

E(ELEX) / SEMI-V / R-19 C Scheme / D.C. / 11/6/25.

(3 Hours)



[Total Marks: 80]

N. B.: 1) Question No. 1 is compulsory.

2) Attempt any three questions out of the remaining five questions.

3) Assume suitable data wherever necessary.

1. Answer the following (any four): 20
 - a What is probability and probability density? Discuss the relationship between them.
 - b Explain Rayleigh's Distribution.
 - c State and explain Shannon Second Theorem.
 - d What is ISI. Discuss briefly the techniques used to mitigate ISI.
 - e For the data sequence 11011101 draw the following line codes: NRZ-L, NRZ-M, bipolar RZ, AMI, Manchester code.
2. a Prove that the mean of sum of two random variables is the sum of the mean of the two random variables. 10
 - b Explain the terms random variables, CDF, PDF, mean and variance with example 10
3. a Explain QPSK modulation with a proper block diagram and waveforms. Draw constellation diagram and find the Euclidean distance. 10
 - b For an alphabet $A=\{a_1, a_2, a_3, a_4\}$ with probabilities $P=\{0.1, 0.3, 0.25, 0.35\}$ respectively. Calculate Huffman code, average code word length, entropy, variance of code and code efficiency. Also construct Huffman tree. 10
4. a A systematic block code has parity check equations as given below:

$$p_1 = m_1 + m_2 + m_4 \quad p_2 = m_1 + m_3 + m_4 \quad p_3 = m_1 + m_2 + m_3$$
 where m_i are the message bits and p_i are the parity bits. 4
 - a) Find the Generator matrix and the Parity check matrix for this code 4
 - b) How many errors can be detected and corrected? 2
 - c) If the received codeword is {0010110}, find the syndrome.
 - b For the binary sequence 10110101 draw the BPSK, BASK, BFSK and MSK waveforms. Explain how phase continuity is maintained in MSK. 10
5. a Explain with block diagram the generation of BFSK, spectrum of BFSK and bandwidth of BFSK. 10
 - b Discuss matched filter with its probability of error. 10
6. Write a short note on: 20
 - a) Central limit theorem
 - b) Code Tree and Code Trellis of convolution code
 - c) Cyclic Code
 - d) Raised Cosine Filter

Q.P. Code:-

85295

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Program Code:-

1T01135.