



**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani**  
**Pilani Campus**  
**AUGS/ AGSR Division**

**SECOND SEMESTER 2019-20**

**COURSE HANDOUT**

**Date: 07.01.2020**

In addition to part I (General Handout for all courses appended to the Time table) this portion gives further specific details regarding the course.

**Course No : EEE/INSTR F414**

**Course Title : Telecommunication Switching Systems and Networks**

**Instructor-in-Charge : RAHUL SINGHAL**

**Instructor(s) : None**

**Tutorial/Practical Instructors: None**

**1. Course Description:** Introduction, electromechanical switching, pulse dialing and DTMF dialing, stored program control, space division switching, speech digitization and transmission, time division switching, fundamentals of traffic engineering, telephone networks, signaling, data networks, layered architecture and protocols, LANs, packet switching networks, TCP/IP, ISDN, ATM networks.

**2. Scope and Objective of the Course:** The objective of the course is to impart theoretical and practical knowledge of the present day telecommunication switching systems and data networks. Topics ranging from the electromechanical switching systems to the voice and data integration systems will be covered. Design of space and time division switching systems will be discussed. The course also deals with SONET, VoIP, data networks and ATM networks.

**3. Text Books: T1.** John C. Bellamy, Digital Telephony, 3rd Edition, John Wiley & Sons, Inc., 2002

**4. Reference Books:**

**R1.** Roger L. Freeman, Telecommunication System Engineering, 4th Edition, John Wiley & Sons, Inc., 2004

**R2.** T. Viswanathan and M. Bhatnagar, Telecommunication Switching Systems and Networks, 2nd Ed., Prentice-Hall, 2015

**5. Course Plan:**

Modules	Lecture No.	Topics to be covered	Ref. to Text Book (chap/Section)	Learning Outcomes
I	1	Overview of the course, the analog network hierarchy, subscriber loop.	Chp 1, TB, Chp 2, R1	Familiarize with the telecom industry and standards, Recognize various systems and stages involved in telecommunication
	2	Switching in an analog environment: electromechanical switching, stored program control.	Chp 1, TB; Chp 3, R1	
	3	Signaling for analog telephone network: Analog interfaces, in-channel and common-channel signaling, SS7	Chp 1, TB; Chp 4, 17, R1	
	4	Transmission media, impairments and systems, Pair gain systems, FDM multiplexing & modulation	Chp 1, TB; Chp 5, R1	
	5,6	Long Distance Telephony, Intelligent networks,	Chp 1, TB; Chp 6, 7 R1	



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		DNHR, digital network evolution		
II	7	Advantages and disadvantages of digital voice networks	Chp 2, TB; Chp 8, R1	Appreciate the characteristics of voice signal, Differentiate among various transmission media with respect to voice, Describe voice digitization, compression and transmission
	8	Voice digitization: PAM, PCM	Chp 3, TB; Chp 8, R1	
	9	Companding techniques	Chp 3, TB; Chp 8, R1	
	10	Speech redundancies, DPCM, DM, Vocoders, Coding Standards	Chp 3, TB; Chp 8, R1	
	11, 12	Digital pulse transmission, Line coding	Chp 4, TB; Chp 8, R1	
III	13, 14	Time division multiplexing, TDM framing and synchronization	Chp 4, TB; Chp 8, R1	Learning different Multiplexing Techniques used at physical layer
	15, 16, 17	SONET/SDH multiplexing and framing & Optical Networks	Chp 8, TB; Chp 8, 20 R1	
IV	18, 19, 20	Digital Switching, Space division switching, Blocking probabilities	Chp 5, TB; Chp 9, R1	Understanding various aspects of analog and digital switching and design space division, time division and hybrid switches
	21, 22	Time division switching	Chp 5, TB; Chp 9, R1	
	23, 24	Combination switching, STS and TST switches	Chp 5, TB; Chp 9, R1	
V	25, 26	Introduction to Wireless & Cellular/ Mobile Radio	Chp 6, 9, TB; Chp 18, R1	Principles of telecommunications as applied in existing data networks
	27, 28, 29, 30	Data communication & networks, X.25, Frame Relay, TCP/IP, MPLS, VPN, ATM networks	Chp 10, TB; Chp 10, 11, 15, 16 R1	
	31, 32	Voice-over-IP	Chp 12, R1	
VI	33, 34	Local Area Networks, CSMA, WLANs	Chp13, R1	Introduction to data communication networks and early network establishments
	35, 36, 37	Digital Subscriber Access, Integrated services digital network (ISDN), Broadband ISDN	Chp 11, TB; Chp14, R1	
	38, 39	Network Management	Chp 7, TB; Chp 21, R1	
VII	40, 41, 42	Traffic engineering: Introduction, loss systems & delay systems	Chp 12, TB; Chp 1, R1	Estimate and analyze traffic in telecom/data networks



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**6. Evaluation Scheme:**

Component	Duration	Weightage (%)	Date & Time	Nature of component (Close Book/ Open Book)
Mid-Semester Test	90 Min.	30	TBA	Closed Book (CB)/Open Book (OB)
Quizzes	10-20 min	20	Surprise Quiz during class hours	CB/OB
Assignment(s)	Regular	10	Details will be announced in class & on Nalanda site	OB
Comprehensive Examination	3 h	40	09/05 FN	CB + OB

**7. Chamber Consultation Hour:** Will be announced in the class.

**8. Notices:** Notices concerning this course will be displayed on the Notice board of EEE Department and/or on [nalanda.bits-pilani.ac.in](http://nalanda.bits-pilani.ac.in) only.

**9. Make-up Policy:** No make-ups in Quizzes, Assignments. Make-ups only for genuine reason that will be judge by Course Instructor-in-Charge itself before grant of make-up. Decision of Course Instructor-in-Charge will be final.

**10. Note (if any):** --

**Instructor-in-Charge**  
**EEE/INSTR C414**