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10EC/TE61

Sixth Semester B.E. Degree Examination, June/July 2017

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. What are the merits and demerits of digital communication? **(06 Marks)**

b. Find the Nyquist rate for the signal $g(t) = \cos^2 400\pi t \cos 1000\pi t$. Plot the spectrum of the signal for n = 0, 1 considering the sampling rate of 1400. **(08 Marks)**

c. Derive the time domain and frequency domain expressions for natural samples. Draw the spectrum of sampled signal. **(06 Marks)**

2 a. What is TDM? Draw the block diagram of TDM and explain its working with waveform. **(08 Marks)**

b. Derive the signal to quantization noise ratio expression for PCM system. Considering midtread uniform quantization, show that $(SNR)_{QdB} = 6n - 7.2$. **(08 Marks)**

c. A telephone signal with cutoff frequency of 4kHz is digitized into 8 bit PCM, sampled at Nyquist rate. Calculate transmission BW and SNR_Q. Assume mid raiser quantization with normalized signal power. **(04 Marks)**

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

b. For the binary data 10110010, give the following binary data formats:
i) Polar format (NRZ)
ii) Bipolar format (NRZ)
iii) Manchester format
iv) Differential encoding **(04 Marks)**

c. Derive the power spectral density expression for NRZ bipolar format and draw the PSD curve. **(08 Marks)**

4 a. Define ISI and explain how it arises. **(06 Marks)**

b. The binary data 011100101 is applied to the input of a modified duobinary system. Construct the modified duobinary coder output and corresponding receiver output without a precoder. **(10 Marks)**

c. What do you mean by equalization? Give the structure of tapped delay line filter and briefly explain how it acts as equalizer. **(04 Marks)**

PART – B

5 a. Derive the expression for probability of bit error considering coherent binary frequency shift keying (FSK) signal. **(12 Marks)**

b. What is the difference between BPSK and DPSK? Given the binary data 10010011 draw BPSK and DPSK waveforms. **(08 Marks)**

6 a. What is Gram Schmidt orthogonalization procedure? Explain briefly. **(06 Marks)**

b. Show that it is possible to construct a set of N orthonormal basis functions from linearly independent signals. **(08 Marks)**

c. What is signal space diagram? Obtain the signal space diagram of QPSK by indicating the signals and basic functions. **(06 Marks)**

7 a. What is maximum likelyhood detector? Explain how the decision is made in detecting the signal in ML detector. **(06 Marks)**

b. State the properties of matched filter and prove any two properties. **(09 Marks)**

c. Explain in brief about correlation receiver. **(05 Marks)**

8 a. What are the advantages of spread spectrum communication? Mention types of SSS. **(05 Marks)**

b. Test all three properties of ML sequence after generating PN sequence for a 3 stage feedback shift register. (Assume 100 as initial state) **(10 Marks)**

c. Define processing gain and jamming margin. What is the relationship between them? **(05 Marks)**

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