GUJARAT TECHNOLOGICAL UNIVERSITY

ELECTRONICS ENGINEERING (10)
TELECOMMUNICATION SWITCHING AND APPLICATIONS
SUBJECT CODE: 2161009
B.E. 6th SEMESTER

Type of course: Regular

Prerequisite: Fundamental knowledge of public switched telephone network (PSTN) and public data network (PDN). Analytical and mathematical knowledge.

Rationale: ME students of EC Engineering need to have good understanding of the fundamentals and application of telecommunication networks i.e. PSTN, PDN and ISDN i.e. the process of total digitalization of telecommunication networks. They will be able to understand recent topics like time division switching systems, data networks, ISDN, voice data integration and fiber optic communication systems and 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	**Introduction:** Evolution of Telecommunications, Simple Telephone Communication, Manual switching system, major telecommunication Networks, Strowger Switching System, Crossbar Switching.	05	12
2	**Electronic Space Division Switching:** Stored Program Control, Centralized SPC, Distributed SPC, Enhanced Services, Two stage networks, Three stage network n-stage networks.	06	12
3	**Time Division Switching:** Time multiplexed Space Switching, Time Multiplexed time switching, combination Switching, Three stage combination switching, n-stage combination switching.	05	12
4	**Traffic Engineering:** Network Traffic load and parameters, Grade of service and blocking probability, Modelling Switching Systems, Incoming Traffic and Service Time Characterisation, Blocking Models and Loss Estimates, Delay systems.	06	14
5	**Telephone Networks:** Subscriber Loop Systems, Switching Hierarchy and Routing, Transmission Plan, Transmission Systems, Numbering Plan, Charging Plan, Signalling Techniques, Inchannel signalling, common channel signalling, Cellular mobile telephony.	7	16

| 6 | **Data networks:** Data transmission in PSTNs, Data Rates in PSTNs, Modems, Switching Techniques for data Transmission, Circuit Switching, Store and Forward Switching Data communication Architecture, ISO-OSI Reference Model, Link to Link Layers, Physical Layer, Data Link Layer, Network Layer, End to End layers, Transport Layer, Session Layer, Presentation Layer, Satellite based data networks, LAN, Metropolitan Area network, Fiber optic networks, and Data network standards. | 9 | 18 |
| 7 | **Integrated Services Digital Networks:** Motivation for ISDN, New services, Network and Protocol architecture, Transmission Channels, User Network Interface, signalling, Numbering and Addressing, Service characterisation, Interworking ,ISDN standards, Broadband ISDN ,Voice data Integration. | 7 | 16 |

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
30	**30**	**20**	**10**	**8**	**2**

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. Thiagarajan Vishwanathan, "Telecommunication Switching Systems and Networks"; PHI Publications.
2. J. E. Flood, "Telecommunications Switching, Traffic and Networks", Pearson Education.
3. John C. Bellamy, "Digital Telephony", Third Edition; Wiley Publications.

Course Outcome:

After completing this course students shall able to:
1. Describe the need for switching systems and their evolution from analogue to digital.
2. Describe the Public Switched Telephone Network.
3. Describe private networks.
4. Describe integrated networks.
5. To compare telephone network, data network and integrated service digital network

List of Experiments:

This shall consist of about 10 Practical's based on the above syllabus.

Design based Problems (DP)/Open Ended Problem:

1. MATLAB/SCILAB implementation to find blocking probability of a two stage and three stage network.
2. MATLAB/SCILAB implementation to find availability and non-availability of single processor and dual processor.

3. MATLAB/SCILAB implementation to find traffic carried per server and group of servers.

Major Equipment: MATLAB/SCILAB

List of Open Source Software/learning website: 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.