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B.E / B.Tech End semester Examinations, April/May 2013
Electronics & Communication Engineering
EC 9301 Digital Communication Techniques
V Semester

Time : 3 Hours **Max. Marks: 100**

Answer all questions

PART A (10×2=20 marks)

1. Draw the Manchester and unipolar NRZ coded format for 11101101.
2. Discuss the practical difficulties that are to be addressed while implementing nyquist pulse shape for ISI free transmission.
3. Write the weight update equation for LMS algorithm, discuss about the influence of step size.
4. With relevant diagram demonstrate how maximum likely hood estimate of the phase of an unmodulated carrier can be obtained?.
5. An analog signal having 4 KHz bandwidth and the noise power spectral density $n_0/2 = 10^{-12}$ W/Hz. The signal power required at the receiver is 0.1mW. Calculate the capacity of the channel
6. Draw a BSC channel write the transition probabilities.
7. Define Hammimg distance, find the error correcting and error detecting capability of a (7,4) Hamming code
8. Discuss on any two properties of cyclic code
9. Give the advantages of LDPC codes over turbo codes and give any two applications of it.
10. Discuss the advantages of soft decision decoding over hard decision decoding.

PART-B (5x16 =80 Marks)

11.i) Explain with required block diagram the digital communication link.

ii) A DMS has six symbols x1,x2,x3,x4,x5,x6 with probability of emission 0.2, 0.3,0.11, 0.16, 0.18, 0.05 encode the source with Huffman and Shannon – fano codes compare its efficiency. (16)

12.a.i) Discuss on the desirable properties of line codes. Also derive the power spectral density for unipolar NRZ scheme.

(OR)

12.b.i) Explain ISI and Write the Nyquist Criterion in frequency domain for pulse shaping to realize ISI free transmission. (6)

ii) The binary data 001101001 are applied to the input of duobinary system. Find the receiver output under the case a) without precoder and case b) with precoder. Suppose the bit at second place is decoded erroneously construct the receiver output for the two cases.(10)

13.a.i) Derive the likelihood function that can be used to obtain the Maximum Likelihood estimate for the carrier phase when the propagation delay $\tau = 0$. Assume that the received signal is a noisy version of the transmitted signal and the noise is AWGN. (10)

ii) With required diagrams explain the Early- late gate Synchronizer.(6)

(OR)

13.b.i) Draw the block diagram of 5 tap linear traversal equalizer and explain the LMS algorithm to update the weights.(10)

ii) Explain the Zero forcing algorithm and discuss about its pros and cons.(6)

14.a.i) For a (7,4) linear cyclic block code with generator polynomial $g(D)=1 + D + D^3$,

a) Obtain all the codewords and find out the error correcting capability (4)

b) Design the encoder and syndrome decoder and explain. (12)

(OR)

14.b.i) For a (2,1,3) convolutional code with generator sequence $g_1 = (101)$ and $g_2 = (111)$, design the encoder and represent it on a trellis diagram (8)

ii) Explain Viterbi decoding algorithm for the above code. (8)

15.a.i)Explain trellis coded modulation of 4-PSK signal using Ungerboeck set partitioning. Draw the 4 state trellis and obtain its asymptotic coding gain. (16)

(OR)

15.b.i) Using suitable diagram explain the soft input and soft output decoder using log likelihood ratios. (6)

ii) Draw a rate 1/3 turbo encoder using two recursive systematic coder connected in parallel assume any generator polynomial. (10)