.

Course Outcomes:

At the end of the course, the students will be able to:

1. Describe the various application layer protocols used by TCP/IP reference model. (PO-1, 2, 3, 4,10, PSO1).
2. Differentiate between connection oriented and connection less services of transport layer (PO-1, 2, 3, 4,10, PSO1).
3. Solve problems of IP addressing and routing using various routing protocols and algorithms. (PO-1, 2, 3, 4,10, PSO1).
4. Illustrate error control and media access control protocols of data link layer (PO-1, 2, 3, 4,10, PSO1).
5. Discuss different types of data transmission techniques. (PO-1, 2, 3, 4,10, PSO 1).