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QUESTION BANK (DESCRIPTIVE)

Subject with Code: DC (18EC0415) **Course & Branch**: B. Tech & ECE
Year & Sem: III-B.Tech & I-Sem **Regulation:** R18

UNIT –I

Source Coding Systems

1. a) Explain the DPCM system with neat diagram? [L2] [CO1] [7M]
   b) What are the advantages & disadvantages of DPCM? [L1] [CO1] [5M]
2. a) Write the differences between PCM, DPCM, and DM? [L3] [CO1] [8M]
   b) Describe about Differential Encoding? [L2] [CO1] [4M]
3. Explain the delta modulation system with suitable diagrams? [L2] [CO1] [10M]
4. a) Explain block diagram explain PCM transmitter and receiver? [L2] [CO1] [7M]
   b) Draw the following line codes for 101001110 [L4] [CO1] [5M]
   i) Unipolar RZ & NRZ ii) polar RZ & NRZ iii) Bipolar RZ &NRZ
5. a) Discuss the Noise considerations in PCM systems? [L2] [CO1] [5M]
   b) Draw and explain the block diagram of regenerative repeaters? [L4] [CO1] [7M]
6. a) Derive the quantization noise in PCM? [L4] [CO1] [6M]
   b) Derive the S/N ratio of PCM? [L4] [CO1] [6M]
7. a) State sampling theorem. [L1] [CO1] [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? [L1] [CO1] [7M]
8. a) Explain the Process of Quantization through one Example? [L2] [CO1] [6M]
   b) Classify the types of Quantization ? [L4] [CO1] [6M]
9. a) Draw the block diagram of digital communication system? Explain each block? [L4] [CO1] [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? [L4] [CO1] [6M]
10. a) Discuss the noise effects in Delta Modulation. [L2] [CO1] [6M]
    b) Give brief note on Encoding, Decoding & Filtering [L2] [CO1] [6M]

Short (2mark) Questions

1. State sampling theorem? [L1][CO1] [2M]
2. Define quantization? [L1][CO1] [2M]
3. What is meant by code word length? [L1][CO1] [2M]

4. Give the importance of prediction in Differential pulse code modulation (DPCM)? [L2] [CO1] [2M]

5. Discuss the noise effects in Delta Modulation? [L2] [CO1] [2M]

6. Give the block diagram of DPCM? [L2][CO1] [2M]

7. Define multiplexing? [L1][CO1] [2M]

8. What is the transmission bandwidth of a PAM/TDM system? [L1][CO1] [2M]

9. What is meant by Nyquist rate? [L1][CO1] [2M]

10. Draw the block diagram of PCM scheme showing the elements required for the transmission? [L4][CO2] [2M]

11. Define pulse code modulation? [L1][CO1] [2M]

12. Discuss noise effects in PCM? [L2][CO1] [2M]

13. Define Frequency Division Multiplexing? [L1][CO1] [2M]

14. Write any two differences between DM and DPCM? [L3][CO1] [2M]

15. What is meant by aliasing effect? [L1][CO1] [2M]

16. The signal to quantization noise ratio in a PCM system depends on which criteria? [L3][CO1] [2M]

17. What are the advantage of delta modulation over PCM? [L1][CO1] [2M]

18. What are the differences between ideal sampling and practical sampling? [L1][CO1] [2M]

19. What is meant by source encoder and decoder? [L1][CO1] [2M]

20. A) Define granular noise? [L1][CO1] [2M]

B) Define slope overload distortion? [L1][CO1] [2M]

21. A binary channel with r = 36,000 bps is available for PCM. Find the appropriate values of n, L, f_s by assuming $f_m = 3.2KHz$. [L3][CO1] [2M]

UNIT –II

BASEBAND PULSE TRANSMISSION

1. a) Explain the matched filter. [L2] [CO2] [6M]

b) Derive the properties of matched filter. [L4] [CO2] [6M]

2. Explain in detail about Inter symbol interference and its effects? [L2] [CO2] [10M]

3.a) Describe the baseband M-array PAM Transmission system. [L2] [CO2] [6M]

b) Give a brief explanation on modified duo binary signaling scheme? [L4] [CO2] [6M]

