



Kadi Sarva Vishwavidyalaya
Gandhinagar-382 015

B.E Semester: 8
Electronics & Communication Engineering
Subject Name: Telecommunication Switching and Networks
Subject Code : EC-802-D (E P II)

A. Course Objective:

The educational objectives of this course are

- To introduce in details the concepts of Frequency and Time division multiplexing.
- To introduce digital multiplexing and digital hierarchy namely SONET / SDH
- To introduce the concepts of space switching, time switching and combination switching, example of a switch namely ESS Toll switch.
- To introduce the need for network synchronization and study synchronization issues. To outline network control and management issues.
- To study the enhanced local loop systems in digital environment. To introduce ISDN, DSL / ADSL, and fiber optic systems in subscriber loop.
- To introduce statistical modeling of telephone traffic. To study blocking system characteristics and queuing system characteristics.
- To characterize blocking probability holding service time distributions for in speech and data networks.

B. Teaching / Examination Scheme

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
		L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
CODE	NAME	Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
EC-802-D	Telecommunication Switching and Networks	4	0	2	6	5	3	70	30	20	30	150



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C. Syllabus

1. Introduction:

Evolution of Telecommunications, Basic of Switching System, Simple Telephone Communication, Manual Switching System, Major Telecommunication Networks.

2. Evolution of Switching System:

Strowger, Rotary Dial Telephone, Signaling Tones, Step by Step Switching, Design Parameters, Crossbar Switching: Principal of Common Control, Touch Tone Dial Telephone and Principals of Crossbar Switching

3. Digital Switching:

Switching Functions, Space Division Switching, Time Division Switching, two dimensional Switching: STS Switching, TST Switching, No.4 ESS Toll Switch, Digital Cross- Connect Systems, Digital Switching in an Analog Environment. Elements of SS7 signaling.

4. Traffic Engineering:

Network Traffic Load And Parameters, Grade Of Service And Blocking Probability, Modeling Switching Systems, Incoming Traffic And Service Time Characterizations, Blocking Models And Loss Estimates, Delay Systems.

5. Telephone Networks:

Subscriber Loop System, Switching Hierarchy And Routing, Transmission Plan, Transmission System Numbering Plan, Charging Plan, Signaling Techniques, In-channel Signaling, Common Channel Signaling, Cellular Mobile Telephony.

6. Digital Subscriber Access :

ISDN: ISDN Basic Rate Access Architecture, ISDN U Interface, ISDN D Channel Protocol. High-Data-Rate Digital Subscriber Loops: Asymmetric Digital Subscriber Line, VDSL. Digital Loop Carrier Systems: Universal Digital Loop Carrier Systems, Integrated Digital Loop Carrier Systems, Next-Generation Digital Loop Carrier, Fiber in the Loop, Hybrid Fiber Coax Systems, Voice band Modems: PCM Modems, Local Microwave Distribution Service, Digital Satellite Services.



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D. Lesson Planning

Sr. No.	No. of Hrs.	% Weight-age in Exam	Topic
1	06	05	Introduction: Evolution of Telecommunications, Basic of Switching System, Simple Telephone Communication, Manual Switching System, Major Telecommunication Networks.
2	10	09	Evolution of Switching System: Strowger, Rotary Dial Telephone, Signaling Tones, Step by Step Switching, Design Parameters, Crossbar Switching: Principal of Common Control, Touch Tone Dial Telephone and Principals of Crossbar Switching
3	12	28	Digital Switching: Switching Functions, Space Division Switching, Time Division Switching, two dimensional Switching: STS Switching, TST Switching, No.4 ESS Toll Switch, Digital Cross- Connect Systems, Digital Switching in an Analog Environment. Elements of SS7 signaling.
4	10	28	Traffic Engineering: Network Traffic Load And Parameters, Grade Of Service And Blocking Probability, Modeling Switching Systems, Incoming Traffic And Service Time Characterizations, Blocking Models And Loss Estimates, Delay Systems.
5	10	15	Telephone Networks: Subscriber Loop System, Switching Hierarchy And Routing, Transmission Plan, Transmission System Numbering Plan, Charging Plan, Signaling Techniques, In-channel Signaling, Common Channel Signaling, Cellular Mobile Telephony.
6	12	15	Digital Subscriber Access : ISDN: ISDN Basic Rate Access Architecture, ISDN U Interface, ISDN D Channel Protocol. High-Data-Rate Digital Subscriber Loops: Asymmetric Digital Subscriber Line, VDSL. Digital Loop Carrier Systems: Universal Digital Loop Carrier Systems, Integrated Digital Loop Carrier Systems, Next-Generation Digital Loop Carrier, Fiber in the Loop, Hybrid Fiber Coax Systems, Voice band Modems: PCM Modems, Local Microwave Distribution Service, Digital Satellite Services.
TOTAL	60	100	



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E. Instructional Method & Pedagogy

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weight age should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.
- Experiments shall be performed in the laboratory related to course contents.

Suggested list of Experiments

Sr. No	Name Of Experiment
1	TO STUDY OF TRANSMISSION & RECEPTION OF SIGNAL ON TELEPHONE NETWORKS.
2	TO MEASURE THE BLOCKING PROBABILITY OF TEELPHONE NETWORKS.
3	TO MEASURE THE NETWORK THROUGHPUT OF TEELPHONE SYSTEM.
4	TO MEASURE THE TRAFFIC ARRIVAL INTO TEELPHONE NETWORKS.
5	TO PROFORM THE TIME DIVISION MULTIPLEXING.



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- 6 TO PROFORM THE FREQUENCY DIVISION MULTIPLEXING.
- 7 TO PERFORM EXPERIMENT ON TRAFFIC MODEL WITH CONSTANT TRAFFIC.
- 8 TO PERFORM EXPERIMENT ON TRAFFIC MODEL WITH POISSION TRAFFIC.
- 9 TO STUDY ABOUT FEECTS ARRIVAL RATE ON VARIOS NETWORK PARAMETERS

F. Students Learning Outcomes

On successful completion of the course

- The student can identify different areas of satellite communication. Can find the applications of all the areas in day to day life. Can identify the operations, working, construction, material etc. aspects of link budget, losses, fading.

G. Recommended Study Materials

Text/ Reference Books:

1. J. Bellamy, "Digital Telephony", John Wiley, 2003, 3rd Edition.
2. JE Flood, "Telecommunications Switching, Traffic and Networks", Pearson.
3. R.A.Thomson, "Telephone switching Systems", Artech House Publishers, 2000.
4. W. Stalling, "Data and Computer Communications", Prentice Hall, 1993.
5. T.N.Saadawi, M.H.Ammar, A.E.Hakeem, "Fundamentals of Telecommunication Networks", Wiley Interscience, 1994.
6. W.D. Reeve, "Subscriber Loop Signaling and Transmission Hand book", IEEE Press (Telecomm Handbook Series), 1995.
7. Viswanathan. T., "Telecommunication Switching System and Networks", Prentice Hall of India Ltd., 1994.
8. James P. Martin, "Modern Telecommunication networks", PHI Publication.