Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–V (NEW) EXAMINATION – WINTER 2020

Subject Code:3151104 **Date:01/02/2021**

Subject Name:Analog and Digital Communication

Time:10:30 AM TO 12:30 PM **Total Marks: 56**

Instructions:

1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	Draw the detailed Block Diagram of Communication System.	**03**
	(b)	Why is Modulation required in Communication? Discuss in detail.	**04**
	(c)	(i) Discuss Channel Capacity relative to Channel Bandwidth and Signal Power.	**04**
		(ii) Discuss the Trade off between Bandwidth and SNR.	**03**
Q.2	**(a)**	Compare Analog and Digital Communication.	**03**
	(b)	A certain transmitter radiates 9kW with the carrier unmodulated and 10.125kW when the carrier is sinusoidally modulated. Calculate the modulation index. If another sine wave is simultaneously transmitted with modulation index 0.4, determine the total radiated power.	**04**
	(c)	Derive expression of Total transmission bandwidth required for DSBSC and SSB in terms of modulating signal frequency. Make suitable comment for bandwidth efficient Amplitude Modulation.	**07**
Q.3	**(a)**	Compare Amplitude Modulation and Angle Modulation.	**03**
	(b)	Given modulating bit stream is 10010011. Draw the ASK,FSK and BPSK signals. Also draw the waveforms for carrier and modulating bit stream.	**04**
	(c)	Draw and explain every block in Superheterodyne receivers.	**07**
Q.4	**(a)**	Enlist various methods of FM generation. Explain any one of them.	**03**
	(b)	Explain QPSK modulator with schematic diagram.	**04**
	(c)	Explain Preemphasis and Deemphasis in FM broadcasting with block diagram , filter circuits and frequency response.	**07**
Q.5	**(a)**	Draw the detailed block diagram of PCM.	**03**
	(b)	Calculate the bit rate for T1 carrier system.	**04**
	(c)	Explain DPCM with block diagram.	**03**
		With mathematical analysis prove that SQNR is improved in DPCM as compared to PCM.	**04**
Q.6	**(a)**	State ‘Sampling Theorem’. Discuss Nyquist Rate of	**03**

sampling.

	(b)	A message signal x(t) band limited to 3 KHz is sampled at a rate 33.34 % higher than the Nyquist rate. Calculate the sampling rate. The maximum acceptable error in the sample amplitude (the maximum quantization error) is 0.5% of the peak amplitude m_p . The quantized samples are binary coded. Find the bit rate. Find the minimum bandwidth of a channel required to transmit the coded binary signal. If 24 such signals are time division multiplexed, determine the maximum transmission bandwidth required to transmit the multiplexed signal.	**04**
	(c)	Explain 'Slope Overload' with diagram.	**04**
		Derive the condition to avoid slope overload considering $x(t)=A\cos(\omega_m t)$ as input signal, δ as step size and T_s as sampling interval.	**03**
Q.7	**(a)**	Enlist the properties of Line Codes.	**03**
	(b)	Explain how to read an eye diagram.	**04**
	(c)	Explain Data Scrambling with suitable example.	**07**
Q.8	**(a)**	Give the full forms of (i) ISI (ii) PSD (iii) AMI	**03**
	(b)	Draw the signals for Unipolar NRZ, Unipolar RZ, Polar NRZ, Polar RZ for 10100111 data.	**04**
	(c)	Explain Clock Recovery in PCM system.	**07**

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