DEPARTMENT CORE COURSE-7 (DCC)
EC206- DIGITAL COMMUNICATION

Details of course: -

Course Title	Course Structure			Pre-Requisite
	L	T	P	
Digital Communication	3	0	2	Probability & Random Process

Course Objective: To understand the key modules of digital communication systems with emphasis on error performance of a digital communication system in presence of noise and other interferences.

Course Outcomes (CO):

1. Understand the basic digital communication systems
2. Introduce signal space concept for signal energy and Euclidean distance calculation
3. Analyze and evaluate the performance of digital communication system in the presence of noise.
4. Acquired knowledge about different Mary modulation techniques
5. Describe and analyze the digital communication system with spread spectrum modulation.

S. No.	Content	Contact Hours
Unit 1	**Baseband Shaping for Data Transmission:** Introduction to digital communication systems, Line coding and its power spectral density, Pulse Shaping, Inter Symbol Interference, Nyquist Criterion for Zero ISI & for Distortion-less Baseband Binary Transmission, Correlative Coding, Signaling with Duo-Binary Pulses, Eye Diagram, Equalization, Adaptive Equalization for Data Transmission, Scrambling and Descrambling.	8
Unit 2	**Signal space concepts:** Analogy between Signals and Vectors, Geometric Structure of the Signal Space, L2 Space, Distance, Norm and Inner Product, Decomposition of a Signal and Signal Components, Complex Signal Space and Orthogonality, Orthogonal Signal Set, Baseband Pulse Data Transmission, Gram-Schmidt Orthogonalization Procedure.	8
Unit 3	**Detection and Estimation:** Review of Gaussian Random Process, Detection of Known Signals in Noise, Optimum Threshold Detection, Optimum Receiver for AWGN Channel, Matched Filter and Correlation Receivers, Decision Procedure: Maximum A- Posteriori Probability Detector- Maximum Likelihood Detector, Probability of Error, Bit Error Rate, Wiener Filter for Waveform Estimation, Linear Prediction.	10
Unit 4	**Digital modulation schemes:** Coherent Binary Schemes: ASK, FSK, PSK, MSK, GMSK. Coherent M-ary Schemes, Non-Coherent Schemes, Calculation of Average Probability of Error for Different Modulation Schemes, Power Spectra of Digitally Modulated Signals, Performance Comparison of Different Digital Modulation Schemes. DQPSK, QPSK, OQPSK, pi/4 QPSK, 8-PSK, 16 QAM, 64 QAM.	10
Unit 5	**Spread Spectrum Modulation:** Pseudo-Noise Sequences, Direct Sequence	6

	Spread Spectrum [DSSS], Resistance to Jamming, Signal Space Dimensionality, Processing Gain, Frequency-Hop Spread Spectrum, Acquisition and Synchronization, Applications.	
	Total	42

Books: -

S. No	Name of Books/Authors/Publisher
1	Digital Communication Systems by Simon Haykin; John Wiley & Sons, 2nd edition
2	Modern Digital and Analog Communication, 3rd Edition by B.P. Lathi; Oxford University Press, 3rd edition
3	Digital Communications by John G. Proakis; McGraw Hill, 4th edition
4	Principles of Communication Systems by H. Taub and Schilling, ; McGraw Hill Education; 4th edition
5	Analog and Digital Communication by Couch; Pearson Education, 8th edition
6	Digital Communications: Fundamentals & Applications, by Bernard Sklar; Pearson education, 3rd edition