

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – WINTER 2023****Subject Code:2161001****Date:02-12-2023****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) Define for a random variable. i. Mean square ii. Variance iii. Standard deviation	03
	(b) Explain Companding in PCM	04
	(c) Write a short note on Delta Modulation.	07
Q.2	(a) Explain advantage and disadvantage of digital communication over analog communication.	03
	(b) What is sampling? What are different types of sampling.	04
	(c) Write a short note on Chebyshev's inequality.	07
	OR	
	(c) Write a short note in Central limit theorem.	07
Q.3	(a) What is CDF? Write the properties of CDF.	03
	(b) Explain how error free communication can be achieve over noisy channel?	04
	(c) What is block codes? Explain with suitable example.	07
	OR	
Q.3	(a) What is PDF? Write the properties of PDF.	03
	(b) Give comparison of channel coding and source coding.	04
	(c) What is convolution codes? Explain with suitable example.	07
Q.4	(a) Which are the ideal requirements for the line coding?	03
	(b) Derive the expression for Conditional probability.	04
	(c) Explain the operation of BPSK transmitter and receiver.	07
	OR	
Q.4	(a) Differentiate between Coherent and Non Coherent detection	03
	(b) Explain quantization in detail. Derive equation for quantization error.	04
	(c) Explain non-coherent detection of Frequency-Shift keying signal with necessary equations.	07
Q.5	(a) Define: Noise temperature, Noise bandwidth, Noise figure	03
	(b) Explain the concept of correlation.	04
	(c) Explain Quadrature Phase Shift Keying (QPSK) modulation.	07
	OR	
Q.5	(a) Give comparison of coded and uncoded system.	03
	(b) Explain regenerative repeater.	04
	(c) Construct a systematic (7,4) cyclic code using a generator polynomial $g(x) = x^3 + x^2 + 1$.	07