4. a) What is ISI? Draw the basic block diagram of baseband binary data transmission [L4] [CO2] [6M]

b) Explain the rectangular pulse for a matched filter? [L2] [CO2] [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. [L4] [CO2][10M]
6. a) Derive the expression for impulse response of a matched filter. [L4] [CO2] [6M]
   b) What are the remedies to reduce ISI. [L1] [CO2] [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. [L4] [CO2] [10M]
8. What is correlative coding? Explain its types. [L1] [CO2] [12M]
9. a) What are the effects of ISI. [L1] [CO2] [6M]
   b) Write a brief note on Eye pattern and construct the diagram. [L3] [CO2] [6M]
10. Explain duo-binary signaling scheme through one example. [L5] [CO2] [10M]

Short (2mark) Questions

1. What is the role of matched filter in baseband pulse transmission? [L1] [CO2] [2M]
2. Give the Nyquist criterion for zero ISI? [L2][CO2] [2M]
3. How eye pattern obtained on the CRO? [L4][CO2] [2M]
4. List the effects of ISI? [L1] [CO2] [2M]
5. What is meant by correlative coding? [L1] [CO2] [2M]
6. How the raised cosine spectrum obtained in baseband transmission? [L4][CO2] [2M]
7. What is Nyquist Bandwidth? [L1][CO2] [2M]
8. Define ideal Nyquist channel ? [L1][CO2] [2M]
9. List the properties of matched filter? [L1][CO2] [2M]
10. What is the condition for zero inter symbol interference? [L1][CO2] [2M]
11. Define baseband binary PAM system? [L1][CO2] [2M]
12. Write the drawbacks of binary PAM system? [L3][CO2] [2M]
13. Write the performance of data transmission system using eye pattern. [L3][CO2] [2M]
14. Why inter symbol interference takes place in a channel? [L1][CO2] [2M]
15. Draw an illustrative figure to show the operation of a correlation receiver? [L4] [CO2] [2M]
16. How to overcome the ISI problem? [L4][CO2] [2M]
17. Give 2 applications for eye pattern? [L3][CO2] [2M]
18. Define matched filter? [L1][CO2] [2M]
19. Define probability of error? [L1][CO2] [2M]

20. What is meant by inter symbol interference? [L1][CO2] [2M]

UNIT –III

Signal Space Analysis

1.a) What is Gram-Schmidt orthogonalization procedure? Explain [L1] [CO3][7M]

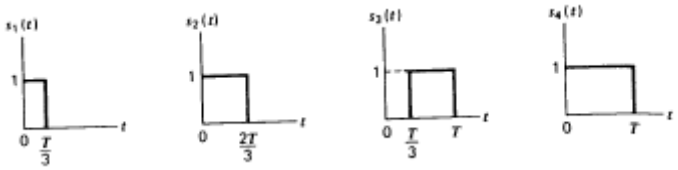
b) Write a brief note on signal constellation diagram.? [L3][CO3][5M]

2. a) Explain the concept of AWGN channel.. [L5] [CO] [6M]

b) With a neat sketch explain the working of correlation receiver. [L2] [CO3][6M]

3. Describe the concept of continuous AWGN channel into a vector channel [L2] [CO3][10M]

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 [L2] [CO3][10M]



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5.Draw the block diagram of the structure and behavior of Matched filter Receiver? [L4] [CO3][12M]

6. a) Explain the the concept of Schwarz Inequality [L2] [CO3] [7M]
b) Explain signal representation of a signal N=2and M=3. [L4] [CO3] [5M]

7. a) What is the concept of orthogonal basis function [L2] [CO3] [7M]

b) Give the condition for Orthogonality for basis function [L5] [CO3] [5M]

. 8. a) Draw the block diagram of a most basic form of digital communication system. [L4] [CO3][6M]

b) Illustrate optimum receiver for AWGN channel [L3] [CO3] [6M]

9. a) Draw the signal constellation diagrams for N=M=2 [L4] [CO3] [6M]

b) Explain the geometrical representation of signals. [L2] [CO3][6M]

