

6E 6054

Roll No. _____

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B.Tech. VI - Semester (Main&Back) Examination, April 2019
Electronics & Communication Engg.
6EC4A Digital Communication

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

Instructions to Candidates:

Attempt any Five questions, selecting One question from each unit. All Questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly Units of quantities used/calculated must be stated clearly).

Unit - I

1. a) By drawing the block and schematic diagrams of the transmitter and receiver and with the help of relevant waveforms, explain the working of a Delta modulation system. (08)
- b) A signal $m(t) = \frac{2}{\pi} \sin(10^3 \pi t)$ is sampled and delta modulation. The granular noise can not exceed 0.2V and there will be no slope overload. Calculate the step size and sampling frequency. (08)

(OR)

- a) Explain the multiplexing of different PCM and DPCM signals and calculate the transmission speed of T-1 carrier system. (05)
- b) With the help of block schematic diagrams of transmitter and receiver explain the working of binary PCM system. (06)
- c) A PCM system is to carry a 20 KHz music channel. It is to have a signal to noise ratio of 80dB and the peak maximum signal is 15dB over its rms value. What sampling rate should be used? (05)

Unit - II

- a) Write down the expression for the transfer function and the impulse response of a matched filter for the signal $P(t)$ which is of T second duration. (08)
- b) Consider the binary sequence 10110001 draw the waveform of following formats
- i) Bipolar RZ ii) Bipolar NRZ iii) AMI iv) Split phase

(OR)

2. a) A communication channel of bandwidth 50KHz is required to transmit binary data at a rate of 0.1 Mb/s using raised-cosine pulses. Determine the roll off factor. (06)
- b) What is ISI? How raised cosine spectrum and ideal Nyquist channel are useful to avoid ISI explain it? (10)

Unit - III

3. a) Given the input binary sequence 100010110, sketch the waveforms of the in phase and quadrature components of an MSK signal sketch the MSK signal also. (08)
- b) What is QPSK? Draw the signal space and signal constellation and calculate the probability of error. (08)

(OR)

3. a) A microwave link is used for transmitting binary data at the rate of 1Mbps, Assuming the PSD of noise at the input of the receiver to be $10^{-10} W / Hz$. Find the transmission bandwidth and the average carrier power required to be maintained if the probability of error $P(e)$ is not to exceed 10^{-4} , when
- a) Coherent BPSK and
- b) Coherent BFSK are used (08)
- b) With the help of a block schematic diagrams explain the working of coherent FSK receiver and transmitter (08)

Unit - IV

4. a) A source produces three symbols A, B and C with the following marginal and conditional probabilities

i	P(i)
A	1/4
B	1/4
C	1/2

P(j/i)		j		
		A	B	C
i	A	1/8	1/4	5/8
	B	1/2	1/8	3/8
	C	3/8	5/8	0

- i) Assuming there is no intersymbol influences calculate the entropy of the source.
- ii) If index i refers to 'X' and j refers to 'Y' determine the conditional entropy $H(Y/X)$

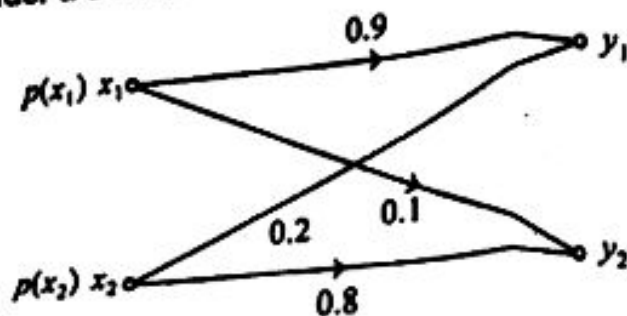
(10)

- b) State Shannon's source-coding theorem and explain it.

(06)

(OR)

4. a) Consider a binary channel shown in figure.



- i) Find $P(y_1)$ and $P(y_2)$ when $P(x_1) = P(x_2) = 0.5$
ii) Find the $p(x_1, y_2)$ and $P(x_2, y_1)$ when $P(x_1) = P(x_2) = 0.5$

(08)

- b) Explain Information content of a symbol and entropy.

(08)

Unit - V

5. a) A DMS X has five equally likely symbols construct the Shannon fano and Huffman code for X. Calculate the efficiency and compare. (12)
b) For a systematic linear block code, the three parity check bits C_4 , C_5 , and C_6 are formed as

$$C_4 = d_1 \oplus d_2$$

$$C_5 = d_1 \oplus d_3 \oplus d_4$$

$$C_6 = d_1 \oplus d_5$$

Write the generator matrix

(04)

(OR)

5. a) A channel encoder uses a (7, 4) linear cyclic code in the systematic form of the generator polynomial being $(x^3 + x + 1)$. Find the correct code word if the received word is 1011011 (08)
b) Find the impulse response of Convolutional encoder shown in figure. (08)

