Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V(NEW) EXAMINATION – SUMMER 2022

Subject Code:3151104 Date:09/06/2022

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)**	Define Following Terms: (1) Modulation Index (2) Power spectral density (3) Signal Distortion	**03**
	(b)	What is modulation? Why modulation required? Describe in detail.	**04**
	(c)	Draw basic diagram of both analog and digital communication system and explain in brief	**07**
Q.2	**(a)**	Give comparison between AM and FM systems.	**03**
	(b)	An audio signal given as 15 sin (2π(1500t)) amplitude modulates a carrier given as 60 sin (2π(100,000t)). Determine the following 1. Sketch the Audio signal 2. Sketch the carrier signal. 3. Determine the percentage of index 4. Draw the frequency spectrum of modulated signal with all frequency component	**04**
	(c)	List the methods of generation of SSB. Explain any one method in detail. Discuss the advantages and disadvantages of SSB over DSB modulation technique.	**07**
		OR	
	(c)	Explain Armstrong method of FM generation with neat diagram.	**07**
Q.3	**(a)**	Draw the transfer function of ideal phase shifter.	**03**
	(b)	Explain pre-emphasis and de-emphasis in relation to FM.	**04**
	(c)	Explain Phased Look Loop with all necessary details.	**07**
		OR	
Q.3	**(a)**	What is the mathematical expression for instantaneous frequency for frequency modulation and Phase Modulation?	**03**
	(b)	An angle modulated signal with carrier frequency $\omega_c = 2\pi \times 10^5$ is described by the equation $e(t) = 10\cos(\omega_c t + 5\sin 3000t + 10\sin 2000\pi t)$ Find: power of modulated signal, frequency deviation Δf and deviation ratio β	**04**
	(c)	Draw the general block diagram of a super heterodyne receiver and briefly explain the function of each block.	**07**
Q.4	**(a)**	What is line coding? What are the ideal requirements from line coding?	**03**

	(b)	State and prove sampling theorem in time domain. Explain aliasing.	**04**
	(c)	Explain Delta Modulation in detail. Also discuss its advantages and disadvantages	**07**

OR

Q.4	**(a)**	What is Inter Symbol Interference? Explain the Nyquist's first criteria for zero ISI.	**03**
	(b)	Draw the block diagram of Regenerative repeater and briefly explain the function of each block.	**04**
	(c)	Derive the formula for signal to quantization noise ratio for PCM.	**07**
Q.5	**(a)**	Explain the zero forcing equalizer with necessary diagrams and expressions.	**03**
	(b)	Explain in brief Frequency Shifting Keying (FSK) technique and list the applications of it.	**04**
	(c)	Draw the block diagram of GMSK modulation technique and explain it.	**07**

OR

Q.5	**(a)**	Explain Noncoherent detection of Amplitude-Shift keying (ASK) signal with necessary equations and diagrams.	**03**
	(b)	Explain coherent detection of Frequency-Shift keying (FSK) signal with necessary equations.	**04**
	(c)	Discuss the MSK modulation technique and list the merits of it	**07**

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