C **Reg. No. :** | | | | | | | | | | | | |

Question Paper Code: U4405

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2024

Fourth Semester

Electronics and Communication Engineering

21UEC405- ANALOG AND DIGITAL COMMUNICATION

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. The envelope detector is _____ CO1-U

   (a) Effective for detection of narrow band AM signal (b) Simple

   (c) Both (a) and (b) (d) None of the above

2. _____ is the process in which frequency of the carrier signal changes with respect to message or modulating signal CO1- U

   (a) Pulse modulation (b) Angle modulation

   (c) Amplitude modulation (d) Frequency modulation

3. Sensitivity is defined as CO1- U

   (a) ability of receiver to amplify weak signals

   (b) ability to reject unwanted signals

   (c) ability to convert incoming signal into Image Frequency

   (d) ability to reject noise

4. When several signals are multiplexed in a time domain then the modulation is called CO1- U

   (a) Frequency Division Multiplexing (b) Time Division Multiplexing

   (c) Space Division Multiplexing (d) Code Division Multiplexing

5. The SNR in delta modulation is _____ CO1-U

   (a) Fair (b) Poor (c) Good (d) None of the above

PART – B (5 x 3= 15 Marks)

6.	A broadcast radio transmitter radiates 10KW when the modulating percentage is 60. Calculate the carrier power.	CO2- App
7.	What is the effect of m_f on the bandwidth of FM?	CO1- U
8.	Define Inter-Symbol Interference. How it can be reduced?	CO1- U
9.	Write the expression for probability of error for PSK?	CO1- U
10.	Determine the code vector for the message 001 given check bits as C1=m1⊕ m3 C2=m2 ⊕ m3 C3=m1⊕ m2	CO3-App

PART – C (5 x 16= 80 Marks)

11.	(a)	Consider a input – output characteristic of the diode – load resistor combination is represented by the square law: $V_2(t)=a_1V_1(t)+a_2V_1^2(t)$; where $V_1(t)$ is the input signal and $V_2(t)$ is output signal. Demonstrate squarelaw device canbe used for modulation and demodulation of AM wave.	CO2-App	(16)
		Or		
	(b)	An AM signal has a peak un-modulated carrier voltage, V_c = 100 V, a load resistance, R_L = 50 W, and a modulation index, m = 1. Determine the following: i. The carrier power (2 Marks) ii. The lower-sideband and upper-sideband power(4 Marks) iii. Total sideband power(4 Marks) iv. Total power of the modulated AM signal(4 Marks) v. Sketch the AM power spectrum(2 Marks)	CO2-App	(16)
12.	(a)	A 107.6 MHz carrier signal is frequency modulated by a 7kHz sine wave. The resultant FM signal has a frequency deviation of 50kHz.Determine i) Carrier swing of the FM signal (4 Marks) ii) Highest and lowest frequencies attained by the modulated signal (4 Marks) iii) Modulation index of the FM wave. (4Marks) iv) Bandwidth of FM (4 Marks)	CO2- App	(16)
		Or		

(b) An FM wave is represented by the voltage equation s(t)=10cos(8*106t+2sin3*104t). Calculate CO2- App (16)

i) Modulating frequency (2 Marks)
ii) Carrier frequency (4 Marks)
iii) Modulation Index (4 Marks)
iv) Frequency deviation (4 Marks)
v) Frequency deviation sensitivity (2 Marks)

13. (a) Illustrate the process of converting continuous time signals into equivalent discrete time signals. CO1-U (16)

Or

(b) Explain in detail about the Differential Pulse Code Modulation Technique. CO1-U (16)

14. (a) Compare the various types of digital modulation techniques. CO1-U (16)

Or

(b) Illustrate the concept of DPSK transmitter and Receiver and also obtain the minimum double sided Nyquist bandwidth. CO1-U (16)

15. (a) A discrete memory-less source has 6 symbols s1,s2,s3,s4,s5,s6 with probabilities 0.4,0.1,0.2,0.1,0.1 and 0.1 respectively. Construct a Huffman code and calculate its efficiency. CO5- Ana (16)

Or

(b) Consider the generator polynomial for a (7,3) cyclic code defined by g(p) =P4+P3+P2+1 CO5- Ana (16)

i) Find the encoding table for the cyclic code.
ii) What is the minimum distance d_{min} of the code?