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06EC61

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Digital Communication

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. Missing data may be suitably assumed.

PART – A

1 a. State and prove sampling and reconstruction of low pass signals using Nyquist criterion. **(08 Marks)**

b. Explain 'flat-top' sampling using waveforms and equations. **(07 Marks)**

c. The spectrum of band pass signal g(t) has a bandwidth of 0.8 kHz centered around ±10 kHz. Write the equation for g(t) interms of quadrature components. Find the Nyquist rate and Nyquist interval. **(05 Marks)**

2 a. Explain the need for non uniform quantization. Also explain μ-law and A-law companding. **(08 Marks)**

b. With a neat block diagram explain the concept of PCM. **(07 Marks)**

c. A signal $m_1(t)$ is band limited to 3 kHz and 3 other signals $m_2(t)$, $m_3(t)$ and $m_4(t)$ are band limited to 1.5 kHz each. These are transmitted by means of TDM.

(i) Set up a commutator scheme to realize the multiplexing with each signal sampled at Nyquist rate.

(ii) Find the speed of the commutator in samples / sec and the minimum bandwidth of the channel. **(05 Marks)**

3 a. Explain the working of DPCM transmitter and receiver with relevant mathematical equations. **(07 Marks)**

b. Derive the expression for signal to quantization noise power ratio for delta modulation. Assume that no slope overload distortion exist. **(08 Marks)**

c. For the binary bit sequence 101001101 draw the waveforms using:
(i) Unipolar NRZ (ii) Unipolar RN (iii) Bipolar NRZ (iv) Polar NRZ (v) Polar RZ. **(05 Marks)**

4 a. Describe Nyquist criterion for distortionless baseband transmission. **(06 Marks)**

b. With a neat structure, explain the concept of the adaptive equalization process. **(06 Marks)**

c. The binary data stream 0010110 is applied to the input of a duobinary system. Construct duobinary coder output and corresponding receiver output. Assume that there is precoder at the input. **(08 Marks)**

PART – B

5 a. With the help of block diagram and expressions explain the operation of DPSK transmitter and receiver. **(10 Marks)**

b. Derive the expression for probability of error of a QPSK system. **(10 Marks)**

6 a. Explain the stress used for finding basis functions using Gram-Schmidt orthogonalization procedure. **(12 Marks)**

b. With an illustration explain the importance of geometric interpolation of signals. **(08 Marks)**

7 a. With the block diagrams of a detector and vector receivers, explain the working of a correlation receiver. **(08 Marks)**

b. Derive the expression for SNR of a matched filter. **(12 Marks)**

8 a. What are pseudo-noise sequences? Explain the method to generate a pseudo-noise sequence. **(06 Marks)**

b. Explain with block diagram the model of direct sequence spread coherent PSK system. **(10 Marks)**

c. A fast FH/MFSK system has the following parameters:
The number of bits per MFSK symbol = 4
The number of hops per MFSK symbol = 4
Calculate processing gain of the system in decibels. **(04 Marks)**

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