USN | | | | | | | | | | 06EC61

Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016
Digital Communication

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. With a neat block diagram, briefly explain the various basic signal processing operations in a digital communication system. **(06 Marks)**

b. State and prove sampling theorem for low pass signals. **(08 Marks)**

c. The signal $g(t) = 10\cos(20\pi t)\cos(200\pi t)$ is sampled at the rate of 250 samples per second.

i) Determine the spectrum of the resulting sampled signal.

ii) Specify the cutoff frequency of the ideal reconstruction filter so as to recover g(t) from its sampled version.

iii) What is the Nyquist rate for g(t)? **(06 Marks)**

2 a. Show that, signal to quantization noise ratio of a uniform quantizer is given by, SNR = 1.8 + 6n. **(05 Marks)**

b. Write a note on TDM. **(05 Marks)**

c. Write a note on Robust quantization. **(05 Marks)**

d. With a neat block diagram, explain the three basic functions of a Regenerative Repeater in a PCM system. **(05 Marks)**

3 a. With a neat block diagram, explain DPCM transmitter and receiver. **(08 Marks)**

b. Draw the polar RZ, polar NRZ, unipolar NRZ, Bipolar RZ and Manchester formats for the data 10110101. **(05 Marks)**

c. What are the types of quantization errors which occur in DM? Explain with a neat sketch and equations. **(07 Marks)**

4 a. Explain the need for a precoder in a Duobinary system. With a transmitter and receiver block diagrams, illustrate the working for the data 11010110, assume initial bit = 0. **(08 Marks)**

b. Define intersymbol interference, explain Nyquist criteria for distortionless baseband transmission. **(06 Marks)**

c. Write a note on adaptive equalization. **(06 Marks)**

PART – B

5 a. With a neat block diagrams, explain DPSK trasmitter and receiver. **(08 Marks)**

b. Obtain the expression for probability of error for coherent detection of PSK. **(08 Marks)**

c. A binary data is transmitted using ASK over AWGN channel at a rate of 2.4 MbPS. The carrier amplitude at the receiver is 1 mV. Noise power spectral density is $\frac{N_0}{2} = 10^{-15}$ watts/Hz. Find the average probability of error if detector is coherent. Take $\text{erfc}(5) \approx 3\times10^{-6}$. **(04 Marks)**

6 a. Explain briefly Gram-Schmidt orthogonalization. (10 Marks)
b. Explain geometric interpretation of signals. (05 Marks)
c. Define conceptual model of a digital communication system. (05 Marks)

7 a. Show that the impulse response of a matched filter is a time reversed and delayed version of the input signal. (08 Marks)
b. Consider a finite energy signal g(t) as shown in Fig. Q7 (b)

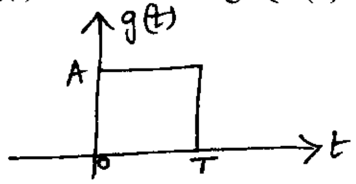

Fig. Q7 (b)

i) Sketch the impulse response of the matched filter.
ii) Determine the output of the matched filter. (06 Marks)
c. Explain the detection of known signal in Noise. (06 Marks)

8 a. Explain the properties of PN sequence. (04 Marks)
b. Explain with a neat block diagram, direct sequence spread coherent BPSK transmitter and receiver. (08 Marks)
c. Explain Fast frequency hopping spread spectrum. (08 Marks)

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