10. Explain the following
i) Additive White Gaussian noise? [L1] [CO3][3M]
ii) Orthogonality? [L1] [CO3][3M]
iii) signal vector? [L1] [CO3][3M]
iv) synthesizer? [L1] [CO3][3M]

Short (2mark) Questions

1. Define Gaussian noise?	[L1][CO3] [2M]
2. What is geometric representation of signals?	[L1][CO3] [2M]
3. What is AWGN channel?	[L1][CO3] [2M]
4. What is signal vector?	[L1][CO3] [2M]
5. Define synthesizer?	[L1][CO3] [2M]
6. What is analyzer?	[L1][CO3] [2M]
7. What are the different types of noises occur in digital communication?	[L1][CO3] [2M]
8. Draw the block diagram of integrator?	[L4][CO3] [2M]
9. What is matched receiver?	[L1][CO3] [2M]
10. What is the condition for orthogonal?	[L1][CO3] [2M]
11. Why is prefiltering done before sampling?	[L1][CO3] [2M]
12. What is signal constellation diagram?	[L1][CO3] [2M]
13. Why do we require equalization for a communication system.	[L1][CO3] [2M]
14. Give the concept of Basis Function in Digital communication.	[L2][CO3] [2M]
15. Define the term optimum in digital communication.	[L1][CO3] [2M]
16. Define the term correlators.	[L1][CO3] [2M]
17. What is the application of Gram –Schmitt orthogonalization procedure?	[L1] [CO3] [2M]
18. What is the meaning of signal space representation?	[L1][CO3] [2M]
19. Define signal space and basis function.	[L1][CO3] [2M]
20. Define signaling set.	[L1][CO3] [2M]

UNIT –IV

Passband Data Transmission

1. a) Describe the generation and detection of BPSK	[L4][CO4][6M]
b) Discuss in brief about coherent detection of binary FSK	[L4][CO4][6M]
2. a) Compare all the digital modulation techniques	[L4][CO][6M]
b) Derive the probability of error for a coherent QPSK system	[L2][CO4] [6M]
3.a) Sketch with a neat diagram of M-array PSK transmitter and receiver	[L1][CO4][[6M]
b) What are the parameters you can consider to choose the modulation techniques.	[L5] [CO4] [6M]

4. a) Draw the block diagram of ASK transmitter and receiver and explain the operation. [L4] [CO4][6M]

b) Derive an expression for probability of error in BFSK [L4][CO4][6M]

5. a) Derive an expression for probability of error of coherent binary ASK? [L2][CO4] [6M]

b) What is Bandwidth of BPSK, BFSK [L4][CO4][6M]

6. a) Obtain the expression for probability of error for BPSK. [L5] [CO4][6M]

b) How will you differentiate binary PSK and M-PSK, explain with block diagrams [L4] [CO4] [6M]

7. a) Illustrate the pass band transmission model with neat diagram? [L3] [CO4] [6M]

b) Explain pass band transmission with band pass transmission [L3] [CO4] [6M]

8. a) Describe the generation and detection of DPSK [L3][CO4][6M]

b) A binary data stream 101101100 is to be transmitted using DPSK. Determine the encoded and decoded output. [L4][CO4][6M]

9. Draw the block diagram of QPSK transmitter & receiver and explain each block in detail [L4] [CO4][10M]

10. i) Define coherent digital modulation technique? [L1] [CO4] [3M]

ii) What is meant by DPSK? [L1][CO4][3M]

iii) Give a brief note on BPSK? [L1][CO4][3M]

iv) Write the two differences between QPSK and BPSK? [L2] [CO4] [3M]

Short (2mark) Questions

1. Why PSK always preferable over ASK in coherent detection? [L1][CO4] [2M]
2. Define coherent digital modulation technique? [L1][CO4] [2M]
3. Define ASK. [L1][CO4] [2M]
4. What is meant by DPSK? [L1][CO4] [2M]
5. What is the difference between PSK and FSK? [L1][CO4] [2M]
6. What is the major advantage of coherent PSK over coherent ASK? [L1][CO4] [2M]
7. Compare the major difference between a QPSK & MSK signal. [L2][CO4] [2M]
8. List the advantages of Passband transmission. [L1][CO4] [2M]
9. Compare the difference between coherent & non coherent binary modulation scheme. [L2][CO4] [2M]

