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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

Paper ID : [A2395]

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 mathematical concept of information and its units.

b) Give the basic idea behind variable length source coding. Give example.

c) For a running data stream, which kind of the coding technique is used?

d) What do you mean by Prefix coding? Give its properties.

e) Define entropy, average length and coding efficiency.

f) Mention structural properties and applications of Convolutional Coding.

g) Briefly explain Hamming Sphere.

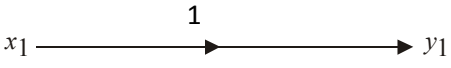
h) Distinguish Source Coding from Channel Coding and its requirement.

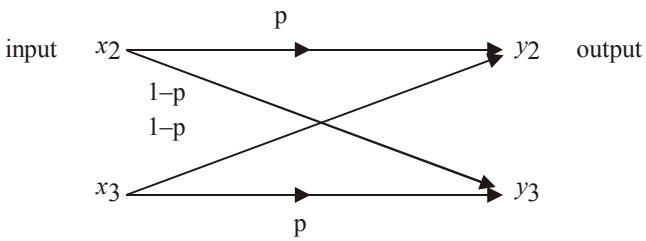
i) How do we use Parity Matrix in Block Coding?

j) Briefly comment about Selective Repeat ARQ strategies.

SECTION-B

2. For Ternary channel $Px(x_1) = P$, $Px(x_2) = Px(x_3) = Q$ where $P + 2Q = 1$. Find channel capacity and I $(x;y)$





3. Design a Huffman code for the following alphabet and find the average code-word length, efficiency and redundancy: A = {a, b, c, d, e, f, g}, P_A = {0.46, 0.26, 0.12, 0.06, 0.05, 0.03, 0.02}.

4. Define Channel Capacity theorem and Shannon limit. Discuss Bandwidth-S/N trade off.

5. Explain the following terms :

   a) Viterbi Coder.

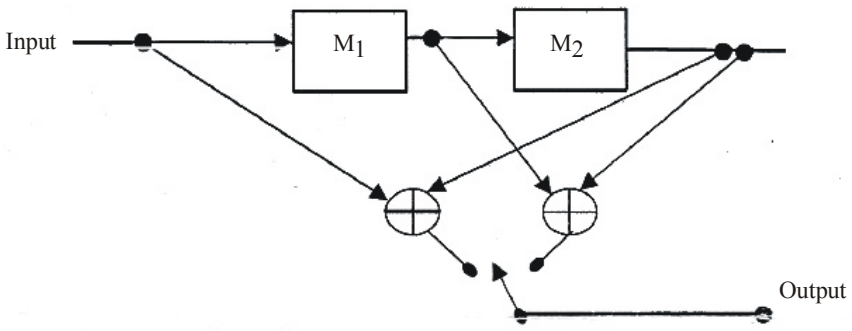
   b) Lempel Ziv coding.

6. Comment on the Cyclic Coding. Simplify the expression according to cyclic code operations: $(1 + x^n)^3$. Also factorize the expression : $1 + x + x^2 + x^3$.

SECTION-C

7. What do you understand by linear block codes? Briefly comment on the BCH codes.

8. Draw Trellis diagram for Convolutional coder (Blocks having usual Meaning) as shown in the diagram shown. Trace the path for received bits are 10 00 10 00 00 and point out discrepancies.



9. What is the significance of the syndromes of a (6, 3) systematic cyclic code? Give a complete list codes and syndromes.