GUJARAT TECHNOLOGICAL UNIVERSITY

ELECTRONICS & COMMUNICATION (COMMUNICATION SYSTEMS ENGG) (05)
DATA COMMUNICATION AND NETWORKING
SUBJECT CODE: 2720507
M.E. SEM-II

Type of course: Major Elective -III

Prerequisite: Basics of Computer hardware, Computer software and Communication

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

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks		Practical Marks				
				ESE (E)	PA (M)	ESE (V)		PA (I)		
						ESE	OEP	PA	RP	
3	2#	0	4	70	30	20	10	10	10	150

Syllabus:

Sr. No.	Content	Total Hrs	% Weightage
1	DATA COMMUNICATION FUNDAMETNALS AND OSI REFERENCE MODEL Overview of Data Communication and Networking – Analog / Digital signals and transmission, Simplex / Half and Full duplex and Synchronous / Asynchronous communication – Multiplexing – Transmission Media – Circuit switching and Telephone network – DSL, ADSL and Cable Modem – Network Configuration, Concepts of layering , ISO's OSI reference model – Physical Layer Standards – RS 232C, RS 449, RS 422A / 423A, X.21 and V.24.	**7**	14%
2	DATA LINK LAYER: Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols, Example Data Link Protocols, The Channel Allocation Problem, Multiple Access Protocols, LAN standards – IEEE 802.3(CSMA/CD) – Fast Ethernet – Giga Bit Ethernet, IEEE 802.4 (Token Bus), IEEE 802.5 (Token Ring), IEEE 802.11 (Wireless LAN) ,Broadband Wireless, 1G, 2G, 3G, 4G and 5G cellular systems, Bluetooth, RFID, Zigbee, Data Link Layer Switching , Near Field Communication	**9**	20%
3	NETWORK LAYER: Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Network Layer Protocols – ARP, RARP, IPv4, ICMP, IPv6 and	**7**	18%

	ICMPv6 - Uni-cast Routing - RIP, OSPF, BGP and Multicast Routing - IGMP, DVMRP, MOSPF, CBT, PIM.		
4	TRANSPORT LAYER: The Transport Service, Elements of Transport Protocols, Congestion Control Algorithms, The Internet Transport Protocols: UDP, The Internet Transport Protocols: TCP, Performance Issues, Delay Tolerant Networks.	**6**	18%
5	APPLICATION LAYER: DNS--The Domain Name System, The World Wide Web, Real-time Audio and Video, Content Delivery and Peer-To-Peer, SMTP and HTTP Protocol	5	12%
6	NETWORK SECURITY: Cryptography, Symmetric-Key Algorithms, Public-Key Algorithms, Digital Signatures, Management Of Public Keys, IPsec, Firewalls, Virtual Private Networks, Wireless Security, Security Issues And Challenges in Wireless Networks, Authentication Protocols, Email Security, Web Security, Social Issues	8	18%
	Total	42	100%

Reference Books:

1. Computer Networks, Andrew Tanenbaum, 5th Edition, Pearson Education.
2. Data Communication And Networking, Behrouz Forouzan, 4th Edition, TMH.
3. Introduction to Data Communication and Networking, Wayne Tomasi, Pearson
4. William Stallings : Data and Computer Communications, PHI.
5. Brijendra Singh : Data Communication and Computer Networks, PHI
6. Michael A.Gallo, William A. Hancock : Computer Communication and Networking Technologies, Thomson Asia.
7. Gerd E.Keiser : Local Area Networks, TMH.
8. http://www.sacg.com.tw/sacweb/marcom/epaper/images/NFC.pdf

Course Outcome:.

After completing this course the student must demonstrate the knowledge and ability to:

1. Independently understand basic computer network technology.
2. Understand and explain Data Communications System and its components.
3. Identify the different types of network topologies and protocols.
4. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
5. Identify the different types of network devices and their functions within a network
6. Understand and building the skills of subnetting and routing mechanisms.
7. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

List of Journals:

1) The *Journal of Communications and Networks* , **ISSN:** 1976-5541, **Published** by IEEE Communications Society

2) **The IEEE Transactions on Network Science and Engineering, ISSN:** 2327-4697, **Published by:** IEEE Computer Society

Learning website:

www.nptel.ac.in

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.