

DIGITAL COMMUNICATIONS

(Core Subject)

Course Code:	10B11EC511	Semester:	5 th Semester, B. Tech (ECE)
Credits:	4	Contact Hours:	L-3, T-1, P-0

Course Objectives

1. To introduce the concepts of digital communication systems.
2. To equip students with various issues related to digital communication such as modulation, demodulation, analog to digital conversion, noise performance, multiplexing, error control coding.

Course Outcomes

After studying this course students will be able to:

1. The students will have the knowledge of components of digital communication system.
2. The students will have the ability to analyze various methods of baseband/band pass digital transmission and detection.
3. The student will be able to analyze and allocate performance objectives to components of a digital communications system.
4. The students will understand the concepts of error control coding techniques.
5. The students will become aware of information theory, source coding, cryptography and spread spectrum systems.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	Digital Signals and Systems: Overview of Digital Communication Systems (DCS) - Merits and Demerits of the same. Digital PAM Signals – Signaling rate (Baud)-Data Rate, Line codes (Unipolar, Polar, Bipolar, Manchester, CHDB-n, 4B3T and Top-hat), Power Spectra of Digital PAM, Transmission Limitations – ISI –Eye Pattern Regenerators, Noise and Errors –M-ary Error Probabilities (Binary Error Probabilities), Matched Filtering – Optimum Terminal filters, Equalization.	Simon Hykin chap-3, 4, 6	9
2.	Analog to digital conversion: Quantization (Uniform and Non –uniform)- Quantization Noise, Pulse Code Modulation–PCM generation and reconstruction- μ and A law Bandwidth considerations, Differential PCM, DM and ADM, Digital Multiplexing –Multiplexing and Hierarchies (North American and CCITT), Synchronization Techniques –Bit and Frame	Simon Hykin chap-5	11

	synchronization		
3	Digital Modulation Techniques (Bandpass Transmission): Binary Modulation: ASK, PSK, FSK, MSK, Spectral Analysis, Coherent Demodulation, Optimum Binary Detection-Coherent OOK, PRK, FSK, M-ary Systems: QAM –M-ary PSK, ASK Systems –Comparison of digital modulation systems.	Simon Hykin chap-7	11
4	Error Control Coding: Error Detection and Correction: Repetition and Parity check code-Code vectors and Hamming distance, FEC systems, ARQ systems, Block codes: Hamming Codes, Cyclic Codes Convolutional Codes.	Simon Hykin chap-8	9
Total Number of Lectures			40

Evaluation Scheme

1. Test 1 : 15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
 - 10 Marks : Class performance, Tutorials & Assignments
 - 10 Marks : Quizzes
 - 5 marks : Attendance

Text Books

1. Simon Haykin, “Digital communications”, John Wiley & Sons.
2. Carlson, Crilly, “Communication Systems”, McGrawHill.
3. Lathi, B.P, “Modern Digital and Analog Communication Systems” Oxford.
4. Taub, Schilling, “Principles of Communication Systems”, McGrawHill.

Reference Books

1. Simon S. Haykin, Michael Moher, “Communication Systems”, 4th Ed., John Wiley.
2. Proakis, John, “Digital Communications”.