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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

July 2023 Semester End Main Examinations

Programme: B.E. **Semester: VI**
Branch: Electronics and Communications Engineering **Duration: 3 hrs.**
Course Code: 19EC6PCCT2 **Max Marks: 100**
Course: Communication Theory II **Date: 12.07.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.
3. Use of error table is allowed

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Discuss the line coding for a binary stream11010110.sketch the following line codes. NRZ-Polar, RZ-Polar, Bipolar, Manchester code formats	*CO1*	*PO1*	**05**
	b)	Differentiate between uniform and non-uniform quantization	-	-	**05**
	c)	The Delta Modulator is used for the transmission and reception of audio signal. With mathematical model Analyze its suitability in transmission stating its advantages over DPCM.	*CO 2*	*PO 2*	**10**
		OR			
2	a)	Explain the ISI in baseband transmission. Discuss the Nyquist criterion for distortion less baseband binary transmission or zero ISI.	*CO 1*	*PO 1*	**07**
	b)	A computer outputs binary data at the rate of 64 kilo bits/sec.The transmitter uses binary PAM with raised Cosine spectrum in shaping of optimum pulse width .Determine the bandwidth of the transmitted waveform if the roll –off factor is 1) α=0.25,ii) α= 0.5,iii) α=0.75	*CO 1*	*PO 1*	**06**
	c)	The binary data stream 001101001 is applied to the input of a duo-binary system. Construct and analyze the duo-binary encoder output and corresponding receiver output without precoder.	*CO 2*	*PO 2*	**07**
		UNIT - II			
3	a)	Explain the working of Binary Phase Shift Keying (BPSK) system with block diagram of transmitter and receiver, and relevant mathematical expressions. Derive an expression for the probability of error of BPSK modulation.	*CO 1*	*PO 1*	**10**

		b)	Compare coherent and non-coherent detection	*CO 1*	*PO 1*	**04**
		c)	Compare BASK, BFSK, BPSK and DPSK in terms of Probability of bit error, Band Width, SNR and Bitrate.	*CO 1*	*PO 1*	**06**
			OR			
	4	a)	With relevant logical expressions, explain the working of DPSK System of Transmitter and Receiver. Also Illustrate the generation of the DPSK signal and detection of the data 1100100010.	*CO 1*	*PO 1*	**08**
		b)	A Digital communication System employing FSK scheme is used for transmitting information over an AWGN channel having two side noise power spectral density of 10^{-9} Watts/H_z The bit rate used is 2400 bits/sec. Determine the average bit energy and probability of error when the signal amplitude at input of the receiver is A=10mV.	*CO 1*	*PO1*	**07**
		c)	Draw the constellation points of a QPSK). Sketch the waveform of the QPSK signal for the binary sequence: 1100100010. Assume carrier frequency fc= $2/T_b$, T_b is the bit duration.	*CO 1*	*PO 1*	**05**
			UNIT - III			
	5	a)	Explain the working of a DSSS system with relevant block diagrams and waveforms,	*CO 1*	*PO 1*	**08**
		b)	A spread spectrum communication system employing binary phase shift keying has chip duration, T_c= 1µsec and the information bit duration, Tb=5msec. Calculate the processing gain of the system. Analyze and find the Jamming Margin, if spread spectrum system uses binary PSK modulation having probability of error less than 10^{-5}. Assume erfc(3.0)=$2x10^{-5}$.	*CO 2*	*PO 2*	**06**
		c)	Illustrate the slow frequency hopping with FH/MFSK using the following PN sequence and input binary data. Input binary data: 11001001111000010111 PN sequence for one period: 010110011001110. Assume M=4, number of bits/symbol= 2 and number of PN segment per hop=3.	*CO 1*	*PO 1*	**06**
			UNIT - IV			
	6	a)	Define Entropy of a source. Consider a discrete memoryless source with source alphabet, S= [s1, s2, s3] with probabilities [0.25, 0.5, 0.25]. Find the entropy of the source.	*CO 1*	*PO 1*	**04**
		b)	Consider a Discrete Memory less Source (DMS) with source alphabet of five symbols, S=[s1, s2, s3, s4, s5] with probabilities [0.55, 0.15, 0.15, 0.10, 0.05]. Construct Huffman's and Shannon fano codes for this source. Compare their efficiencies	*CO 2*	*PO 2*	**12**
		c)	Give examples for i. singular and non-singular codes ii. Fixed and variable codes	*CO 1*	*PO 1*	**04**

			UNIT - V			
	7	a)	Design (**6,3)** linear block code with the parity matrix **P==** $\begin{bmatrix} \mathbf{1} & \mathbf{0} & \mathbf{1} \\ \mathbf{0} & \mathbf{1} & \mathbf{1} \\ \mathbf{1} & \mathbf{1} & \mathbf{0} \end{bmatrix}$ Find all possible code vectors, d_{min}, error detection and correction capability.	*CO 2*	*PO 3*	**10**
		b)	For the n=2, K=1, m=2 convolutional encoder with g(1)= [1,1,1,] and g(2)= [1,0,1] Find the output sequence for the input message d=10011. Using time domain and transform approach. Draw the tree structure	*CO 2*	*PO 2*	**10**

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