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

Question Paper Code: U4405

B.E. / B.Tech. DEGREE EXAMINATION, NOV 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 antenna height is equal to_____ CO1-U

   (a) h=λ/2 (b) h=λ/8 (c) h=λ/4 (d) h=λ/12

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. FSK reception uses _____ CO1- U

   (a) FSK reception uses (b) PLL

   (c) Correlation receiver & PLL (d)None of the above

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.	What is the need for modulation?	CO1- U	
7.	Distinguish narrow band and wide band FM.	CO1- U	
8.	State sampling theorem.	CO1- U	
9.	Sketch the ASK output for the binary sequence 110101.	CO2- App	
10.	What are cyclic codes? Why they are called sub class of block codes?	CO1- U	

PART – C (5 x 16= 80 Marks)

11.	(a)	Explain the generation and detection of AM signals with neat diagrams.	CO1- U	(16)
		Or		
	(b)	Derive the expression of an AM wave, modulation index, total power and transmission efficiency.	CO1- U	(16)
12.	(a)	Explain the generation of FM signals with neat diagram.	CO1- U	(16)
		Or		
	(b)	Give the basic difference between Phase Modulation and Frequency Modulation. Explain in detail about Wide Band FM with necessary equations.	CO1- U	(16)
13.	(a)	The television signal with a bandwidth of W=f_m=4.2MHz is transmitted using PCM. The number of quantization level is 512. The amplitude of signal is varied from 7V to -7V. Calculate (i) Nyquist rate (ii) code word length or number of bits (iii) transmission bandwidth (iv) final bit rate (v) step size	CO3-App	(16)
		Or		
	(b)	A signal has a bandwidth of 10MHz and dynamic amplitude of -5V to 5V. The signal is sampled, quantized and binary coded to obtain PCM signal. Find the following (i) sampling or nyquist rate when the samples are encoded into 128. (ii) what is binary bits required to each sample (iii) bit rate (iv) transmission bandwidth (v) step size	CO3-App	(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) Consider a (7,4) linear block code defined by the generator matrix CO5- Ana (16)

$$\vec{G} = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 0 & 1 \end{bmatrix}$$

i. Find the parity check matrix H.
ii. Find the encoding table for the linear block code.
iii. What is the minimum distance d_{min} of the code? How many errors can the code detect and correct?

Draw the hardware encoder diagram.

Or

(b) A message source generates one of four messages randomly every microsecond. The probabilities of these messages are 0.4, 0.3, 0.2, and 0.1. Each emitted message is independent of the other messages in the sequence. CO5- Ana (16)

i. i) What is the source entropy?
ii. ii) What is the rate of information generated by this source? (in bits per second)