Code No: 07A6EC12 **R07** **Set No. 2**

III B.Tech II Semester Examinations,APRIL 2011
PRINCIPLES OF COMMUNICATION
Common to Instrumentation And Control Engineering, Electronics And Instrumentation Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. Compare the FDM and TDM methods, and explain the application of each method with circuits. [16]

2. (a) Give the mathematical expressions of ASK, PSK and FSK signals. Compare their spectra and state the merits of above signaling schemes.
   (b) Explain the relationship between minimum bandwidth required for an FSK system and bit rate. [12+4]

3. Show that a low pass filter can be used as a discriminator. [16]

4. (a) Consider a single-error-correcting code for 11 data bits.
      i. How many check bits are required?
      ii. Find a parity-check matrix H for this code.
   (b) Show that if c_i and c_j are two code vectors in an (n, K) linear block code, then their sum is also a code vector. [10+6]

5. (a) What are the limitations of Fourier Transform?
   (b) State and explain the Dirichlet conditions, in Fourier series. [8+8]

6. Derive the SSB-SC expression for General Modulating Signal. [16]

7. (a) Consider a telegraph source having two symbols, dot and dash. The dot duration is 0.2s. The dash duration is 3 times the dot duration. The probability of the dot's occurring is twice that of the dash, and the time between symbols is 0.2s. Calculate the information rate of the telegraph source.
   (b) A system has band width of 4Khz and SNR of 28 db at the input of the receiver. Calculate
      i. It's information carrying capacity
      ii. The capacity of channel if it's bandwidth is double while the transmitted signal power remains constant. [10+6]

8. A signal band limited to 1MHz is sampled at a rate of 50% higher than Nyquist rate and quantized into 256 levels using a μ-law quantizer with μ=255.
   (a) Determine the signal to quantization noise ratio.

(b) The SNR found in (a) was unsatisfactory It must be increased at least by 10dB.Would you be able to obtain the desired SNR without increasing the transmission bandwidth, if it was found that a sampling rate 20% above the Nquist rate is adequate. If so, explain how. What is the maximum SNR that can be realized in this way. [16]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: 07A6EC12 **R07** **Set No. 4**

III B.Tech II Semester Examinations,APRIL 2011
PRINCIPLES OF COMMUNICATION
Common to Instrumentation And Control Engineering, Electronics And Instrumentation Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. Find the Fourier transform of a signum function denoted by sgn(t). [16]
2. A voltage v = 200(1+0.4sin ω_mt) sin ω_ct is applied to a resistor of 100 ohms. Find the power dissipated by each of the frequency components present in the voltage v? [16]
3. (a) Sketch the binary ASK, FSK, PSK, and QPSK waveforms for the following sequence 1011.
   (b) A received signal is ± 1mv for T_b second intervals with equal probability. The signal is accompanied by white Gaussian noise with a psd of 10^{-10} Watt/Hz. The receiver integrates the signal plus noise synchronously for Tb second duration and decodes the signal by comparing the integrator output with 0. Find the maximum signaling rate (Minimum value of T_b) such that Pe=10^{-4}.[12+4]
4. (a) State and prove sampling theorem for low pass signals.
   (b) Determine the sampling rate, if an audio rate signal having 5KHz bandwidth is sampled at
      i. Nyquist rate
      ii. 10% above Nyquist rate
      iii. 50% below Nyquist rate. [10+6]
5. Discuss the channel band width for a PAM signal. [16]
6. The linear characteristic deviation in a balanced-slope detector is 3B/2, where 2B is the 3 dB bandwidth of each resonant circuit. Justify. [16]
7. A DMS X has five symbols x_1, x_2, x_3, x_4 and x_5 with respective probabilities 0.2, 0.15, 0.05, 0.1, and 0.5 construct a shannon-Fano code and a huffman code for X and compare their code efficiancies. [16]
8. (a) Construct the standard array for a (6, 3) linear block code whose generator matrix is given below. $G = \begin{vmatrix} 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 0 & 1 \end{vmatrix}$
   (b) Write the advantages of table lookup decoding scheme in linear block codes. [10+6]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: 07A6EC12 **R07** **Set No. 1**

