Reg. No. :

Question Paper Code:U4B03

B.E./B.Tech. DEGREE EXAMINATION, NOV 2023

Fourth Semester

Biomedical Engineering

21UBM403 - COMMUNICATION SYSTEMS

(Regulations 2021)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1.	Differentiate AM and FM	CO1-U
2.	Define frequency deviation.	CO1-U
3.	Write about a regenerative repeaters.	CO1-U
4.	Define sampling	CO1-U
5.	Define FSK	CO1-U
6	List out the applications of Digital modulating techniques.	CO1-U
7	Define Entropy.	CO1-U
8	Explain about the source coding.	CO1-U
9	List the application of Spread spectrum Modulation.	CO1-U
10	Give the principle of Frequency hopping spread spectrum	CO1-U

PART – B (5 x 16= 80 Marks)

11.	(a)	Discuss and analyze the generation and detection of VSB	CO2-App	(16)
		Or		
	(b)	Classify the types of FM modulators and explain in detail the two types of direct FM Modulators	CO2-App	(16)

12. (a) A Compact Disc records audio signals digitally by using PCM. CO2-App (16)
Assume the audio signal bandwidth to be 15kHz.
  i) What is the Nyquistrate. (4)
  ii) If the nyquist Samples are quantized into L=65,536 levels and then binary coded, determine the number of binary digits required to encode a sample. (4)
  iii) Determine the number of binary digits per second(bits/sec) required to encode the audio signal. (4)
  iv) For Practical reasons, the signals are sampled at a rate well above the nyquist rate at 44100 samples per second. If L=65,536, Determine number of bits per second required to encode the signal and transmission bandwidth of encoded signal. (4)

Or

(b) The bandwidth of signal input to the PCM is restricted to 4kHz. CO2-App (16)
The input various from -3.8V to +3.8V and has the average Power of 30mW. The Required signal to noise ratio is 20dB. The Modulator Produces binary input. Assume uniform quantization.
  i) Calculate Number of bits required per sample. (7)
  ii) Outputs of 30 such PCM coders are time Multiplexed. What is the minimum required transmission bandwidth for the Multiplexed signal? (5)
  iii) Calculate the signaling rate. (4)

13. (a) Discuss the operation of FSK transmitter and receiver with neat CO1-U (16)
diagram draw its waveform and constellation diagram.

Or

(b) Define 8 phase shift keying and explain in detail about the 8 PSK CO1-U (16)
transmitter and Receiver draw its waveform and constellation diagram.

14. (a) Consider a linear block code with generator matrix, CO2-App (16)

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

  i) Determine the parity check matrix
  ii) Determine the error detecting and correcting capability of the code.
  iii) Draw the encoder and syndrome calculation circuit.
  iv) Calculate the syndrome for the received vector r=[1 1 0 1 0 1 0].

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(b) Consider a rate ½, non-systematic convolutional code with, g1={1, 0, 1} and g2={1 1 1}. Determine the encoder output corresponding to the data sequence {1, 0, 1, 0,1}. If the first and fourth bits of the encoded sequence are affected during transmission, demonstrate the error correcting capability of the Viterbi algorithm.   CO2-App   (16)

15. (a) Explain the principle of DS Spread spectrum technique   CO1-U   (16)

<div align="center">Or</div>

(b) Describe the Frequency hopping spread spectrum technique   CO1-U   (16)

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