GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–VI (NEW) EXAMINATION – WINTER 2024

Subject Code:2161001   **Date:20-11-2024**
Subject Name:Digital Communication
Time:02:30 PM TO 05:00 PM   **Total Marks:70**
Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	State and prove the sampling theorem for the low pass signal.	**03**
	(b)	With the help of neat diagram explain the transmitter and receiver of Pulse Code Modulation	**04**
	(c)	Explain companding process in PCM and state the different laws for companding	**07**
Q.2	**(a)**	Discuss the significance of Eye Diagram in the pulse detection technique	**03**
	(b)	Explain Inter symbol interference in digital communication and how to achieve zero ISI.	**04**
	(c)	Derive the formula for signal to quantization noise ratio for PCM.	**07**

OR

	(c)	Explain the working principle of 1-bit DPCM. List the problems associated with it.	**07**
Q.3	**(a)**	Discuss the effect of slope overloading in delta modulation .	**03**
	(b)	Draw the block diagram of regenerative repeater and briefly explain the function of each block	**04**
	(c)	List out different parameter that should be examined for the selection of the line codes? Explain each in brief .	**07**

OR

	(a)	Describe frame structure of T1 system in brief	**03**
	(b)	Differentiate between RZ and NRZ line codes	**04**
	(c)	Explain the concept of scrambling with suitable example.	**07**
Q.4	**(a)**	Explain Noise Figure (NF) in detail.	**03**
	(b)	Discuss the advantages and disadvantages of MSK as compared to QPSK	**04**
	(c)	Explain Quadrature Amplitude modulation. Compare 8-QAM with 8-PSK.	**07**

OR

(a)	Discuss the MSK modulation technique and list the merits of it	**03**
(b)	Differentiate between Coherent and Non Coherent detection	**04**
(c)	With the help of block diagram, waveforms and expressions explain the operation of DPSK transmitter	**07**

Q.5	**(a)**	List out types of random variable and explain them.	**03**
	(b)	Explain central limit theorem and its significance in channel estimation.	**04**
	(c)	Discuss and prove properties of CDF,	**07**

OR

(a)	A Discrete Memory less Source X has four symbols x_1, x_2, x_3, x_4 with probabilities $P(x_1) = 0.4$, $P(x_2) = 0.3$, $P(x_3) = 0.2$, $P(x_4) = 0.1$. Calculate Entropy $H(X)$.	**03**
(b)	Explain Cyclic code with suitable example.	**04**
(c)	Discuss practical communication system in the light of Shannon theorem.	**07**

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