15182

B. Tech 5th Semester Examination

Communication System-II (NS)

EC-312

Time : 3 Hours   Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all selecting one question each from sections A, B, C and D. Section - E is compulsory.

SECTION - A

1. (a) Explain delta sigma modulation. Compare Delta modulation and PCM?

   (b) A speech signal is transmitted using delta modulation. The pulse repetition frequency is 56 Kbps and the step size is 100mW. Determine the permissible amplitude of the speech signal, which can be transmitted by the DM system avoiding overload.   (10+10=20)

2. (a) Describe process of quantization. Prove that mean square quantization error is $|\bar{e}|^2 = s^2/12$ where s is step size.

   (b) A Television signal having bandwidth of 4.2 MHz is transmitted using binary PCM system. Given that number of quantization levels is 512, determine
      (i) Code word   (ii) Transmission bandwidth
      (iii) Final bit rate
      (iv) Output signal to quantization noise ratio.
                                                      (10+10=20)

SECTION - B

3. (a) What is ISI? Explain the causes of ISI. Enumerate methods to take care of it.

   (b) Explain Gram Schemidt orthogonalisation procedure, with an example. Explain how the basis set is determined by gram Schemidt procedure.   (10+10=20)

4. (a) Define a matched filter and compare its functioning with a correlation.

   (b) Explain how a matched filter can maximize SNR for a given transmitted symbol.   (10+10=20)

SECTION - C

5. (a) Explain the working of a correlator type receiving filter.

   (b) Give the expression for ASK modulated signal. Is ASK a digital modulated signal? Justify your answer. Draw signal space diagram and PSD for ASK signal.   (10+10=20)

6. (a) Discuss the representation and spectral characteristics of ASK, PSK, QAM, QPSK and FSK signals

   (b) Define FSK modulation scheme using appropriate block diagram. Derive an expression for the bit error.
                                                      (10+10=20)

SECTION - D

7. (a) Differentiate between coherent and non coherent detection. Explain QPSK with corresponding equations and constellation diagrams.

   (b) Explain the concept of coherent BPSK with transmitter and receiver block diagrams and obtain the expression for probability of error.   (10+10=20)

8. (a) A set of binary data is sent at the rate of 100 kbps over a channel with 60dB transmission loss and power spectral density $\eta = 10^{-12}$ W/Hz at the receiver. Determine the transmitted power for a bit error probability Pe=10^{-3} for the following modulation schemes.

   (i) Coherent ASK (ii) Non coherent ASK (iii) FSK (iv) PSK (v) DPSK

   (b) Discuss about the coherent detection of QPSK and non-coherent detection of ASK.   (10+10=20)

SECTION - E

9. (i) In a PCM system the signal to noise ratio is to be held to a minimum of 40dB. Determine the number of quantization levels needed.

   (ii) Explain uniform and non uniform quantization.

   (iii) Why clock recovery is required in BPSK demodulator circuit?

   (iv) Sketch the QPSK waveform for the sequence 1100010 assuming the carrier frequency equal to the bit rate.

   (v) Draw the waveform of an unmodulated carrier, PSK and FSK.

   (vi) Describe the difference between uniform and nonuniform companding.

   (vii) What is meant by bandwidth-SNR tradeoff?

   (viii) Explain Nyquist criteria for distortionless base band binary transmission.

   (ix) State the disadvantages of DPSK and PSK.

   (x) What are the advantages of digital communication systems over analog communication systems?

            (2×10=20)