SILVER OAK UNIVERSITY

Engineering and Technology (M.Tech.)
Electronics & Communication (Communication Systems Engg)
Subject Name: Advanced Communication Networks
Subject Code:
Semester: II

Prerequisite: Basics of Computer hardware, Computer software, data Communication and computer networks

Objective: Students of EC Engineering need to possess good understanding of the advancements in networking and various networking standards and protocols. This course imparts a unified system view of the broad field of advanced computer communications. The fundamental principles of advanced communications networks and protocols are thoroughly presented and applied in data communication networking.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Evaluation Scheme				Total Marks
				Internal		External		
L	T	P	C	Th	Pr	Th	Pr	
3	0	2	4	40	20	60	30	150

Content:

Unit No.	Course Contents	Teaching Hours	Weightage %
1	**Functional Elements and Current Practice in Networking:** Networking as Resource Sharing, Analogy with the Operating System of a Computer, The Functional Elements: Multiplexing, Switching, Routing, Network Management, Traffic Controls and Timescales, Current Practice: Network Infrastructure, Networking Architectures, Telephone and ISDN Networks, X.25 and Frame Relay Networks, The Internet, and Asynchronous Transfer Mode (ATM) Networks.	10	25
2	**Wireless Networks:** Bits over a Wireless Network, TCP Performance over Wireless Links, Adaptive and Cross-Layer Techniques, Random Access: Aloha, S-Aloha, and CSMA/CA, Wireless Local Area Networks, Wireless Ad Hoc Networks, Link Scheduling and Network Capacity, Scheduling Constraints, Centralized Scheduling, Capacity of a WANET, Wireless Sensor Networks: An Overview.	8	25

3	**Packet Processing:** Addressing and Address Lookup, Addressing, Addressing in IP Networks: Subnets and Classless Inter domain Routing, Efficient Longest Prefix Matching: Level-Compressed Tries, Hardware-Based Solutions, Packet Classification	7	20
4	**Admission control in Internet.** Concept of Effective bandwidth. Measurement based admission control. Differentiated Services in Internet (DiffServ). DiffServ architecture and framework	7	15
5	IPV4, IPV6, IP tunnelling, IPswitching and MPLS,Overview of IP over ATM and its evolution to IP switching. MPLS architecture and framework. MPLS Protocols. Traffic engineering issues in MPLS.	7	15

Course Outcome:

Sr. No.	CO statement	Unit No
CO-1	Awareness advancement and bottlenecks in the conventional technologies	1,2
CO-2	Awareness and possibilities in Real Time Communication techniques.	3,4
CO-3	Identify the possibilities with scheduling techniques in networking.	1,4,5
CO-4	Learn Packet classification and control techniques for networking.	3,5
CO-5	Analyzethe techniques used for authentication in networking.	2,5

Teaching & Learning Methodology: -

1. Direct Instruction
2. Flipped Classrooms
3. Kinesthetic Learning
4. Context-Based Learning
5. Adaptive Teaching

List of Experiments/Tutorials:

1. Basics of Network Simulation Introduction | Platform required to run network simulator | Backend Environment of Network Simulator | Basics of Tcl Programming for NS-2 | Agents and applications | Tracing

2. Simulating a Local Area Network Local Area Network | LAN Topologies | MAC Protocols | Taking turns | Ethernet | Ethernet Frame Structure | Ethernet Versions | Simulating a LAN using Network Simulator 2

3. Measuring Network Performance Network Performance Evaluation | Performance Evaluation Metrics | Parameters Affecting the Performance of Networks | Performance Evaluation Techniques | Network Performance Evaluation using NS-2

4. Simulation of a Satellite Network Satellite | Simulating a Satellite network in ns2 | Geostationary satellite nodes | Terminal nodes | Polar orbiting satellite nodes(Non-geostationary satellite) | Satellite links | Handoffs | Routing | Structure of trace files in Satellite network

5. Simulating a Wireless Sensor Network Wireless Sensor Networks | Basic Characteristics of WSNs | Operating Systems for WSNs | Differences with Mobile Ad hoc Networks | Types of Wireless Sensor Networks | Routing protocols for WSNs | Clusters and Cluster heads in WSNs | The LEACH Protocol | Operation of LEACH | Discussions on LEACH | Applications of WSNs | Simulating a WSN using Network Simulator 2

6. Setting up a Bluetooth Network Bluetooth Network | Bluetooth vs Wi-Fi | Bluetooth – Power Classes | Bluetooth - Versions| Networking of Bluetooth | Simulating Bluetooth Network with NS-2

7. Setting up a ZigBee Network ZigBee Network | IEEE 802.15.4 and ZigBee | ZigBee vs. Bluetooth | Features & Characteristic of ZigBee Technology | Application of ZigBee Technology | Component of IEEE 802.15.4 LR-WPAN | Network Topologies | ZigBee Architecture | The Superframe structure | Nodes Configuration | Energy Model

Major Equipment:

Computer with simulator

Books Recommended: -

- Gary J. Mullett, "Introduction to Wireless Telecommunications Systems and Networks", CENGAGE
- UpenaDalal, "Wireless Communication", Oxford University Press, 2009
- Ke-Lin Du & M N S Swamy, "Wireless Communication System", Cambridge University Press, 2010
- GottapuSasibhusan Rao, " Mobile Cellular Communication ", PEARSON

List of Open Source Software/learning website:

http://www.nptel.ac.in/