Reg. No. | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATIONS, DEC 2019

Fifth Semester

EC16501 – Digital Communication

(Electronics and Communication Engineering)

(Regulation 2016)

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

Answer **ALL** questions

PART A - (10 X 2 = 20 Marks)

		CO	RBT
1.	Mention one advantage and disadvantage of digital communication system.	1	U
2.	Mention the properties of Entropy.	1	R
3.	A television signal has a bandwidth of 4.5 MHz. This signal is sampled, quantized and binary coded to obtain a PCM signal. (1) Determine the sampling rate if the signal is to be sampled at the rate of 30% above Nyquist Rate. (2) If the samples are quantized into 1024 levels, determine the number of binary pulses required to encode each sample	1	U
4.	Differentiate the principles of temporal waveform coding and model based coding.	1	AN
5.	Draw the Polar RZ and Manchester line coding formats for the following data sequence 1 1 1 0 0 0 1 0 1 0	1	AP
6.	What is equalization? Why is it needed?	1	U
7.	Draw the BPSK and BFSK wave forms for the data sequence 1 0 0 1 0 1 1 0	2	AP
8.	What is coherent detection?	2	R
9.	Find the Hamming distance between 11011001 and 10010111. If the minimum Hamming distance of (n,k) linear block code is 3, what is its minimum Hamming weight?	3	AP
10.	In a (4, 3, 2) convolutional encoder, find the code rate 'r', and the constraint length.	3	AP

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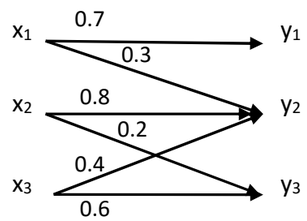
PART B - (5 X16 = 80 Marks)

11.	(a)	Compute the Mutual Information for the given Discrete Memoryless input-output channel with probabilities of source symbols x1, x2, x3 as 0.35, 0.25 and 0.4 respectively.	(16)	1	AP



(OR)

	(b)	(i) The probability of occurrence of the symbols S1, S2, S3, S4, S5, S6,S7,S8 are 0.125, 0.125, 0.15, 0.15, 0.2, 0.1, 0.1, 0.05 respectively. Generate the Shannon-Fano code and determine the code variance and code efficiency.	(8)	1	AP
		(ii) The probability of occurrence of the symbols S1, S2, S3, S4, S5, S6,S7,S8 are 0.125, 0.125, 0.15, 0.15, 0.2, 0.1, 0.1, 0.05 respectively. Generate the Huffman code with minimum code variance and determine the code variance and code efficiency.	(8)	1	AP
12.	(a)	Explain the process of Differential Pulse Code Modulation and Demodulation with necessary block diagrams. Also explain about improving the output SNR by minimizing the variance of the prediction error.	(16)	1	U

(OR)

	(b)	Explain in detail about Linear Predictive Coding and also Model Based Encoding using Linear Predictive Coding with all necessary block diagrams.	(16)	1	U

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13.	(a)		Derive the Power Spectral Density of NRZ Polar and NRZ - bipolar Line Coding Format and analyze the same.	**(16)**	**1**	**U**
			(OR)			
	(b)		What is Correlative Coding? With necessary block diagram explain Duo Binary Encoding and obtain the Magnitude response, Phase response and Impulse response of the encoder.	**(16)**	**1**	**U**
14.	(a)	(i)	With suitable block diagrams explain the generation and detection of coherent Binary FSK.	**(10)**	**2**	**U**
		(ii)	Obtain the expression for bit error rate and draw the signal space diagram for BFSK system	**(6)**	**2**	**AN**
			(OR)			
	(b)	(i)	Explain the concept of coherent QPSK with suitable block diagrams for transmitter and receiver.	**(10)**	**2**	**U**
		(ii)	Obtain the expression for bit error rate and draw the signal space diagram for QPSK system.	**(6)**	**2**	**U**
15.	(a)	(i)	For a (7,4) Cyclic Hamming code whose generator polynomial is $g(X)=1+X+X^3$, determine the code words for the given message sequences 0110, 1001, 1010, 1100.	**(8)**	**3**	**AP**
		(ii)	Draw the (7,4) cyclic Hamming encoder for the generator polynomial $g(X)=1+X+X^3$ and explain its operation.	**(8)**	**3**	**AP**
			(OR)			
	(b)		Draw the convolutional encoder having a constraint length of '3' and code rate r =1/2, for the given generator sequence. $(g_0^1, g_1^1, g_2^1) = (1,1,1)$ *and* $(g_0^2, g_1^2, g_2^2) = (1,0,1)$. Derive the code words using **time domain approach** and **transform domain approach** for the input message sequence (101011).	**(16)**	**3**	**AP**