Total No. of Questions : 8]   *[Total No. of Printed Pages : 2*

Roll No ....

IT-8003(3)-CBGS
B.E. VIII Semester
Examination, December 2020
Choice Based Grading System (CBGS)
Information Theory and Coding
Time : Three Hours

Maximum Marks : 70

Note: i)   Attempt any five questions.

   ii)   All questions carry equal marks.

1. a) Derive the relationship between entropy and mutual information.

   b) Explain the encoding procedure of I,P and B frames in video encoding with suitable diagrams.

2. a) Briefly describe the steps of Viterbi algorithm.

   b) Find the generator and parity check matrices of a(7,4) cyclic code with generator polynomial
$$g(X) = 1 + X + X^3.$$

3. a) From channel capacity theorem, find the capacity of a channel with infinite bandwidth and explain.

   b) What is source coding? Define code length and code efficiency. Give the relation between it.

4. a) Explain the LZW compression algorithm with example.

   b) Explain adaptive Huffman coding for the Message "Malayalam".

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5. a) What is entropy? Show that the entropy is maximum when all the symbols are equiprobable. Assume number of symbols M = 3.

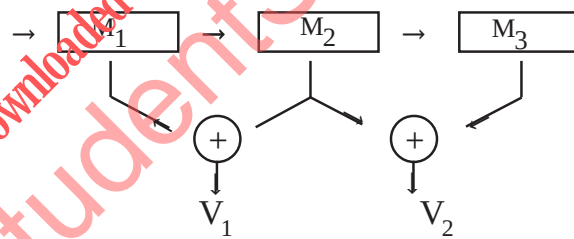   b) Find the mutual information for the channel show in given figure.
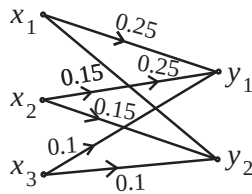
6. How the calculate coding efficiency? Apply Shannon Fano coding procedure for the following message Px symbol. Take M = 2 and find coding efficiency.

   $[X] = [x_1 \quad x_2 \quad x_3 \quad x_4 \quad x_5 \quad x_6 \quad x_7]$

   $[P] = [0.4 \quad 0.2 \quad 0.12 \; 0.08 \; 0.08 \; 0.08 \; .04]$

7. The encoder for a convolutional code is given below. Find all the code words for a 4 bit input data.

8. a) Explain image formats such us GIF, TIFF, SIF, CIF and QCIF.

   b) What is video compression? Write principles of video compression.

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