Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE – SEMESTER- V EXAMINATION-SUMMER 2023
Subject Code: 3151104   **Date: 27/06/2023**
Subject Name: Analog and 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)**	Compare Analog and Digital Communication.	**03**
	(b)	Give Comparison between Am and FM.	**04**
	(c)	State and prove sampling theorem. Also explain types of sampling in details.	**07**
Q.2	**(a)**	Explain Vestigial Side Band AM in brief.	**03**
	(b)	State and explain Sampling theorem.	**04**
	(c)	An AM signal is represented by	**07**

$e(t) = (10+ 4 \cos 1000 \pi t) \cos (2 \pi 106 t)$.

Find: Modulation index, total power , sideband power, efficiency and transmission Bandwidth required for this AM signal.

OR

	(c)	A 10 kw carrier wave is amplitude modulated at 80%. Compute sideband power, total power and efficiency.	**07**
Q.3	**(a)**	Compare DSB-FC, DSB-SC, SSB,VSB	**03**
	(b)	What is Carson's rule in FM?	**04**
	(c)	A 107.6 MHz carrier is frequency modulated by a 7 KHz sine wave. The resultant FM signal has a frequency deviation of 50 KHz.	**07**

i) Find the carrier swing of the FM signal.
ii) Determine the highest and lowest frequencies attained by the modulated signal
iii) What is the modulation index of the FM wave?

OR

Q.3	**(a)**	With related to Amplitude modulation discuss following parameters: (i) Modulation index (ii) Modulation depth (iii) Bandwidth requirement	**03**
	(b)	Discuss drawbacks of direct method for FM generation.	**04**
	(c)	An FM wave is given by	**07**

$e(t) = 10\sin (5 \times 108 t + 4\sin 1250t)$.

Determine: (i) The carrier frequency (ii) Modulating frequency (iii) The modulation index (iv) The maximum deviation.

Q.4	**(a)**	What is aliasing effect?	**03**
	(b)	Describe the effect of slope overloading and hunting in delta modulation.	**04**
	(c)	A compact disc (CD) records audio signals digitally by PCM. Assume audio signal's BW to be 15 KHz. If signals are sampled at a rate 20% above Nyquist rate for practical reasons and the samples are quantized into 65,536 levels, determine bps required to	**07**

encode the signal and minimum BW required to transmit encoded signal.

OR

Q.4	**(a)**	Discuss advantages and disadvantages of delta modulation.	**03**
	(b)	What is companding process in PCM? State laws for the same.	**04**
	(c)	A TV signal having a BW of 4.2 MHz is transmitted using binary PCM system. Given that the number of quantization levels is 512. Determine Code word length, Transmission BW, Final bit rate and Output signal to quantization noise ratio.	**07**
Q.5	**(a)**	For the data stream 10111001 draw the following formats. i) Polar NRZ ii)Bipolar NRZ iii) AMI NRZ	**03**
	(b)	Differentiate BPSK,QPSK and DPSK.	**04**
	(c)	What is scrambling? Explain scrambling and descrambling process with block diagram and suitable example	**07**

OR

Q.5	**(a)**	What is line coding? What are the ideal requirements from line coding?	**03**
	(b)	Draw the waveform of OQPSK generator for bit pattern 01101011001.	**04**
	(c)	Explain eye diagram. How ISI and other signal degradation can be studied using eye-diagram.	**07**

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