



SCAN ME

VIT

Vellore Institute of Technology

Continuous Assessment Test – I

Programme Name & Branch: B.Tech ECE

Course Code & Name: ECE4007-Information theory and Coding

Class Number: VL2019205005055

Slot: B1+TB1

Faculty: Prof K.S.Preetha

Date: 20-01-2020

Exam Duration: 90 minutes

Maximum Marks: 50

Instruction: Answer all questions

- 1 A transmitter has 5 alphabets $\{x_1, x_2, x_3, x_4, x_5\}$ and a receiver has 4 alphabets $\{y_1, y_2, y_3, y_4\}$. Determine $H(X)$, $H(Y)$, $H(X/Y)$, $H(Y/X)$ and $I(X,Y)$ by using the given matrix and $p(y_i) = \{0.35, 0.35, 0.2, 0.1\}$ 10

0.25	0	?	0
0.1	?	0	0
0	0.05	0.1	0
0	0	0.05	?
0	0	0.05	0

- 2 a) Derive the channel capacity for a Binary Erasure Channel with suitable channel transition diagram. 6
- b) Differentiate between noiseless and deterministic channel with necessary channel diagram. 4
- 3 a) An engineer says that he can design a system for transmitting computer output to a line printer operating at a speed of 30 lines/minute over a cable having bandwidth of 3.5 kHz and SNR of 30dB. Assume that the printer needs 8 bits of data/character and prints out 80 characters/line. Would you believe the engineer? 6
- b) Verify the rule of additivity for a memory less information source with 4 symbol alphabets and the corresponding probability of occurrence is given as $P = \{1/2, 1/3, 1/12, 1/12\}$ 4

- 4 Following output has been observed from a Discrete Memoryless Source (DMS) within 1 milli second duration. 10

Output = {a c d a e c a c b a a b c a b a d b a f}

- Construct a code using Shannon Fano encoding procedure
- Construct a code using ternary Shannon Fano encoding procedure
- Determine the efficiency in each case and justify your answer with which procedure provides better efficiency.

- 5 Given the source symbols s_0, s_1 and s_2 with the corresponding probabilities of 0.65, 0.2 and 0.15. 10

- Generate the codeword Huffman encoding algorithm and calculate its efficiency.
- Construct the Huffman code for the second order extension source. And compare the efficiency of this codeword with part (i).

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