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

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E. **Semester: VI**
Branch: Electronics and Communication Engineering **Duration: 3 hrs.**
Course Code: 19EC6PCCT2 **Max Marks: 100**
Course: Communication Theory II **Date: 22.09.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1	a)	With the input-output characteristics of compressor and expander, analyse how the Non-uniform quantisation is achieved for speech signals.	**06**
	b)	A sinusoidal message signal of 15 Volt peak-to-peak is to be transmitted using 8-bit PCM. Determine the values of quantization levels, L, step-size and Signal-to-quantization noise ratio.	**04**
	c)	The T carrier system offered by AT &T accommodates 24 Voice channels. i)Draw the structure of one T1 frame indicating all details. ii)If highspeed T3-line is used to multiplex T1 and T2 lines, draw the digital hierarchical structure for the same indicating bitrates at each level. iii)If only voice channels are required, how many such voice channels can be accommodated at T3?	**10**

OR

2	a)	With the structure of waveform coding using Delta modulation, analyse its effectiveness as compared to standard PCM in transmission.	**08**
	b)	23 analog signals of 3.4KHz BW are multiplexed together with I sync channel at 8Khz.If 8bit standard PCM is to be used, design the transmission scheme for TDM PCM and compute transmission rate.	**06**
	c)	Apply the binary data 011100101 to the Duo binary system with precoder and illustrate the encoding output and corresponding received output stating the working of duobinary system with precoder.	**06**

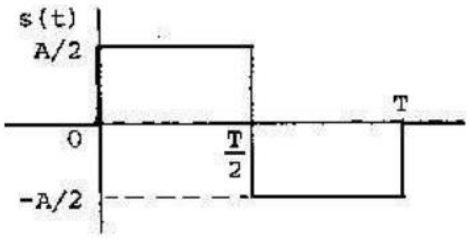
UNIT - II

3	a)	Draw only the structure of QPSK modulator and demodulator. i)Given the bit stream [10110100], identify the QPSK I and Q message points and draw the constellation. ii)Draw the in phase, quadrature and transmitted QPSK waveform indicating expression for transmitted QPSK signal.	**12**

b) Draw the structure of baseband OFDM system and mention any two applications **08**

OR

4 a) Design the Optimum receiver structure using bank of Matched filters and indicate its properties. If signal waveform s(t) input to filter is as shown below, write the impulse response of matched filter h(t) and its waveform. **12**



b) With the structure of transmitter and receiver, Illustrate how the message bk={1001100} is transmitted and detected with DPSK . **08**

UNIT - III

5 a) Explain with block diagram Frequency hop spread spectrum system and illustrate slow and fast hop. **10**

b) What is antijam characteristics of Direct sequence spread spectrum and how is it expressed? If such system has 19 stage shift register for generation of PN code, compute antijam characteristics in terms of jamming margin(dB). To achieve probability of error of $\mathbf{10^{-5}}$, system requires minimum bit energy to noise ratio as 11 dB. **10**

UNIT - IV

6 a) A Discrete Memoryless Source X has symbols a, b, c, d, e, f , g with p(a)=0.5, p(b) =0.26, p(c)= 0.11, p(d)= 0.04, p(e)=0.04, p(f)=0.03, p(g)=0.02 i)Generate Huffman code and compute its entropy. ii)Find its average length iii) From above code encode "deaf" and check is it uniquely decodable? **12**

b) Generate Shannon Fano code for the source that emits vowels A,E,I O U with their probabilities p(A)=0.34, p(E)=0.22, p(I)=0.19, p(O) =0.17, p(U) =0.08 and compute its variance. **08**

UNIT - V

7 a) For a systematic (7,4) linear block code, the coefficient matrix P is given by $[P] = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}$ **10**

Write [G] matrix, [H] matrix and Find all possible code vectors.

b) Given the generator polynomial g^1=[101], and g^2=[111] , draw the convolution encoder .Through polynomial representation find the code for message m=[1 0 1] , draw its state diagram. **10**

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