Reg. No.															

Question Paper Code	12893

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

Fifth Semester

Electronics and Communication Engineering

20ECPC501 - DIGITAL COMMUNICATION

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

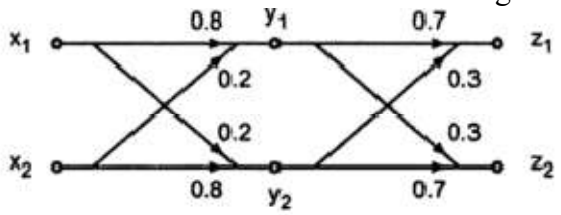
Answer ALL Questions

		Marks	K – Level	CO
1.	Define information rate.	2	K1	CO1
2.	What is the channel capacity of a BSC and BEC?	2	K1	CO1
3.	Why delta modulation is superior to Differential pulse code modulation?	2	K2	CO3
4.	State any four desirable properties of a line code.	2	K1	CO3
5.	Explain the eye pattern is obtained on a CRO.	2	K2	CO4
6.	Define the principle of adaptive equalization.	2	K1	CO4
7.	Illustrate the need for geometric representation of signals.	2	K2	CO5
8.	Draw the waveform for the binary data sequence 101010 modulated under ASK, PSK, FSK.	2	K2	CO5
9.	What are cyclic codes? Mention its properties.	2	K1	CO6
10.	Express the syndrome properties of linear block code.	2	K1	CO6

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a) i)	Define entropy and explain it briefly along with the properties of entropy.	6	K2	CO1
ii)	Explain BSC and derive the Channel Capacity For Binary Symmetric Channel.	7	K2	CO1
	OR			
b) i)	Two BSC's are connected in cascade as shown in figure below	7	K2	CO1



Find the channel matrix of resultant channel & Find P(z1) & P(z2) if P(x1)=0.6 and P(x2)= 0.4

ii)	State and prove the properties of mutual information.	6	K2	CO1

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

12. a) i) What is the need for Adaptive Delta Modulation and how it overcomes the drawback of delta modulation? *6 K2 CO3*

ii) Explain the features of adaptive delta modulation with transmitter and receiver. *7 K2 CO3*

OR

b) Explain the principle, generation and reconstruction of DPCM System in detail. *13 K2 CO3*

13. a) What is ISI? List the different methods to remove ISI in a communication system. Also state and prove Nyquist first criterion for Zero ISI. *13 K2 CO4*

OR

b) Explain in detail the principle of matched filter and Correlation filter. *13 K2 CO4*

14. a) i) Draw the transmitter, receiver block diagram of BFSK. *7 K2 CO5*

ii) Explain its signal space diagram and Band width in detail. *6 K2 CO5*

OR

b) i) Draw the transmitter, receiver block diagram of QPSK. *7 K2 CO5*

ii) Explain its signal space diagram and Band width in detail. *6 K2 CO5*

15. a) The Generator Matrix for a (6,3) block code is given below. Find all code vectors of this code. *13 K3 CO6*

$$\begin{vmatrix} 1 & 0 & 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{vmatrix}$$

(i) Determine P sub matrix from generator matrix and Parity Check Matrix.
(ii) Obtain equation for check bits using C=MP.
(iii) Determine check bits for every message vector.
(iv) Decode 111011 using syndrome Decoding.
(v) Prove that syndrome can detect only one error.

OR

b) A 1/3 rate Convolution code has the following generators g_1=[100], g2=[101] and g3=[111]. *13 K3 CO6*
(i) Draw the Encoder circuit corresponding to the code.
(ii) Draw state table, State Diagram.
(iii) Determine output digit sequence for the data 1 1 0 1 0 1 0 0 using transform domain approach.
(iv) Draw the Trellis diagram for this code.

PART - C (1 × 15 = 15 Marks)

16. a) Encode the following messages with their respective probability using basic Huffman algorithm. *15 K3 CO2*

Message: x1, x2, x3, x4, x5, x6
Probability: 0.2,0.3,0.11,0.16,0.18,0.05
Compute the Huffman code and Shannon fano coding for this source. Also calculates average code word length, efficiency and variance of the source encoder.

OR

b) A discrete memory less source has an alphabet of seven symbols whose probabilities of occurrence are as described below *15 K3 CO2*

Symbol : {x1, x2, x3, x4, x5, x6, x7, x8}
Probability: {0.48, 0.15, 0.1, 0.1, 0.07, 0.05, 0.03, 0.02}.
Compute the Huffman code and Shannon fano coding for this source Also calculates average code word length and the efficiency of the source encoder.