Roll No. | | | | | | | | | | |

B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2014

Electronics and Communication Engineering

Semester : V

EC9301-Digital Communication Techniques

(Regulation 2008)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Draw the eye pattern for 2ary scheme and discuss about its main features.

2 Write the Nyquist Criterion in frequency domain for pulse shaping to realize ISI free transmission.

3. Write the received signal equation and discuss on the parameter that are to be estimated.

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 8 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 (2)

6. Draw a BSC channel write the transition probabilities.

7. Differentiate systematic code and non systematic codes give an example for each.

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. Draw a rate ½ recursive systematic coder with constraint length K=4.

Part – B (5 x 16 = 80 marks)

11.i. What are desirable properties of Line codes. Draw the RZ signal and derive its power spectral density.(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)

12.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)

12.b.i) Draw the block diagram of 3 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)

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

(OR)

13.b.i) Derive the mutual information I(x;y) for a binary symmetric channel, when the probability of source is equally likely and the probability of channel p=0.5. (6)

ii) For a source emitting three symbols with probabilities p(X) = {1/8, 1/4, 5/8} and p(Y/X) as given in the table, where X and Y represent the set of transmitted and received symbols respectively, compute H(X), H(X/Y) and H(Y/X) (10)

P(Y/X)		y_1	y_2	y_3
	x_1	2/5	2/5	1/5
	x_2	1/5	2/5	2/5
	x_3	2/5	1/5	2/5

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

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

ii) 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 8-PSK signal using Ungerboeck set partitioning. Draw the 8 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) For the given two dimensional single parity codes (product code), if the received data sequence is 0.75,0.05,0.10,0.15,1.25,1.0,3.0,0.5 and the LLR of the channel is $L_c(x_1)=1.5$, $L_c(x_2)=0.1$, $L_c(x_3)=0.2$, $L_c(x_4)=0.3$, $L_c(x_{12})=2.5$, $L_c(x_{34})=2.0$, $L_c(x_{13})=6.0$ and $L_c(x_{24})=1.0$. using SISO find the decoded data after two iterations. (10)

ALL THE BEST