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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, MAY/JUNE 2024

ELECTRONICS AND COMMUNICATION ENGINEERING

Semester V

EC7502 Digital Communication Techniques

(R 2015)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Compare PAM and PPM schemes of base band modulation techniques.
2. Write down the significance of Eye diagram.
3. What it is meant by cyclic codes? Give an example.
4. State channel coding theorem.
5. Draw the channel transition diagram for binary erasure channel.
6. Define entropy of the channel.
7. Draw the constellation diagram of 16 QAM.
8. Compare the bandwidth efficiency of BPSK with 16 PSK.
9. Why is carrier synchronization required? Give an example for carrier synchronization method.
10. If a PN chip of 1 μs duration spreads the input sequence of rate 1 kbps, determine the processing gain of spread spectrum modulator .

Part – B (5 x 13 = 65 Marks)

11 a) What are preferable characteristics of line codes? Derive the PSD of NRZ unipolar coding scheme and compare it with that of NRZ polar scheme. (13)

(OR)

b) Explain the duobinary signaling scheme with and without precoder with an appropriate example. (13)

12 a) (Consider the (7,4) Linear block code with generator matrix $G=\begin{bmatrix}1&1&0&1&0&0&0\\0&1&1&0&1&0&0\\1&1&1&0&0&1&0\\1&0&1&0&0&0&1\end{bmatrix}$ (13)

i. Construct code words for this (7,4) code.

ii. If the received code is 1100110. Generate the syndrome for the error and find the corrected code word.

iii. Show that with minimum distance of this code only one error can be corrected.

(OR)

12 b) Consider a convolutional encoder of rate ½. If the generator sequence of the encoder are (1, 1,1) and (1, 0,1),

i. Draw the block diagram of the encoder and trellis diagram. (8)

ii. Derive the code word for input sequence (1 1 0 1). (5)

13. a) Explain the Shannon Fano source coding algorithm. Compute the Shannon Fano code for the discrete memoryless source emits symbols {a, b, c, d, e} with probabilities {0.4, 0.2, 0.2, 0.05, 0.15}. Calculate coding efficiency. (13)

(OR)

b) Explain the Huffman algorithm for source coding. Compute the Huffman code for the discrete memoryless source which emits symbols {a, b, c, d, e} with probabilities {0.4, 0.2, 0.2, 0.05, 0.15}. Calculate coding efficiency. (13)

14. a) With the block diagram of transmitter and receiver, explain and derive the probability error for BPSK modulation system. (13)

(OR)

b) Explain the DPSK modulation and demodulation with appropriate example. Discuss advantage of DPSK over BPSK. (13)

15. a) Derive and explain the processing gain of direct sequence spread spectrum technique with BPSK modulation in detail. (13)

(OR)

b) Discuss the features of fast and slow frequency hop spread spectrum techniques in detail with an example. (13)

Part – C (1 x 15 =15 Marks)

16. i) Discuss the properties of PN sequence. (5)

ii) What is meant by matched filtering? Derive the condition for the SNR maximization of matched filter. (10)