Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–V (NEW) EXAMINATION – WINTER 2024

Subject Code:3151104 Date:02-12-2024

Subject Name:Analog and Digital Communication

Time:10:30 AM TO 01:00 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: Modulation index , SNR and Channel capacity.	**03**
	(b)	What is modulation? Why modulation required? Describe in detail.	**04**
	(c)	Draw and Explain block diagram of Communication System.	**07**
Q.2	**(a)**	Give comparison between AM and FM systems.	**03**
	(b)	An audio signal given as 15 sin ($2\pi(1500t)$) amplitude modulates a carrier given as 60 sin ($2\pi(100{,}000t)$). 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)	How AM waves are detected in Envelop Detector method.	**07**
		OR	
	(c)	Explain Armstrong method of FM generation with neat diagram.	**07**
Q.3	**(a)**	Explain DSB amplitude modulation with necessary figures.	**03**
	(b)	Explain pre-emphasis and de-emphasis in relation to 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. 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?	**07**
		OR	
Q.3	**(a)**	What is Carson's rule in FM?	**03**
	(b)	State the difference between PCM, DPCM and Delta modulation.	**04**
	(c)	What is a super heterodyne receiver? Explain with block diagram.	**07**

Q.4	**(a)**	State and prove Sampling theorem.	**03**
	(b)	Discuss advantages and disadvantages of delta modulation	**04**
	(c)	Write a note on Differential Pulse Code Modulation.	**07**
		OR	
Q.4	**(a)**	What is Inter Symbol Interference? Explain the Nyquist's first criteria for zero ISI.	**03**
	(b)	Describe the effect of slope overloading and hunting in delta modulation.	**04**
	(c)	State advantages and disadvantages of digital communication over analog communication.	**07**
Q.5	**(a)**	Explain Noncoherent detection of Amplitude-Shift keying (ASK) signal with necessary equations and diagrams.	**03**
	(b)	What is an Eye diagram? Explain with example.	**04**
	(c)	What is scrambling? Explain scrambling and descrambling process with block diagram and suitable example.	**07**
		OR	
Q.5	**(a)**	Draw the signals for Unipolar NRZ, Unipolar RZ, Polar RZ for Data stream 1110000111.	**03**
	(b)	Differentiate BPSK,QPSK and DPSK.	**04**
	(c)	Draw and explain a Regenerative Repeater in detail.	**07**

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