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QUESTION BANK (DESCRIPTIVE)

Subject with Code: DC (16EC421) **Course & Branch**: B. Tech & ECE
Year & Sem: III-B. Tech & II-Sem **Regulation:** R16

UNIT –I

Source Coding Systems

1. a) Explain the DPCM system with neat diagram? [7M]
   b) What are the advantages & disadvantages of DPCM? [5M]
2. a) Write the differences between PCM, DPCM, and DM? [8M]
   b) Describe about Differential Encoding? [4M]
3. Explain the delta modulation system with suitable diagrams? [12M]
4. a) With a neat block diagram explain PCM transmitter and receiver? [7M]
   b) Explain the following line codes for 110101101 [5M]
   i) Unipolar RZ & NRZ ii) polar RZ & NRZ iii) Bipolar RZ &NRZ
5. a) Discuss the Noise considerations in PCM systems? [5M]
   b) Draw and explain the block diagram of regenerative repeaters? [7M]
6. a) Derive the quantization noise in PCM? [6M]
   b) Derive the S/N ratio of PCM? [6M]
7. a) State sampling theorem. [5M]
   b) Consider an audio signal consisting of the sinusoidal term given as x (t) =3cos (500πt)
   i). Determine the SNR noise ratio. When this is quantized using 10 bits PCM.
   ii). How many bits of quantization are needed to achieve a SNR ratio of at least 40dB? [7M]
8. a) Explain the Process of Quantization through one Example? [6M]
   b) Give types of Quantization in Detail? [6M]
9. a) Draw the block diagram of digital communication system? Explain each block? [6M]
   b) A Television signal having a bandwidth of 4.2 MHz is transmitted using binary PCM system. Given that the number of quantization levels is 512. Determine
   i). Codeword length? ii). Transmission Bandwidth? iii). Final Bit rate? iv). Output SNR ratio? [6M]
10. a) Discuss the noise effects in Delta Modulation. [6M]
    b) Give brief note on Encoding, Decoding & Filtering [6M]

UNIT –II

BASEBAND PULSE TRANSMISSION

1. a) Explain the matched filter. [6M]

   b) Derive the properties of matched filter. [6M]

2. Explain in detail about Inter symbol interference and its effects? [12M]

3.a) Describe the baseband M-array PAM Transmission system. [6M]

   b) Give a brief explanation on modified duo binary signaling scheme? [6M]

4. a) Derive the mathematical expression for raised cosine spectrum? [6M]

   b) Explain the rectangular pulse for a matched filter? [6M]

5. Derive the expression for the Nyquist criterion for distortion less baseband transmission in the absence of noise in terms of time domain & Frequency domain [12M]

6. a) Derive the expression for impulse response of a matched filter. [6M]

   b) What is ideal Nyquist solution for Zero ISI? [6M]

7. A polar NRZ waveform has to be received into the help of a matched filter. Here binary '1' is represented as a rectangular positive pulse. Also, binary '0' is represented by a rectangular negative pulse. determine the impulse response of the matched filter. Also sketch it. [12M]

8. What is correlative coding? Explain its types [12M]

9. a) Explain about partial signaling scheme [6M]

   b) Write a brief note on Eye pattern and construct the diagram. [6M]

10. Explain duo-binary signaling scheme through one example. [12M]

UNIT –III

Signal Space Analysis

1.a) Explain the Gram-Schmidt orthogonalization procedure? [7M]

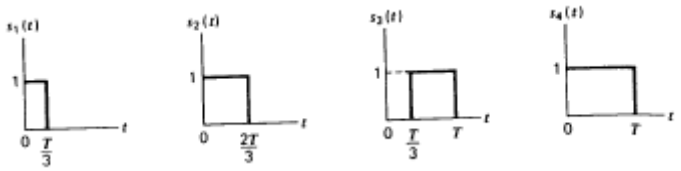
b) Write a brief note on signal constellation diagram.? [5M]

2. a) Illustrate the coherent detection of signals in noise? [6M]

b) With a neat sketch explain the working of correlation receiver [6M]

3. Describe the concept of continuous AWGN channel into a vector channel? [12M]

4. consider the signals $s_1(t)$, $s_2(t)$, $s_3(t)$, $s_4(t)$, shown in fig. Find the orthogonal basis function using Gram Schmidt orthogonalization procedure [12M]



