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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 likelihood 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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