

Elective-1

ADVANCED COMPUTER NETWORKS

Subject Code: CS35121CS	Subject Type: DE (Elective-1)	Evaluation Scheme: MSE (30), TA (20), ESE (50)	L-T-P: 2-0-2 (3)
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Pre-Requisites: Computer Fundamentals, Computer Architecture, Operating Systems

Course Objective: To enable students to understand and apply Network Addressing, Communication protocols, and Routing Algorithms.

Course Outcomes: At the end of the course, the student will be able to

CO	Course Outcomes
CO-1	Understand the reference models, and layer functionalities of Network
CO-2	Demonstrate the key challenges of Channel Allocation, and various solutions
CO-3	Develop customized Routing algorithms, IP addressing, and subnet masking
CO-4	Analyze Data Center Networking (DCN), and IoT communication and data exchange protocols

Syllabus:

Unit-1: Introduction, Reference Models and Physical Layer

Introduction, Reference Models (TCP & IP), Software Defined Networking (SDN) & ATM Networks, Physical Layer - Transmission Media, Switching Techniques, Data link layer – Framing, Error Detection, Correction & Flow control.

Unit-2: Channel Allocation and MAC Protocols

Channel Allocation Problem, Fundamentals of MAC Protocols – CSMA/CD, CSMA/CA, Token Bus & Token Ring. MAC Protocols for WSNs: Schedule-Based Protocols, Random Access-Based Protocols, Coordination, Schedule Synchronization, Adaptive Listening, Access Control and Data Exchanges.

Unit-3: Routing and IP Addressing

Structure of a Router, Subnet, Building a Routing Table, Static Routing, Dynamic Routing Distance Vector Routing Algorithm, Link State Routing (OSPF), Hierarchical Routing. IP addressing & classes, Subnet masking, Algorithms for IP address lookup and optimization, hardware implementation of address lookup, Differentiated Service, Quality of Service, Traffic Polishing, Traffic Shaping.

Unit-4: WSN, NFV, Data Center Networking and IoT

WSN - Low-Energy Adaptive Clustering Hierarchy, Power-Efficient Gathering in Sensor Information Systems, Geographical Routing Directed Diffusion. Network Function Virtualization (NFV) - Architecture and Concepts, Data Center Networking (DCN) – SAN & NAS architectures. Introduction To: IoT Data Transmission Protocols - MQTT, CoAP, DDS, AMQP. Network Access & Wireless Protocols - LoRaWAN, Zigbee/Z-Wave, Bluetooth Low Energy (BLE).

Learning Resources:

Text Books:

1. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, Keith W. Ross, Fifth Edition, Pearson Education, 2012.
2. Computer Networks: A Systems approach, Larry L. Peterson & Bruce S. Davie, 5E, Elsevier, 2012.
3. Computer Networks: A Top-Down Approach, Behrouz A. Forouzan, Firoz Mosharaf, Tata McGraw Hill, 2012.
4. Holger Karl and Andreas Wiling, Protocols and Architectures for Wireless Sensor Networks, John Wiley & Sons.
5. Raj Kamal, Internet of Things: Architecture and Design Principles, McGraw Hill Education, 2017.