Total No. of Questions :8]

Roll No ....

MCSE - 202
M.E./M.Tech., II Semester
Examination, December 2014
Information Theory, Coding and Cryptography

Time : Three Hours

Maximum Marks : 70

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

1. a) Prove that the entropy for a discrete source is maximum when the out put symbols are equally probable?   7
   b) For the given channel matrix, calculate the mutual information I(x,y) with $P(x_1) = 1/2$ and $P(x_2) = 1/2$.   7

P(y/x)	y_1	y_2	y_3
x_1	2/3	1/3	0
x_2	0	1/6	5/6

2. a) Explain Hidden Markov model. What is the use of this model? Also discuss its properties. rgpvonline.com 7
   b) Write short note on: rgpvonline.com   7
      i) Renewal process
      ii) Bernoulli process

3. a) Discuss Shannon's theorem and its application.   7
   b) Describe the discrete birth -death processes. What are its properties? Using an example show how the process may be applied to queuing theory?   7

a) The parity check matrix of a particular (7,4) linear block code is given by ahead: 7

$$H = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

   i) Find the generator matrix G.
   ii) List all the code vectors.
   iii) What is the minimum distance between the code vectors?
   iv) How many error can be detected? How many errors can be corrected?

b) Write a brief notes on CRC codes.   7

a) Discuss BCH codes and write its properties. Show using an example, the decoding steps of the code   7.
b) Show that the block length of a fire code is
   $n = LCM(2t-1, q^m-1)$.   7

Discuss the following codes and their applications:
i) Reed-Solomon code
ii) Concatenated codes
iii) Convolutional coding.   14

a) What is Viterbi algorithm of MLSE? Discuss its applications in communication.   7
b) What do you understand by turbo decoding?   7

a) Differentiate between the following terms: 7
   i) Confusion and diffusion.
   ii) Substitution cipher and transposition cipher.
b) Explain RSA algorithm with an example.   7

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