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BIEL-023

B.Tech. – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

00846 **Term-End Examination**

June, 2014

BIEL-023 : INFORMATION THEORY AND CODING

Time : 3 hours *Maximum Marks : 70*

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

1. State and explain Kraft's inequality theorem. *10*

2. (a) Let A = {0, 1, 2} and $l_1 = l_2 = 1$, $l_3 = 2$, $l_4 = l_5 = 4$, $l_6 = 5$. Check whether this is satisfying Kraft's inequality or not. *5*

(b) Explain the term "Entropy of a source". What are the units of entropy ? *5*

3. (a) Write down the properties of mutual information and entropy. *5*

(b) Show that the mutual information I (X; Y) can be written in the form *5*

$$I(X; Y) = \sum_{i=1}^{s} \sum_{j=1}^{t} P(X_i, Y_j) \log \frac{P(X_i, Y_j)}{P(X_i)\, P(Y_j)}$$

4. Explain the Viterbi algorithm with an example. *10*

5. (a) What are the properties of syndrome ? *5*

   (b) Compare linear block code, cyclic codes and convolutional codes by giving their advantages and disadvantages. *5*

6. State and explain Shannon-Hartley law. Derive the upper limit of the channel capacity with increasing bandwidth. *10*

7. Calculate the information capacity of the Gaussian channel. *10*

8. Draw and explain the bandwidth efficiency plane for a single carrier system. *10*

9. Write the model of an M-ary discrete channel and explain the condition when channel is memoryless. Derive the equation of error for this channel. *10*

10. Write short notes on any ***two*** of the following : *2×5=10*

    (i) Shannon limit

    (ii) Reed Solomon codes

    (iii) Galois field arithmetic
