GUJARAT TECHNOLOGICAL UNIVERSITY

INFORMATION AND COMMUNICATION TECHNOLOGY
TELECOMMUNICATION ENGINEERING
SUBJECT CODE: 2163204
B.E. 6thSEMESTER

Type of course: Telecommunication

Prerequisite: Basic switching mechanisms, Digital Electronics

Rationale: Students of ICT Engineering need to have good understanding of the fundamentals and application of telecommunication networks. They will be able to understand recent topics like Time Division Switching systems, Space Division Switching systems, data networks.

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.	Content	Total Hrs	% Weightage
1	**Electronic switching systems:** Basics of a switching system, electronic space division switching - stored program control, Centralized SPC ,Distributed SPC, Enhanced Services, Time division switching - Time division Space and Time division Time Switching, time multiplexed space switching, time multiplexed time switching - two stage, three stage and N-stage combination switching	15	30
2	**Digital circuit switching networks:** Two-stage network , three-stage network ,n-stage network , non- blocking switches , blocking probability analysis of multistage switches – lee approximation, examples of digital switching systems - AT & T 5ESS and NTI - DMS 100 switching systems	5	15
3	**Elements of traffic engineering:** Network traffic load and parameters, grade of service and blocking probability, incoming traffic and service time characterization, blocking models and loss estimates, delay systems	5	10
4	**Telephone Networks:** Subscriber Loop System, Switching Hierarchy and Routing, Transmission Plan, Numbering Plan, Charging Plan	5	15

5	**Data networks:** Data transmission in PSTNs, Switching Techniques for data Transmission, Data communication Architecture, Link to Link Layers, End to End layers, Satellite based data networks, LAN, Metropolitan Area network, Fiber optic networks, and Data network standards.	10	20
6	**Signalling:** Customer line signalling – out band signalling – in band signalling - PCM signalling -inter register signalling - common channel signalling principles - CCITT signalling system No.7(SS7)	5	5
7	**Speech Digitization and Transmission:** Sampling, Quantization and Binary Coding, Companding , Differential Coding, Vocoders, Pulse Transmission, Line Coding	5	5

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
12	20	24	6	4	4

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create 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. Viswanathan T., Telecommunication Switching Systems and Networks, Prentice Hall of India Pvt. Ltd.
2. Schwartz M., Telecommunication Networks - Protocols, Modeling and Analysis, Addison Wesley Publishing Company
3. 3. Telecommunication Systems – V. S. Bagad, Technical Publication

Course Outcome:

After learning the course the students should be able to:
- Understand the switching systems in telecommunication.
- Understand the telephone networks.

List of Experiments:

1. To study the working of a manual switch board (switching).
2. To study of Switching Matrix for PSTN.
3. To Study the working of Dialer Section &DTMF Signals Using High Pass Filter and Low Pass Filter.
4. To Study the working of ringer circuit.

5. Write a program for Erlang B for traffic calculation.
6. Study of PING command of networking.
7. Implementation of Star topology using 100 Base Tx
8. To study TCP/IP Protocol Suite.
9. To study SNMP protocol.

Design based Problems (DP)/Open Ended Problem:
1. Demonstration of types of cables used in telecommunication systems.
2. MATLAB implementation to find traffic carried per server and group of servers.

List of Open Source Software/learning website:

1. www.nptel.ac.in

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.