CBCS SCHEME

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15EC61

Sixth Semester B.E. Degree Examination, July/August 2021
Digital Communication

Time: 3 hrs. Max. Marks:80

Note: ***Answer any FIVE full questions.***

1 a. Define the pre-envelope. Show the spectral representation of pre-envelopes for low pass signal. **(06 Marks)**

b. Define Hilbert transform. State and prove its properties. **(06 Marks)**

c. For the binary data 10011101, sketch the following :
i) RZ unipoler
ii) NRZ polar
iii) NRZ Bipolar
iv) Manchester format. **(04 Marks)**

2 a. Derive the expression for power spectral density of polar signaling. **(08 Marks)**

b. Derive the expression for complex low pass representation of band pass system. **(08 Marks)**

3 a. Explain the geometric representation of the signal for N = 2 and M = 3 and explain the various parameters. **(06 Marks)**

b. S.T. correlator outputs are statically independent. **(04 Marks)**

c. What do you mean by match filter receiver? Derive the expression for the impulse response of matched filter receiver. **(06 Marks)**

4 a. Using Gram-Schmitt orthoganalization procedure and find the orthnormal basis function for the signal shown below.

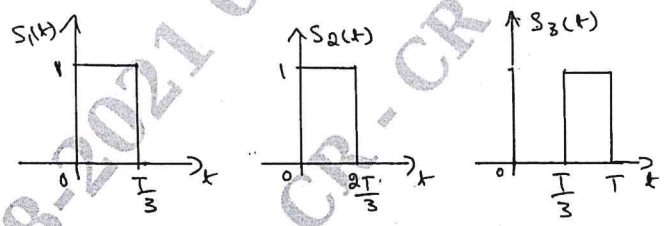

Fig.Q4(a) **(08 Marks)**

b. With neat block diagram explain detector and maximum likelihood decoder of a correlation receiver. **(08 Marks)**

5 a. Explain the generation and detection of BFSK. **(06 Marks)**

b. With the signal space representation of BPSK derive the expression for probability of error. **(06 Marks)**

c. For the input binary sequence 11001001, draw the in phase and quadrature phase components of the QPSK signal. **(04 Marks)**

6 a. With a neat block diagram, explain the generation and coherent detection of QPSK signal. **(06 Marks)**

b. Explain the DPSK transmitter and receiver with neat block diagram. **(06 Marks)**

c. Explain the binary FSK using non coherent detection. **(04 Marks)**

7 a. With a neat diagram of digital PAM system obtain the expression for ISI. (10 Marks)
b. State and prove Nquist criterion for zero ISI. (06 Marks)

8 a. Explain the design by band limited signals with controlled ISI. (10 Marks)
b. With neat diagram and relevant expressions explain the concept of adaptive equalization. (06 Marks)

9 a. Explain the model of a spread spectrum digital communication system. (08 Marks)
b. A slow frequency Happed/MFSK system has the following parameters
i) The number of bits/MFSK symbol = 4
ii) The number of MFSK symbol per hop = 5
iii)Calculate the processing gain of the system in decibels. (02 Marks)
c. List and briefly explain any 3 application of direct sequence spread spectrum. (06 Marks)

10 a. With a neat block diagram explain frequency spread spectrum technique. Also explain the terms chiprate, jamming margin and processing gain. (08 Marks)
b. Explain the effect of dispreading on a narrow band interference in direct sequence spread spectrum systems.
A DSSS signal in designed to have the power ratio P_R/P_N at the intended receiver is 10^{-2}. If the desired $E_b/N_0 = 10$ for acceptable performance. Determine the minimum value of processing gain. (08 Marks)

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