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Name.....

Reg. No.....

SEVENTH SEMESTER B.Tech. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2006

EC 2K 703—INFORMATION THEORY AND CODING

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

I. (a) State Shannon-Fano coding procedure.

(b) Define mutual information and state its properties.

(c) Explain what is meant by minimum distance ?

(d) Find the generator matrix corresponding to the generator polynomial of $g(X) = X^3 + X^2 + 1$ of a (7, 4) cyclic code.

(e) Explain what is meant by irreducible polynomial ?

(f) Define BCH code and explain.

(g) Explain what is meant by constraint length in convolutional code ?

(h) Explain what is meant by maximum likelihood decoding ?

(8 × 5 = 40 marks)

II. (a) Construct binary optimal code for the following probabilities using Huffman procedure.

0.4, 0.2, 0.12, 0.08, 0.08, 0.08, 0.04

Or

(b) Find the channel capacity of the channel with matrix $\begin{bmatrix} 1 & 0 & 0 \\ 0 & p & 1-p \\ 0 & 1-p & p \end{bmatrix}$.

III. (a) Explain the error detecting and correcting capability of an (n, k) linear block code.

Or

(b) Draw the general block diagram of decoder of cyclic code and explain its function.

IV. (a) Explain the construction procedure of Galois field with an example.

Or

(b) Explain Reed-Solomon code.

V. (a) A rate $\frac{1}{3}$ non-systematic code is given by the generator sequences :

$g(1, 1) = (1\ 1\ 0\ 1)$.

$g(2, 1) = (1\ 0\ 0\ 1)$.

$g(3, 1) = (1\ 1\ 1\ 0)$.

(i) Construct the coder.

(ii) Draw the tree diagram, state diagram and trellis diagram.

Or

(b) Explain sequential decoding algorithm for convolutional code.

[4 × 15 = 60 marks]