Reg. No.																

Question Paper Code	14495

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2026

Fourth Semester

Electronics and Instrumentation Engineering

(Common to Electronic Instrumentation and Control Engineering)

24EIPC403 - PRINCIPLES OF COMMUNICATION ENGINEERING

Regulations - 2024

Duration: 3 Hours | Max. Marks: 100

PART – A (i) (MCQ)
(16 × 1 = 16 Marks)
Answer ALL Questions

		Marks	K – Level	CO
1.	The modulation index for AM should be _____ a) Greater than 1 b) Equal to 2 c) Negative d) Less than or equal to 1	1	K2	CO1
2.	SSBSC transmission saves _____ a) Power and bandwidth b) Frequency only c) Noise only d) Carrier power only	1	K3	CO1
3.	Vestigial Sideband transmission is mainly used in _____ a) Radio broadcasting b)Television broadcasting c) Radar systems d) Satellite uplink only	1	K2	CO1
4.	Angle modulation includes _____ a) FM and PM b) AM and PAM c) PCM and PWM d) ASK and FSK	1	K1	CO2
5.	According to Carson's rule, FM bandwidth is approximately a) 2fm b) $2(\Delta f + fm)$ c) $\Delta f/fm$ d) $fm/\Delta f$	1	K3	CO2
6.	In NBFM, the modulation index is _____ a) Much greater than 1 b) Equal to infinity c) Less than 1 d) Equal to 10	1	K1	CO2
7.	In PAM, the _____ of pulses varies. a) Width b) Position c) Amplitude d) Frequency	1	K1	CO3
8.	Adaptive Delta Modulation improves performance by _____ a) Keeping step size fixed b) Changing carrier amplitude c) Varying step size automatically d) Reducing bandwidth to zero	1	K3	CO3
9.	In TDM, multiple signals share the channel by _____ a) Different frequencies b) Different amplitudes c) Different time slots d) Different phases	1	K2	CO3
10.	Which digital modulation technique is most affected by noise? a) FSK b) PSK c) ASK d) QPSK	1	K1	CO4

11.	In PSK, the _____ of the carrier changes according to input data.		*1*	*K3*	*CO4*
	a) Phase	b) Amplitude			
	c) Frequency	d) Width			
12.	A telemetry system generally consists of _____		*1*	*K3*	*CO4*
	a) Oscillator only	b) Amplifier only			
	c) Antenna only	d) Sensor, transmitter and receiver			
13.	The entropy of a source is measured in _____		*1*	*K2*	*CO5*
	a) Joules	b) Bits/symbol			
	c) Watts	d) Hertz			
14.	Shannon-Hartley theorem relates channel capacity with _____		*1*	*K3*	*CO5*
	a) Power and phase	b) Frequency and wavelength			
	c) Bandwidth and signal-to-noise ratio	d) Entropy and coding only			
15.	The main advantage of FHSS is ___		*1*	*K2*	*CO6*
	a) Resistance to jamming	b) High bandwidth efficiency			
	d) Low data rate	d) Simple receiver			
16.	Which satellite orbit is mainly used for weather monitoring?		*1*	*K1*	*CO6*
	a) LEO	b) GEO			
	c) Circular orbit	d) Elliptical orbit			

PART – A (ii) (Short Answer Questions)
(6 × 3 = 18 Marks)
Answer ALL Questions

17.	Choose the main differences between SSB and VSB transmission systems in terms of bandwidth requirement, sideband transmission, and applications.	*3*	*K3*	*CO1*
18.	Identify the differences between NBFM and WBFM.	*3*	*K3*	*CO2*
19.	Analyze sampling theorem for band limited signals and the filters to avoid aliasing.	*3*	*K4*	*CO3*
20.	In a Frequency Shift Keying system, analyse the concept of FSK to sketch the modulated waveform corresponding to the binary input sequence 11000011010010.	*3*	*K4*	*CO4*
21.	Examine the entropy of the system for an event that has six possible outcomes with probabilities 1/2, 1/4, 1/8, 1/16, 1/32.	*3*	*K4*	*CO5*
22.	Identify the advantages of CDMA over TDMA multiple access schemes.	*3*	*K3*	*CO6*

PART - B (Descriptive Answer Questions)
(6 × 11 = 66 Marks)
Answer ALL Questions

23.	a)	Construct the balanced modulator circuit for the generation of DSB SC-AM and explain its operation.	*11*	*K3*	*CO1*
		OR			
	b)	Build the block schematic of super heterodyne receiver and explain the various operations involved in each stages.	*11*	*K3*	*CO1*
24.	a)	Construct and explain the FM generation using Varactor diode and reactance tube modulators.	*11*	*K3*	*CO2*
		OR			

	b)	Illustrate in detail the generation of frequency modulation (FM) using the Armstrong method, describing the underlying principle, circuit arrangement, and the sequence of operations involved in producing the FM signal.	*11*	*K3*	*CO2*
25.	a)	Analyze the operation of a Pulse Code Modulation system with the help of neat block diagrams, and differentiate each stage of the process. Further, derive and examine the expression for the Signal-to-Quantization Noise Ratio.	*11*	*K4*	*CO3*
		OR			
	b)	Analyze the operation of a Delta Modulator (DM) system with the help of a neat block diagram, and examine its working principle. Further, analyze how the performance of the Delta Modulator is improved through step size control.	*11*	*K4*	*CO3*
26.	a)	In a digital communication system, apply the working principles of Binary Phase Shift Keying (BPSK) to illustrate how a BPSK signal is generated and coherently detected with the help of neat block diagrams.	*11*	*K3*	*CO4*
		OR			
	b)	Apply Quadrature Phase Shift Keying (QPSK) principles in Digital Communication to explain modulator and demodulator operation with block diagrams, and construct phasor and constellation diagrams.	*11*	*K3*	*CO4*
27.	a)	Five symbols of the alphabet of discrete memory less source and their probabilities are given below, P(S)={0.4,0.19,0.16,0.15,0.10}. Point out the symbols using Shannon Fano coding and calculate the average codeword length and efficiency.	*11*	*K3*	*CO5*
		OR			
	b)	Using Huffman code encode the symbols S={0.3,0.2,0.25,0.12,0.05,0.08}, Identify (i) Average code word length (ii) entropy of the source (iii) code efficiency (iv) redundancy.	*11*	*K3*	*CO5*
28.	a)	Analyze the operational principle of a Direct Sequence Spread Spectrum (DSSS) system by explaining the spreading and de-spreading processes. Illustrate the transmitter and receiver sections with suitable block diagrams, and examine how the original information signal is recovered at the receiver.	*11*	*K4*	*CO6*
		OR			
	b)	Analyze the architecture and operation of a Global System for Mobile Communications system by examining the roles of its major components, and differentiate the stages involved in call establishment and maintenance with suitable diagrams.	*11*	*K4*	*CO6*