

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 6 – EXAMINATION – SUMMER 2026

Subject Code: 3163206

Date: 08/06/2026

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.**

- Q.1**
- (a)** Define Double Sideband Suppressed Carrier (DSB-SC) modulation with Suitable waveforms? **03**
 - (b)** A carrier is frequency modulated with a sinusoidal signal of 2 kHz resulting in a maximum frequency deviation of 5 kHz. Find i) Modulation index ii) bandwidth of modulated signal. **04**
 - (c)** Derive mathematical representation of Amplitude Modulation and explain the signification of Modulation Index with necessary waveforms **07**
- Q.2**
- (a)** Explain the SSB receivers? **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 **04**
 - 1. Determine the percentage of index
 - 2. Determine all frequency components
 - (c)** Define is a noise figure? Derive the expression of noise figure for cascaded stages of amplifiers. **07**
- OR
- Q.2**
- (c)** Explain the classification of the noise and drive the expression for noise temperature **07**
- Q.3**
- (a)** What is meant by bit error rate (BER) and probability of error in digital communication? **03**
 - (b)** Explain the ASK modulation technique with suitable wave forms. **04**
 - (c)** Explain the Adaptive differential PCM and how it is differed from the DPCM? **07**
- OR
- Q.3**
- (a)** Explain the BPSK modulation technique with suitable waveforms. **03**
 - (b)** Draw ASK and FSK waveform for the given binary data: 1001001101011001 **04**
 - (c)** What is PWM? Explain the generation method with suitable diagrams and waveforms. **07**
- Q.4**
- (a)** Explain the difference between Coherent and Non-Coherent Detection techniques **03**
 - (b)** What does coherent demodulation of binary ASK? **04**
 - (c)** What is an AM transmitter? Draw the block diagram of the AM transmitter and explain each block. **07**
- OR
- Q.4**
- (a)** What is the bandwidth of the QPSK signal? **03**

	(b) Explain the non-coherent FSK detection technique.	04
	(c) What is an FM receiver? Draw the block TRF receiver and explain each block	07
Q.5	(a) Explain the importance of Pre-emphasis and De-emphasis circuits in FM. Sketch a typical Pre-emphasis and De-emphasis circuit	03
	(b) Explain the concept and working of Direct Sequence Spread Spectrum (DSSS) communication	04
	(c) Draw the circuit diagram of delayed AGC and explain its operation.	07
	OR	
Q.5	(a) Explain the Wideband FM generation method in brief.	03
	(b) Draw and explain the block diagram of a Frequency Hopping Spread Spectrum (FHSS) system. Illustrate frequency hopping using waveforms	04
	(c) Explain foster seeley FM discriminator method with a neat diagram.	07