III B.Tech II Semester Examinations,APRIL 2011
PRINCIPLES OF COMMUNICATION
Common to Instrumentation And Control Engineering, Electronics And Instrumentation Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. Write short notes on:
   (a) Entropy
   (b) Redundancy
   (c) Hartley-Shannon Law
   (d) Channel capacity. [16]
2. (a) Explain the working of Adaptive delta modulation system with neat block diagram.
   (b) Clearly bring out the difference between granular noise and slope over load error. [8+8]
3. (a) Determine the output of a DPSK transmitter for the data input 1011011100.
   (b) Draw the phasor diagram and constellation diagram of a 4PSK signal.
   (c) Distinguish between baseband and carrier modulation. [6+6+4]
4. An AM transmitter has an unmodulated carrier power of 10kw. It can be modulated by a sinusoidal modulating voltage to a maximum depth of 40%, without overloading. If the maximum modulation index is reduced to 30% what is the extent up to which the unmodulated carrier power can be increased to avoid overloading? [16]
5. Evaluate (S_0/N_0) of FM and AM, and show that FM behaves as AM for $m_f <= 0.5$. [16]
6. (a) State and prove the frequency convolution theorem.
   (b) If x(t) = A Sinc($2\omega t$), let us use Duality and find X(f). [8+8]
7. Construct a code tree for the following encoder and explain the sequential decoding method. Shown in figure 7 [16]

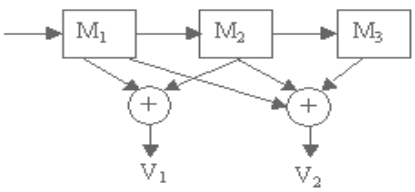

Figure 7

8. Explain the cross-talk in PAM due to the HF and LF limitations of the channel. Which one of two affects more than one channel and why? [16]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: 07A6EC12 **R07** **Set No. 3**

III B.Tech II Semester Examinations,APRIL 2011
PRINCIPLES OF COMMUNICATION
Common to Instrumentation And Control Engineering, Electronics And Instrumentation Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) What do you understand by error control coding? Explain the various methods briefly.
   (b) What are cyclic codes? Explain the algebraic structure of cyclic codes. [8+8]
2. Derive the proprieties of Fourier transform.
   (a) Differentiation
   (b) Integration. [8+8]
3. Show that an increase in the carrier amplitude `A' in FM has a noise-quenching affect. [16]
4. Show that the probability of error in a ASK system is greater than that for a PSK system for transmitting the same amount of signal energy. [16]
5. Explain Flat-top sampling with circuit. [16]
6. A sinusoidal carrier $e_0 = 100cos(2\pi.10^5$ t) is amplitude modulated by a sinusoidal voltage $e_m = 50cos(2\pi.10^3$ t) up to a modulation depth of 50%. Calculate the frequency and amplitude of each sideband and rms voltage of the modulated carrier. [16]
7. (a) A DMS X has four symbols x_1, x_2, x_3, and x_4 with $P(x_1) = 1/2$, $P(x_2) = 1/4$, *and* $P(x_3) = P(x_4) = 1/8$. Construct a Shannon-fano code for X, and show that this code has the optimum property that n_i=$I(x_i)$ and that the code efficiency is 100 percent.
   (b) If a discrete memoryless source whose alphabet consists of K equiprobable symbols. Explain why the use of a fixed-length code for the representation of such a source is about as efficient as any code can be. [12+4]
8. (a) Obtain an expression for the quantization noise in a A-law companded PCM system.
   (b) Explain what type of signals need to be companded? [10+6]

⋆ ⋆ ⋆ ⋆ ⋆