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Roll No .....

MEMT - 203

M.E./M.Tech., II Semester

Examination, June 2016

Information Theory and Coding

Time : Three Hours

Maximum Marks : 70

Note : Attempt any five questions. All questions carry equal marks.

1. a) Prove what the entropy for a discrete source is a maximum when the output symbols are equally probable.

   b) A source produces symbols A, B, C with equal probabilities at a rate of 100/sec. Due to noise on channel, the probabilities of correct reception of the various symbols are as shown in table Q 1 (b).

	yj			
Xi	P(j/i)	A	B	C
	A	¾	¼	0
	B	¼	½	¼
	C	0	¼	¾

Table Q1 (b)

2. a) Explain Lempel-Ziv coding.

   b) State and prove Shannon-Hartley Law. Derive an expression for the upper limit on channel capacity as bandwidth tends to infinity.

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3. What is a BSC? What is the capacity of a BSC? State and explain Shannon's theorem on channel capacity.

4. a) Explain Hamming codes and their applications.

   b) Discuss the error detection and correction capabilities of block codes.

5. a) Discuss about the Galois field and its construction in GF(2m) and its basic properties.

   b) Explain the coding and decoding of cyclic codes with the help of circuit diagram.

6. a) Define cyclic code. Explain how cyclic codes are generated from the generating polynomials.

   b) The generator polynomial for a (7, 4) binary code is $g(x) = 1 + x + x^2$. Find the code vector in systematic form for a message vector 1100.

7. a) Determine the decoded data bits by applying Viterbi decoding algorithm, if r = 1100000111 rest all 0.

   b) Discuss BCH code and write its properties. Show using an example, the decoding steps of the code.

8. Write short notes on any two:
   a) Source coding theorem
   b) Fading channel
   c) Vector spaces
   d) Convolution codes

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