GUJARAT TECHNOLOGICAL UNIVERSITY
Bachelor of Engineering
Subject Code: 3173212

TELECOMMUNICATION ENGINEERING
B.E. 7th Semester

Type of course: Core

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 and data networks.

Teaching and Examination Scheme:

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

Sr.No	Content	Total Hrs
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
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
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
4	Telephone Networks: Subscriber Loop System, Switching Hierarchy and Routing, Transmission Plan, Numbering Plan, Charging Plan.	5
5	Data networks: Data transmission in PSTNs, Switching Techniques for data Transmission, Data communication Architecture, Link to Link Layers, End layers, Satellite based data networks, LAN, End to Metropolitan Area Network, Fiber Optic Networks, and Data Network Standards.	10
6	Signaling: Customer line signaling – out band signaling – in band signaling - PCM signaling -inter register signaling - common channel signaling principles - CCITT signaling system No.7(SS7).	5

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	**20**	**10**	**10**	**5**	**0**

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. Telecommunication Systems – V. S. Bagad, Technical Publication

Course Outcome: After learning the course the students should be able to:

Sr. No.	CO Statement	Marks % Weightage
CO-1	Understand various switching systems in telecommunication.	25
CO-2	Analyze single stage and multi-stage digital circuit switching networks.	20
CO-3	Evaluate the different elements of traffic engineering.	10
CO-4	Understand the fundamentals of Telephone networks.	15
CO-5	Differentiate various data networks.	20
CO-6	Identify signaling for telecommunication.	10

Suggested 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. Analysis of single stage and multi-stage switches 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

	Analysis Model, Data Modeling, Functional Modeling and Information Flow, Behavioral Modeling and Structured Analysis, Software Design and Software Engineering, The Design Process, Design Principles, Design Concepts, Modular Design, Design Heuristics for Effective Modularity, The Design Model ,Design Documentation, Function oriented v/s object-oriented design, Object Modeling using UML, Software Architecture and Data Design, Architectural Styles, Analyzing Alternative Architectural Designs, Mapping Requirements into a Software Architecture	
6	**User Interface Design, Component Level Design:** User Interface Design, Task Analysis and Modeling, Interface Design Activities and Implementation Tools, Design Evaluation, Structured Programming and Comparison of Design Notation.	04
7	**Risk Analysis & Management:** Reactive versus Proactive Risk Strategies, Software Risks (Risk Identification, Risk Projection, Risk Refinement, Risk Mitigation), Risks Monitoring and Management	03
8	**Coding, Software Testing Techniques & Software Testing Strategies:** Software Testing Fundamentals and Test Case Design, White-Box Testing and Black-Box Testing, ISO/IEC/IEEE Software Testing standards, Testing for Specialized Environments, A Strategic Approach to Software Testing and Issues, Unit Testing, Integration and Validation Testing, System Testing, Software Documentation and Debugging Techniques.	06
9	**Software Quality Assurance and Configuration Management:** Quality Concepts and Software Quality Assurance, Quality Planning and Control, Software Reviews (Formal Technical Reviews), Software Reliability and Fault Tolerance, The ISO 9000 Quality Standards, The SCM Process, Identification of Objects in the Software Configuration, Six Sigma, Version Control and Change Control.	04
10	**Emerging and advanced topics in Software Engineering**: Security Engineering, Agile Methods, Client Server Software Engineering, Aspect Oriented Software Development, Software Engineering Aspects of Programming Languages, Reverse Engineering, Re-engineering, Web Engineering, CASE.	04
11	**DevOps Viewpoints:** Overview, Problem Case Definition, Benefits of Fixing Application Development Challenges, DevOps Adoption Approach through Assessment, Solution Dimensions, What is DevOps?, DevOps Importance and Benefits, DevOps Principles and Practices, 7 C's of DevOps Lifecycle for Business Agility, DevOps and Continuous Testing, How to Choose Right DevOps Tools, Challenges with DevOps Implementation, Must Do Things for DevOps, Mapping My App to DevOps - Assessment, Definition, Implementation, Measure and Feedback	04

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