10. Write the two differences between DPSK and BFSK? [L3][CO4] [2M]
11. Define non-coherent digital modulation technique? [L1][CO4] [2M]
12. Give a brief note on BPSK? [L2][CO4] [2M]
13. What is the role of QPSK? [L1][CO4] [2M]
14. What are the two forms of synchronization required for the operation of coherent detector? [L1] [CO4] [2M]
15. What is meant by offset QPSK. [L1][CO4] [2M]
16. What is meant by Probability of error & Bit Error Rate? [L1][CO4] [2M]
17. What does 8-QAM & 16-QAM means? [L1][CO4] [2M]
18. Write the two differences between QPSK and BPSK? [L3][CO4] [2M]
19. What are the advantages of M-ARY PSK over BPSK? [L1][CO4] [2M]
20. List the types of digital modulation techniques? [L1][CO4] [2M]

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. [L5][CO5][4M]

b) Find out minimum distance & weight of the code. [L5][CO5][4M]

c) How many errors can be detected &corrected? [L5][CO5][4M]

2. a) Explain the concept of matrix representation of Linear block codes. [L2] [CO5] [6M]
   b) Write short notes on Error detection and correction codes. [L2][CO5][6M]

3. a) What are the types of parity check codes explain with neat diagrams? [L3][CO5][6M]

   b) Explain the concept of Parity check matrix for linear block codes. [L2][CO5][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). [L5][CO5][6M]

b) List all the code vectors. [L3][CO5][6M]

5. a) What is forward error correction system and explain in detail? [L2][CO5][6M]

   b) Describe the matrix representation of linear block codes? [L1][CO5][6M]

6. a) Draw and explain the block diagram of ARQ system in detail [L5] [CO5][6M]
   b) Write about various types of ARQ systems. [L5][CO5][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). [L5][CO5][6M]

   b) Find code vectors for any eight messages. [L5][CO5][6M]

8. a) Explain the Convolutional Encoding and Decoding methods. [L2] [CO5][6M]
   b) Discuss in brief about sequential decoding of convolutional codes. [L4][CO5][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) $Y_B = [1011100]C)\ Y_C = [1010000]$ [L4][CO5] [10M]

10. i) Define code efficiency. [L1][CO5][3M]

   ii) Define Hamming Distance [L1][CO5][3M]

   iii) Define code vectors. [L1][CO5][3M]

   iv) Minimum distance. [L1][CO5][3M]

Short (2mark) Questions

1. Define Interleaving. [L1][CO5] [2M]
2. Define convolutional coding. [L1][CO5] [2M]
3. What is the use of syndromes explain syndrome decoding? [L1][CO5] [2M]
4. What are convolutional codes how they are different from block codes. [L1][CO5] [2M]
5. What is constraint length for convolutional encoders? [L1][CO5] [2M]
6. What is Repetition codes. [L1][CO5] [2M]
7. Define even and odd parity coding with suitable example? [L1][CO5] [2M]
8. Write the of encoder of (7,4) Hamming code with suitable diagram? [L1][CO5] [2M]
9. What are the types of error control methods? [L1][CO5] [2M]
10. How many coding techniques are used for transmission the digital data? [L1][CO5] [2M]
11. Define Parity & Parity check code. [L1][CO5] [2M]
12. Define the term Hamming distance in coding. [L1][CO5] [2M]
13. What is meant by code efficiency? [L1][CO5] [2M]
14. Write about code tree and trellis diagram for convolution encoder. [L3][CO5] [2M]

15. Define the term Constraint length (K) in convolutional code. [L1][CO5] [2M]

16. Define the term Metric in Viterbi Algorithm. [L1][CO5] [2M]

17. Define the term Surviving path in Viterbi Algorithm. [L1][CO5] [2M]

18. List the advantages of convolutional codes over block codes? [L4][CO5] [2M]

19. Give the relation between Euclidean distance and partition in trellis code modulation. [L2] [CO5] [2M]

20. Define the following terms [L1][CO5] [2M]

a) Codeword b) Minimum Distance c) code vectors d)Hamming Distance