Roll No. | | | | | | | | | | | | **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 xl = 000; x2 = 001; x3 = 011; x4 = 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 Shanon'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.