Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VI EXAMINATION – WINTER 2025

Subject Code:3163206 Date:02-12-2025

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.**

Q.1	**(a)**	What do you mean by digital modulation technique?	**03**
	(b)	Draw the basic building block for communication system and explain working of each block.	**04**
	(c)	What is noise figure? Derive the expression noise figure and noise figure for cascade network with support necessary diagram.	**07**
Q.2	**(a)**	What is modulation index in amplitude modulation? What will be total modulation index for multitone AM wave.	**03**
	(b)	Explain the detection technique for ASK with suitable diagram.	**04**
	(c)	Describe the DSB-SC generation method using balance modulation technique. Also derive the expression for the AM modulated wave.	**07**
		OR	
	(c)	Derive the expression for single tone amplitude modulated wave for DSB and SSB.	**07**
Q.3	**(a)**	Explain the types of FM modulation techniques?	**03**
	(b)	What are coherent digital modulation techniques?	**04**
	(c)	A carrier wave of frequency 1GHz and amplitude 3 volts is frequency modulated by a sinusoidal modulating signal frequency of 500 Hz and of peak amplitude 1 volt. The frequency deviation is 1kHz. The level of the modulation waveform is changed to 5volt peak and the modulating frequency is changes to 2kHz. Obtained the expression for new modulated waveform?	**07**
		OR	
Q.3	**(a)**	Explain the types of FM demodulation techniques?	**03**
	(b)	What is FSK? Draw the block diagram for FSK detection.	**04**
	(c)	A 107.6 MHz carrier signal is frequency modulated by a 7kHz since wave. The resultant FM signal has a frequency deviation of 50 kHz. Determine the following. (i) The carrier swing of the FM signal. (ii) The highest and lowest frequencies attained by the modulated signal. (iii) The modulation index of the FM wave.	**07**
Q.4	**(a)**	Compare the AM and FM receiver.	**03**
	(b)	Draw the AM transmitter and explain the working of each block.	**04**
	(c)	Draw the block diagram of Tuned radio Frequency (TRF) Receiver and explain its operation. Describe the problems in TRF receiver	**07**
		OR	
Q.4	**(a)**	Explain the feature of a radio receiver.	**03**
	(b)	Explain the PLL detector for FM.	**04**
	(c)	Draw the general block diagram of superheterodyne receiver and briefly explain the function of each block.	**07**

Q.5	**(a)**	What PCM modulation? Draw its schematic.	**03**
	(b)	Explain the DPCM modulation technique and also mentioned the merits as compared to PCM.	**04**
	(c)	Explain CDMA in detail with suitable diagram and its applications.	**07**

OR

Q.5	**(a)**	What is delta modulation? Also write its advantages.	**03**
	(b)	Explain the pulse analog modulation scheme.	**04**
	(c)	Draw Block diagram of frequency hopping spread spectrum (FHSS) system and Explain Frequency Hopping with necessary waveforms.	**07**

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