1213465

No. of Printed Pages : 3

BIEL-023

B. TECH.-VIEP-ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

Term-End Examination

June, 2019

BIEL-023 : INFORMATION THEORY AND CODING

Time : 3 Hours *Maximum Marks : 70*

Note : *Attempt any* ***seven*** *questions. All questions carry equal marks. Use of scientific calculator is permitted. Any missing data maybe suitably assumed.*

1. (a) What is information theory ? Write down the properties of entropy. 5

   (b) A source generates four messages m_0, m_1, m_2, m_3 with probabilities 1/3, 1/6, 1/4 and 1/4 respectively. The successive messages emitted by the source are statistically independent. Calculate the entropy of the source. 5

2. State and explain Kraft's inequality theorem. 10

3. An information source produces a sequence of independent symbols having the following probabilities : 10

$$P_1 = \frac{1}{3},\ P_2 = \frac{1}{27},\ P_3 = \frac{1}{3},\ P_4 = P_5 = \frac{1}{9},\ P_6 = P_7 = \frac{1}{27},$$

Construct Binary code using Huffman encoding procedure and find its efficiency.

4. (a) Define mutual information. Enlist its various properties. 5

(b) Discuss the term differential entropy for the continuous random variable. 5

5. State and prove Shannon's channel capacity theorem. What is its significance ? 10

6. Show that the mutual information I (X; Y) of the channel, with the input probabilities P (x_i), i = 1, 2, 3, 4 ..... m and the output probabilities P (y_j), j = 1, 2, 3, 4 ..... n can be expressed as ; 10

$$I(X; Y) = \sum_{i=1}^{m} \sum_{j=1}^{n} P(x_i, y_j) \log_2 \frac{P(x_i/y_j)}{P(x_i)}.$$

7. How is syndrome calculated in cyclic codes ? Explain. 10

8. (a) Write down the comparison between code tree and trellis diagram of convolutional encoder. 5

   (b) Enlist the various properties of finite field. 5

9. (a) Compare the spectral efficiency of the three digital m-ary modulation schemes– ASK, PSK and FSK for various pulse shaping. 5

   (b) Compare BPSK, QPSK and 8-PSK modulation schemes. 5

10. Write short notes on any *two* of the followings : 5 each

    (a) Bandwidth efficient modulation schemes

    (b) Viterbi decoding

    (c) Reed Solomon coding technique