PVP 20

Code: 20EC3501

III B.Tech - I Semester – Regular / Supplementary Examinations
NOVEMBER 2023

DIGITAL COMMUNICATIONS

(ELECTRONICS & COMMUNICATION ENGINEERING)

Duration: 3 hours Max. Marks: 70

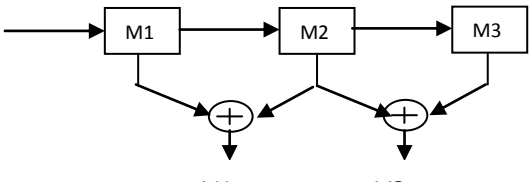
Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	a)	Explain Differential Pulse Code Modulation System with neat diagram.	L2	CO1	7 M
	b)	Draw line coding wave forms for the 101001001 bit pattern.	L3	CO1	7 M
OR					
2	a)	Explain Delta modulation with block diagram and discuss different types of noise effects in Delta modulation.	L2	CO1	7 M
	b)	Discuss Correlative coding with neat diagram.	L2	CO1	7 M
UNIT-II					
3	a)	Explain Matched Filter receiver with neat diagram.	L2	CO2	7 M
	b)	Interpret generation and detection of QPSK and draw the constellation diagram .	L3	CO2	7 M

		OR			
4	a)	Analyze the working principal of generation and Coherent detection of BFSK.	L4	CO2	7 M
	b)	Illustrate the comparisons of digital modulation schemes (FSK, PSK and DPSK) with respect to bandwidth requirements, power requirements, immunity to channel impairments and equipment complexity.	L3	CO2	7 M
		UNIT-III			
5	a)	Compare Slow frequency Hopping, and fast Frequency Hopping.	L4	CO2	7 M
	b)	Explain the properties of Pseudo random Noise sequence.	L2	CO2	7 M
		OR			
6	a)	Describe Direct Sequence Spread Spectrum with necessary diagrams.	L2	CO2	7 M
	b)	Explain advantages and applications of Spread spectrum Communication system.	L3	CO2	7 M
		UNIT-IV			
7	a)	A Transmitter has an alphabet of four letters [$x1$ $x2$ $x3$ $x4$] and the receiver has an alphabet of three letters [$y1$ $y2$ $y3$].Then it probability matrix is $P(X,Y) = \begin{array}{c} \\ X_1 \\ X_2 \\ X_3 \\ X_4 \end{array} \begin{array}{c} \begin{array}{ccc} Y_1 & Y_2 & Y_3 \end{array} \\ \begin{bmatrix} 0.3 & 0.05 & 0 \\ 0 & 0.25 & 0 \\ 0 & 0.15 & 0.05 \\ 0 & 0.05 & 0.15 \end{bmatrix} \end{array}$ Calculate all the entropies	L3	CO3	7 M

	b)	Derive an expression for capacity of a Gaussian Channel.	L2	CO3	7 M
		OR			
8	a)	A Discrete Information source has five symbols[x 1 , x 2 , x 3 , x 4 , and x 5]with probabilities [0.4, 0.19, 0.16, 0.10 and 0.15] respectively. Construct Shannon-Fano code for the source and calculate code efficiency η	L3	CO3	7 M
	b)	Prove I(X Y)= H(X)-H(X/Y)	L3	CO3	7 M
		UNIT-V			
9	a)	The generation matrix for a (7,4) block code is given below: $G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 & 1 \end{bmatrix}$ i. Find the code vector for message vector (1001) ii. How many errors can be detected and corrected iii. If the third bit of code vector suffers an error in transmission then explain how the syndrome helps in correcting a single error	L3	CO4	7 M
	b)	A (15, 5) linear cyclic code has a generator polynomial $G(x) = 1 + x+x^2+x^4+x^5+x^8+x^{10}$. (i) Draw the block diagram of encoder and syndrome calculator for this code.	L3	CO4	7 M

		(ii) Find the code polynomial for the message polynomial $D(x) = 1+x^2+x^4$.			
OR					
10	a)	Interpret the encoder for a convolution code is shown below:  Find the code word for a 1010 input data and draw the trellis diagram	L3	CO4	7 M
	b)	Describe a syndrome calculator for a (7, 4) cyclic code generated by the polynomial $g(x) = x^3+x+1$. Calculate the syndrome for the received code vector 100101.	L2	CO4	7 M