Reg. No. ☐☐☐☐☐☐☐☐☐☐☐☐☐

B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2023
Fifth Semester
EC16501 – DIGITAL COMMUNICATION
(Electronics and Communication Engineering)
(Regulation 2016)

TIME: 3 HOURS   MAX. MARKS: 100

PART- A (10 x 2 = 20 Marks)
(Answer all Questions)

1. Define Entropy.
2. Mention one advantage and one disadvantage of digital communication system.
3. A television signal has a bandwidth of 4.5 MHz. What is the sampling rate if the signal is to be sampled at a rate 30% above Nyquist Rate?
4. List the various temporal waveform coding techniques.
5. Draw the Bipolar NRZ line coding format for the following data sequence 0 0 0 1 0 1 0 1 1 1.
6. What is correlative coding?
7. Define ASK and FSK.
8. Compare coherent and noncoherent detection.
9. What is Hamming distance?
10. What is the code rate in a (n, k, K) convolutional encoder.

PART- B (5 x 16 = 80 Marks)

Marks

11. (a) The probability distribution of a discrete memoryless source is given below. Determine Huffman codes for the source symbols and compute the coding efficiency. **(16)**

s_0	s_1	s_2	s_3	s_4	s_5
0.3	0.25	0.15	0.12	0.10	0.08

(OR)

(b) Compute the mutual information for the given discrete memoryless channel. The probability of the source symbols x_0, x_1, x_2 are 0.3, 0.4 and 0.3 respectively. **(16)**
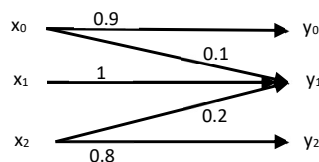
12. (a) Explain low pass sampling and reconstruction of the signal from its samples in detail with mathematical relations. **(16)**

(OR)

(b) Explain the principle and working of Delta Modulation system. How is it different from Differential PCM? **(16)**

13. (a) Derive the power spectral density of NRZ Unipolar format and NRZ Polar format and analyze the same. **(16)**

(OR)

(b) Explain in detail about Duo-binary encoding and obtain the frequency response and impulse response. **(16)**

14. (a) Explain the concept of coherent BPSK with transmitter and receiver block diagrams and obtain the expression for Bit Error Rate. **(16)**

(OR)

(b) Explain the principles of QAM and M-ary modulation techniques with relevant signal expressions and signal space diagrams. **(16)**

15. (a) For a (7,4) cyclic block code with generator polynomial $g(D)=1 + D + D^3$, draw and explain the operation of the encoder and decoder. Also obtain the code words for all the messages and tabulate them. **(16)**

(OR)

(b) For a (6, 3) systematic linear block code, the code word comprises of [I1 , I2 , I3 , P1 , P2 , P3] where the three parity check bits P1 , P2 and P3 are formed from the information bits I1, I2, I3 as follows :

P1 = I1 $\oplus$ I2; P2 = I1$\oplus$ I3; P3 = I2 $\oplus$ I3

Find (i) The parity check matrix; (ii) The generator matrix; (iii) All possible code words; (iv) Minimum weight; (v) Minimum distance and (vi) the error detecting and correcting capability of the code; (vii) if the received sequence is 111001, calculate the syndrome and decode the received sequence. **(16)**

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