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**BIEL-023**

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

00869

## Term-End Examination

## December, 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 calculators is permitted. Any missing data may be suitably assumed.*

**1.** State and explain Huffman coding scheme with an example. *10*

**2.** (a) If X and Y are random variables, then prove that *5*

$$H(X/Y) = H(X, Y) - H(Y)$$

(b) Discuss joint, conditional and relative entropy. *5*

**3.** Let $\mathcal{A} = \{0, 1, 2\}$ 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 ? Construct the binary code with given codeword lengths. *10*

**4.** Write short notes on the following : *2×5=10*

(i) Band limited Gaussian channel

(ii) Channel capacity

**5.** (a) What are the various properties of differential entropy and mutual information ? *5*

(b) Explain the channel coding theorem for continuous sources. *5*

**6.** How is syndrome calculated in cyclic codes ? Explain. *10*

**7.** A generator matrix of (6, 3) linear code is given as

$$G = \begin{vmatrix} 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 & 1 \end{vmatrix}$$

Determine the $d_{min}$ for the above code. Comment upon the number of error correction and detection capabilities. *10*

**8.** (a) Explain the basic properties of finite fields. *5*

(b) Define cyclic codes. How is generated polynomial evaluated in cyclic codes ? *5*

**9.** Compare the band limited and power limited system in context of bandwidth efficiency. *10*

**10.** Explain Bandwidth – Efficient modulation schemes. *10*

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