Register Number:……..

KUMARAGURU
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B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2018)

Sixth Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U18ECI6201: Communication Engineering II

COURSE OUTCOMES

CO1: Demonstrate digital communication system and estimation techniques used in the receiver.

CO2: Apply and verify source coding techniques.

CO3: Apply and analyze channel coding techniques for data transmission.

CO4: Examine the interference effects in band limited communication systems).

CO5: Compare and implement the performance of various digital modulation techniques.

CO6: Describe various synchronization techniques.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

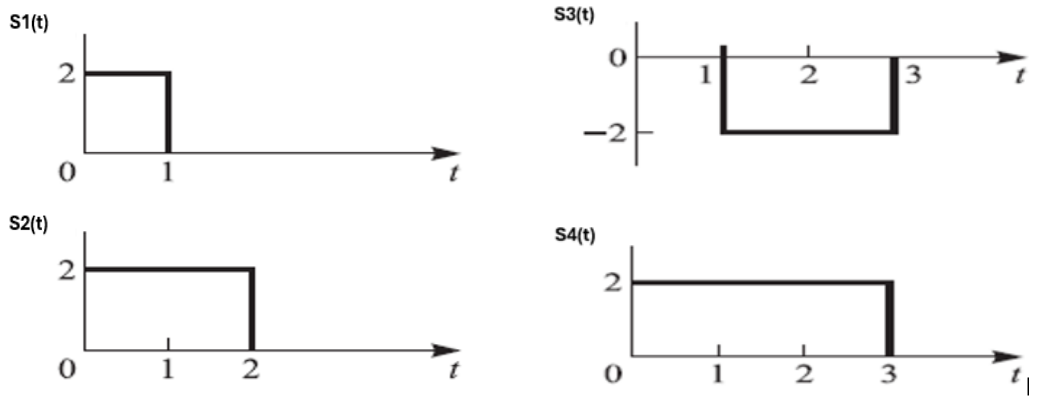
PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

1.	Recall and draw the block diagram of a Digital Communication system.	CO1	[K_1]
2.	Define MAP and ML decision rule in signal detection.	CO1	[K_1]
3.	Interpret the relation between uncertainty, information and entropy in information theory.	CO2	[K_2]
4.	A discrete memoryless source emits 4 equiprobable symbols. Determine the codeword using Shannon Fano coding.	CO2	[K_3]
5.	Compare Linear Block codes and Convolutional codes.	CO3	[K_2]
6.	For the code vector C_1= [1 0 0 10]; C_2= [0 1 1 0 1]; C_3= [1 1 0 0 1], Identify which of the following statements are true: 1. D_{min} > = 0 2. $D(C_1,C_2) = D(C_2,C_1)$ 3. $D(C_1,C_2)+ D(C_2,C_3)$ > = $D(C_1,C_3)$ Where D is the hamming distance measure.	CO3	[K_3]
7.	Outline the advantages of Correlative level coding.	CO4	[K_2]
8.	Analyze how an eye pattern could be used to evaluate the performance of a baseband pulse transmission system.	CO4	[K_3]
9.	Compare Coherent and Non coherent detection.	CO5	[K_2]
10.	Justify the need for carrier synchronization.	CO6	[K_2]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	a)	Determine the set of orthonormal basis functions for the signals given and plot the signal space diagram.	12	CO1	[K_3]



	b)	Define a Matched filter and list its properties.	4	CO1	[K_2]
12.	a)	Encode the following source using Huffman coding procedure and calculate entropy of the source, average code length, efficiency, redundancy.	10	CO2	[K_3]

X	x_1	x_2	x_3	x_4	x_5
p(X)	0.4	0.19	0.16	0.15	0.10

	b)	Derive the Information capacity of an AWGN channel .	6	CO2	[K_2]
13.	a)	A rate 1/2 convolutional encoder with constraint length 3 is described by the generator polynomial : $g^{(1)}$= [1 1 1] and $g^{(2)}$=[1 0 1] i. Draw the encoder for this code. ii. Draw the state transition diagram. iii. Encode the message [1 0 0 1 1] using state transition diagram. iv. For the received vector [10,11,00,01,01,11], Decode the code word using Viterbi Algorithm . Check whether it is a valid codeword.	12	CO3	[K_3]
	b)	For a systematic (7, 4) cyclic code with generator polynomial $g(x)= 1+x+x^3$, Sketch the cyclic encoder and determine the codeword for message 1010.	4	CO3	[K_3]
14.	a)	Deduce an expression for Nyquist criteria for distortion less base-band transmission for zero ISI. Give the ideal and practical solutions for zero ISI.	10	CO4	[K_3]

	b)	Explain the operational modes of an Adaptive Equalizer with a neat diagram.	6	CO4	[K_2]
15.	a)	Illustrate a detailed note on the following for BFSK digital modulation Scheme: i. Signal space diagram ii. Probability of error iii. Generation and detection	10	CO5	[K_3]
	b)	Discuss the generation and detection of Differential Phase shift Keying technique with relevant block diagram.	6	CO5	[K_2]
16.	a)	A (6,3) Linear Block code has the Parity Check matrix $H = \begin{bmatrix} 1 & 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$ i. Find the code word for the message m= (101). ii. Decode the received codeword 110110 iii. Comment on the error detection and correction capability of the code.	8	CO3	[K_3]
	b)	Explain the principle of early late gate synchronization technique with necessary diagrams.	8	CO6	[K_2]

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