

EC 605 : DIGITAL COMMUNICATION AND INFORMATION THEORY

Teaching Scheme			Examination Scheme							
Lect.	Pract	Total	Theory				Practical			Grand Total
			Int. Assess.	Sem End		Total	Int. Assess.	Sem End	Total	
				Marks	Hrs					
4	2	6	30	70	3	100	25	25	50	150

1. Geometric representation of signal waveforms:

Baseband and bandpass signals, constellations, signal as a vector, Gram-Schmidt orthogonalization procedure, correlation receiver, matched filter receiver.

2. Analog to Digital conversion:

PAM, PWM, PCM, quantization, differential PCM, delta modulation, adaptive delta modulation, adaptive differential PCM, applications.

3. Digital transmission through band-limited (BL) channel:

PAM signals, polar format, line codes, Inter symbol interference, Nyquist criterion for zero ISI; design of BL signals with zero ISI; design of BL signals for controlled ISI- partial response signals; maximum-likelihood detector for partial response signaling; design of transmitter and receiver for known channel; channel equalization, synchronization.

4. Bandpass transmission through AWGN channel:

bandwidth, power and error probability; optimum receiver structures, basic digital bandpass modulation schemes- ASK, PSK, QAM and FSK; Coherent demodulation and detection; probability of error in ASK, PSK, QAM and FSK schemes; optimum receiver structures for non-coherent detection; M-ary FSK- non coherent detection and error performance; symbol error probability in M-ary systems (MPSK, MFSK); bit versus symbol-error probabilities.

5. Information Theory and Coding:

Entropy, Source coding theorem, Huffman coding, mutual Information, channel models, channel capacity and bounds on communication, differential entropy, Linear Block code, cyclic code, BCH codes, Reed-Solomon codes, convolution code, ML decoding of convolution codes.

(Note: Weight age of digital communication and information theory would be 50% each)

Reference Books:

1. Digital Communications By S. Haykin 3rd Edition 2000 (John Wiley & Sons).
2. Digital Communication By J. G. Proakis 2002 (TMH)
3. Modern Digital and Analog Communication Systems By B. P. Lathi 1998, 3rd Edition (Oxford University Press).
4. Communication Systems Engineering By J. G. Proakis and S. Salehi 2002 (Pearson Edition).