

C

Reg. No. :

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

**Question Paper Code: U4405**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2023

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 = 5Marks)

1. A carrier of peak voltage 15 V is used to transmit a message signal. If the modulation index is 70%, then what will be the peak voltage of the modulating signal? CO2- App  
(a) 25V (b) 11 V (c) 10.5V (d) 30V
2. A 12 MHz carrier gets modulated by a sine signal with a frequency of 500 Hz bearing the frequency deviation of about 50 kHz. Find the bandwidth? CO2- App  
(a) 100 (b) 101 (c) 102 (d) 103
3. The SNR in delta modulation is \_\_\_\_\_ CO1-U  
(a) Fair (b) Poor (c) Good (d) None of the above
4. In On-Off keying, the carrier signal is transmitted with signal value '1' and '0' indicates CO1-U  
(a) No carrier (b) Half the carrier amplitude  
(c) Amplitude of modulating signal (d) None of the above
5. The Channel capacity is measured in terms of \_\_\_\_\_ CO1-U  
(a) 1 bits/channel (b) Number of inputs connected  
(c) Calls per channel (d) Number of output channels connected

PART – B (5 x 3= 15Marks)

6. The antenna current of an AM transmitter is 8A when only carrier is sent. It increases to 8.93A when the carrier is modulated by a single sine wave. Find the percentage modulation. CO2- App
7. An FM wave with a frequency deviation of 10KHz and maximum deviation allowed is 2.5KHz. Find out the percentage modulation. CO2- App
8. Define Intersymbol interference. How it can be reduced? CO1- U
9. Sketch the ASK output for the binary sequence 110101. CO2 App
10. What is the weight of the code? Calculate weight of X=01110101. CO2 App

PART – C (5 x 16= 80Marks)

11. (a) Explain the generation and detection of AM signals with neat diagrams. CO1-U (16)
- Or
- (b) Explain the Process of Square law demodulator and Envelope detector in AM demodulation with neat diagrams. CO1-U (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 CO4-Ana (16)
- a) Carrier swing of the FM signal
  - b) Highest and lowest frequencies attained by the modulated signal.
  - c) Modulation index of the FM wave.
  - d) Bandwidth of FM
- Or
- (b) An FM signal is applied to the square law device with output voltage  $v_2$  related to the input voltage  $v_1$  by  $v_2 = av_1^2$ , where 'a' is constant. Explain how such a device can be used to obtain an FM signal with greater frequency deviation than the available input. CO4-Ana (16)
13. (a) The television signal with a bandwidth of  $W = f_m = 4.2\text{MHz}$  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) Consider the input data sequence 1011011. Sketch the waveforms for each of these sequences using following methods . (i) Unipolar NRZ (ii) Unipolar RZ (iii) Polar NRZ, (iv) Polar RZ (v) Bipolar NRZ (vi) Bipolar RZ (vii) Manchester (viii) Differential Manchester (Line Coding) CO3-App (16)
14. (a) A data bit sequence consists of the following stream of bits 10111010. Analyze and draw the nature of waveform transmitted by BPSK transmitter and Receiver. CO2-App (16)
- Or
- (b) Demonstrate Differential phase shift keying technique with neat diagram. CO2-App (16)
15. (a) A message source generates one of five messages randomly every microsecond. The probabilities of these messages are 0.4, 0.2, 0.2, 0.1 and 0.1. Each emitted message is independent of the other messages in the sequence. CO5- App (16)
- a) Determine the source entropy?
- b) Determine the rate of information generated by this source (in bits per second)?
- Or
- (b) Consider a (6,3) systematic linear block code, the code word comprises  $I_1, I_2, I_3, P_1, P_2, P_3$  where the three parity check bits  $P_1, P_2$  and  $P_3$  are formed from the information bits as follows  

$$P_1 = I_1 + I_3, P_2 = I_1 + I_2, P_3 = I_2 + I_3.$$
 Find
- (i) The parity check matrix
- (ii) The generator matrix
- (iii) All possible code words.
- (iv) Minimum weight and minimum distance
- (v) The error detecting and correcting capability of the code..

