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FIFTH SEMESTER

SUPPLEMENTARY EXAMINATION

Roll No. ......

B.Tech. (COE)

FEB.-2019

CO-305 INFORMATION THEORY & CODING

Time: 3:00 Hours

Max. Marks: 50

Note: Answer Any FIVE questions. All questions carry equal marks.
Assume suitable missing data, if any.

1[a] A coin is tossed an odd number of times. If the probability of getting more heads than tails in these tosses is equal to the probability of getting more tails than heads then show that the coin is unbiased.

[b] Find the discrete entropy for the source with symbol probabilities {0.3, 0.25, 0.2, 0.15, 0.1}.

2[a] Given $xi = \{x1, x2, x3, x4, x5, x6\}$ with probabilities $p(xi) = \{0.3, 0.25, 0.2, 0.12, 0.08, 0.05\}$. Make Huffman code. Find efficiency of this code.

[b] Derive the relationship between entropy and mutual information.

3[a] Define (i) Discrete entropy H (X) and joint entropy H (X,Y) and (ii) Mutual information I(X;Y).

[b] Define and Explain the following:-
i) Source coding Theorem.   ii) Convolution Code.

4 [a] Find the generator and parity check matrices of a (7, 4) cyclic code with generator polynomial $g(X) = 1 + X + X3$.

[b] Define channel capacity. Difference between binary symmetric and Asymmetric channel.

5 [a] State Shannon-Hartley theorem and from that derive Shannon's theoretical limit.

[b] Determine the capacity of a channel of infinite bandwidth.

6 [a] Prove that the entropy for a discrete source is maximum when the output symbols are equally probable.

[b] Explain how to generate a linear block code using G-matrix. Explain with an example

7 Write short note Any Two:-
[a] Kraft; and Mc Millan's inequality.
[b] Prefix coding with suitable Example.
[c] Briefly describe the steps of Viterbi algorithm.