

3EC06 : DIGITAL COMMUNICATION
CREDITS-3(LTP: 3,0,0)

Course Objective:

To analyze and characterize the concept of digital data transmission, probability & information theory, source coding, channel coding & BER analysis of digital demodulation techniques.

Teaching and Assessment Scheme :

Teaching Scheme (Hours per Week)			Credits	Assessment Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE	CE	ESE	CE	100	
3	0	0	3	60	40	00		00

Course Content :

Unit No.	Topics	Teaching Hours
1.	Sampling & Interpolation : Introduction, Sampling theorem, Signal reconstruction, Aliasing, Applications of sampling theorem, Quantization, Compander, Types of analog to digital modulation technique – Pulse code modulation, Differential pulse code modulation, Delta modulation, Adaptive delta modulation.	07
2.	Digital data transmission : Digital Communication system, Line coding technique and its properties, PSD of various line coding technique, Pulse shaping, ISI and its effect, Nyquist's first criteria for zero ISI, Scrambling, Regenerative Repeater, Zero forcing equalizer.	06
3.	Basics of Probability Theory and Random Variable : Concept of probability, Conditional probability and independent events, Bayes' theorem, random variable, types of random variable, CDF, PDF, Mean, Variance, Various Distribution functions – Bernoulli, Binomial, Poisson, Uniform, Gaussian, Chebyshev's inequality, Central limit theorem.	10
4.	Information Theory & Source coding : Measure of information, Entropy, Source encoding – Huffman code, Channel capacity of discrete memory less channel, Channel capacity of continuous channel, Channel capacity of band-limited AWGN channel and infinite bandwidth channel.	07

Unit No.	Topics	Teaching Hours
5.	Channel Coding : Comparison of block codes and Convolutional codes, Hamming bound Linear block code-Encoding and Decoding, Cyclic code-Encoding and Decoding, Convolutional Codes – Code tree, state diagram, trellis diagram, Maximum likelihood decoding, Sequential decoding.	07
6.	Digital Modulation & Demodulation technique : BPSK transmitter, BPSK receiver and its BER, QPSK transmitter, QPSK receiver and its BER, BER of M- ary PSK technique, M- ary QAM technique and its BER, MSK transmitter, receiver and its BER, GMSK transmitter, receiver and its BER, Comparison of BER of coherent detection technique, Case studies.	08
Total		45

List of References :

1. B.P. Lathi, Zhi Ding, “*Modern Digital & Analog Communication Systems*”, Oxford University Press, 4th Edition, 2010.
2. Simon Haykin, “*Digital Communication Systems*”, Wiley Publication, 2nd Edition, 2014.
3. John G. Proakis, Masoud Salehi “*Digital Communications*”, McGraw Hill Higher Education, 5th Edition, 2008.
4. Bernard Sklar, “*Digital Communications — Fundamentals and Applications*”, Pearson Education, 2nd Edition, 2009.

Course Outcomes (COs) :

By learning this course student will be able to ...

1. Convert analog signal into digital signal using various modulation technique.
2. Design the PSD of various line coding technique.
3. Calculate the Mean, Variance, PDF & CDF of various distribution functions.
4. Measure entropy, average word length, efficiency of memoryless channel.
5. Generate the codeword and correct the errors of various channel coding technique.
6. Compare different digital modulating techniques and measure its bit error rate (BER).