5.Draw the block diagram of the structure and behavior of Matched filter Receiver.Explain?[12M]

6. a) Describe the probability error in correlation receiver? [7M]

b) Explain signal representation of a signal N=2and M=3. [5M]

7. a) What is the concept of orthogonal basis function [7M]

b) Give the condition for Orthogonality for basis function [5M]

8. a) Derive mathematical expression for probability of errors in AWGN channel [6M]

b) Illustrate optimum receiver for AWGN channel [6M]

9. a) Derive the probability error of optimum receiver. [6M]

b) Explain the geometrical representation of signals. [6M]

10. Define the following

i) Additive White Gaussian noise? [3M]

ii) Orthogonality? [3M]

iii) signal vector? [3M]

iv) synthesizer? [3M]

UNIT –IV

Passband Data Transmission

1. a) Explain the generation and detection of BPSK [6M]

   b) Discuss in brief about Non-coherent detection of binary FSK [6M]

2. a) Compare all the digital modulation techniques [6M]

   b) Derive the probability of error for a coherent QPSK system [6M]

3.a) Sketch with a neat diagram of M-array PSK transmitter and receiver [6M]

   b) What is the bandwidth of M-array PSK? [6M]

4. a) Draw the block diagram of QASK transmitter and receiver and explain the operation [6M]

   b) What is the bandwidth of M-array QAM? [6M]

5. a) Illustrate the power spectrum of BPSK and BFSK? [6M]

   b) What is Bandwidth of BPSK, BFSK [6M]

6. a) Draw and Explain the power spectrum of QPSK, DPSK? [6M]

   b) How will you differentiate binary PSK and MPSK, explain with block diagrams [6M]

7. a) Illustrate the pass band transmission model with neat diagram? [6M]

   b) Compare pass band transmission with band pass transmission [6M]

8. a) Describe the generation and detection of DPSK [6M]

   b) Derive the probability of error for DPSK [6M]

9.Draw the block diagram of QPSK transmitter & receiver and explain each block idetail[12M]

10. i) Define coherent digital modulation technique? [3M]

    ii) What is meant by DPSK? [3M]

    iii) Give a brief note on BPSK? [3M]

    iv) Write the two differences between QPSK and BPSK? [3M]

UNIT –V

Channel Coding

1. A generator matrix for a (6, 3) block code is given below

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{bmatrix}$$

a) List all the code vectors. [4M]

b) Find out minimum distance & weight of the code. [4M]

c) How many errors can be detected &corrected? [4M]

2. The generator polynomial of a (15, 11) hamming code is defined by: $g(X) = 1+X+X^{2.}$
a) Develop an encoder and syndrome calculator for this code, using a systematic form of the code. [6M]
b) Write short notes on Hamming codes and burst error codes. [6M]

3 a) What are the types of parity check codes explain with neat diagrams? [6M]

b) Write the advantages and disadvantages of parity check codes. [6M]

4.The parity check matrix for a (7, 4) block code is given below

$$\begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

a) Find the generator matrix (G). [6M]

b) List all the code vectors. [6M]

5. a) What is forward error correction system and explain in detail? [6M]

b) Describe the matrix representation of linear block codes? [6M]

6. a) Draw and explain the block diagram of ARQ system in detail [6M]
b) Write about various types of ARQ systems. [6M]

7.The Generator matrix(G) for a (7, 4) block code is given below

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{bmatrix}$$

a) Find the Parity check matrix (G). [6M]

b) Find code vectors for any eight messages. [6M]

8.a) Explain the Convolutional Encoding and Decoding methods. [6M]
b) Discuss in brief about sequential decoding of convolutional codes. [6M]

9.For a systematic (7, 4) linear block code the sub matrix 'P' is given as P= $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}$

Detect & correct the error using syndrome vector for the code vectors

A)$Y_A = [0111110]$ B) $Y_B = [1011100] C)\ Y_C = [1010000]$ [12M]

10. i) Define code efficiency. [3M]

ii) Define Hamming Distance [3M]

iii) Define code vectors. [3M]

iv) Define the term Constraint length. [3M]

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