Roll No. Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ECE) (E–I 2012 to 2017)
(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) Write a short note on: Kraft inequality

b) Prove that the mutual information of a channel is symmetric.

c) What is ARQ? State its types.

d) Briefly explain Hamming Sphere.

e) What do you mean by generator matrices of the cyclic codes?

f) Write the steps for decoding of BCH codes.

g) Write short note on decoding methods of convolutional codes.

h) Write short note on Hamming distance and code efficiency.

i) Explain in brief Go Back N ARQ system.

j) What do you mean by matrix description of cyclic codes?

SECTION-B

2. Prove that the average information is maximum when the messages are equally likely.

3. Show how a 4bit stage shift register can generate a convolution code for input train 11001.

4. What is Nyquist criterion? Prove its sampling theorem mathematically. What is the need of antialiasing filter? How does it affect the distortion?

5. Maximum likelihood algorithm is used for decoding. Show its convergence and implementation in comparison to conventional technique by taking one example.

6. Discuss in detail convolution decoding procedure using the Trellis diagram.

SECTION-C

7. Write down short notes on :

   a) RS codes

   b) Golay codes

   c) Shortened cyclic codes

   d) Burst error correcting code

8. Design a block code with minimum distance of three and a message block size of 8bits.

9. Consider the random variable

$$\mathbf{X} = \begin{matrix} x_1 & x_2 & x_3 & x_4 & x_5 & x_6 & x_7 \\ 0.49 & 0.26 & 0.12 & 0.04 & 0.04 & 0.03 & 0.02 \end{matrix}$$

   a) Find the binary Huffman code for X.

   b) Find the expected code length for the encoding

   c) Find a ternary Huffman code for X.

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.