

# GUJARAT TECHNOLOGICAL UNIVERSITY

## COMPUTER ENGINEERING (07), INFORMATION TECHNOLOGY (16) & INFORMATION & COMMUNICATION TECHNOLOGY (32)

COMPUTER NETWORKS

SUBJECT CODE: 2140709

B.E. 4<sup>th</sup> SEMESTER

**Type of course:** Bachelor of Engineering

**Prerequisite:** data structure and operating system.

**Rationale:** To understand the basic concepts of computer network and firm foundation for understanding how data communication occurring using computer network. It is based around the OSI Reference Model which deals with the major issues and related protocol studies in the various layers (Physical, Data Link, Network, Transport, Session, Presentation and Application) of the model. This course provides the student with fundamental knowledge of the various aspects of computer networking and enables students to appreciate recent developments in the area. The course will be driven from the engineering perspective.

### 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)	
					PA	ALA	ESE	OEP		
4	0	2	6	70	20	10	20	10	20	150

### Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	Introduction to computer networks and Internet; Understanding of network and Internet, The network edge, The network core, Understanding of Delay, Loss and Throughput in the packet-switching network, protocols layers and their service model, History of the computer network	07	17
2	Application Layer: Principles of computer applications, Web and HTTP, E-mail, DNS, Socket programming with TCP and UDP	07	18
3	Transport Layer: Introduction and transport layer services, Multiplexing and Demultiplexing, Connection less transport (UDP), Principles of reliable data transfer, Connection oriented transport (TCP), Congestion control.	10	25
4	Network Layer: Introduction, Virtual and Datagram networks, study of router, IP protocol and addressing in the Internet, Routing algorithms, Broadcast and Multicast routing	10	25
5	The Link layer and Local area networks: Introduction and link layer services, error-detection and correction techniques, Multiple access protocols, addressing, Ethernet, switches.	06	15

**Suggested Specification table with Marks (Theory):**

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
14	28	20	4	4

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate and above Levels (Revised Bloom's Taxonomy)**

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

**Reference Books:**

1. Computer Networking- A Top-Down approach, 5<sup>th</sup> edition, Kurose and Ross, Pearson
2. Computer Networks (4th edition), Andrew Tanenbaum, Prentice Hall
3. Computer Networking and the Internet (5<sup>th</sup> edition), Fred Halsall, Addison Wesley
4. Data Communications and Networking (4th edition), Behrouz Forouzan, McGraw Hill
5. TCP/IP Protocol Suite (3rd edition), Behrouz Forouzan, McGraw Hill

**Course Outcomes:**

After successful completion of the course students should be able to:

1. analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies;
2. specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols;
3. analyze, specify and design the topological and routing strategies for an IP based networking infrastructure
4. Have a working knowledge of datagram and internet socket programming

**List of Experiments:**

Experiments will be based on the topics taught in the theory

**Open ended problems:**

1. Solve the travelling salesman problem (TSP) with optimal and shortest routing algorithm.
2. Compatibility issues of IPv6 with existing IPv4.
3. Adaptability of the wired networking protocols in wireless network environments.

**Major Equipments:**

1. Computer systems
2. LAN trainer kit

**List of Open Source Software/learning website:**

1. Wireshark packet analyzer, Boson network simulator
2. Netsim
3. NS2

**ACTIVE LEARNING ASSIGNMENTS:** Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.