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Total No. of Pages : 02

Total No. of Questions : 09

**B.Tech.(ECE/ETE) (E-I 2011 Onwards)
(Sem.-6)****INFORMATION THEORY AND CODING**

Subject Code : BTEC-907

M.Code : 71236

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A**1. Answer briefly :**

- a) Define mutual information and its properties.
- b) Define Hamming weight and Hamming distance. Find the hamming weight of 10110 and the hamming distance between 1111 and 0000.
- c) Define bandwidth efficiency.
- d) Explain in brief Go Back N ARQ system.
- e) Define code efficiency.
- f) Enumerate the properties of a syndrome.
- g) Write the properties of information.
- h) What is meant by constraint length and free distance of a convolution code?
- i) What is the significance of a syndrome vector in the context of error control coding?
- j) Consider $G = [100111; 010110; 001101]$, find out parity check matrix.

SECTION-B

- Q2. What do you understand by information? What are its units? How does it relate to the entropy?
- Q3. Explain the encoding method of a (7, 4) linear block code.
- Q4. A BSC has the error probability $p = 0.2$ and the input to the channel consists of 4 equiprobable messages $x_1 = 000$; $x_2 = 001$; $x_3 = 011$; $x_4 = 111$. Calculate :
- a) $p(0)$ and $p(1)$ at the input
 - b) Efficiency of the code
- Q5. What is meant by stop-and-wait ARQ? Explain.
- Q6. Explain the working of (2,1,3) convolutional encoder using transform domain approach.

SECTION-C

- Q7. Discuss Shannon's Hartley theorem based on channel capacity. How does channel capacity change if bandwidth is increased to infinity? Comment on the orthogonal signaling performance on the basis of theorems.
- Q8. For a (7, 4) cyclic code, the generating polynomial $g(x) = 1 + x + x^3$. Find the code word if data word is :
- a) 0011
 - b) 0100

Show that how cyclic code is decoded to get word for previous case (a).

- Q9. Construct the Huffman code with minimum code variance for the following probabilities and also determine the code variance and code efficiency :
- {0.25, 0.25, 0.125, 0.125, 0.125, 0.0625, 0.0625}

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.