

D 42106

(Pages 2)

Name.....

Reg. No.....



**FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE
EXAMINATION, DECEMBER 2007**

Information Technology

IT 2K 503—INFORMATION THEORY AND CODING

Time : Three Hours

Maximum : 100 Marks

- I. (a) Show that for equal probability events the entropy would be maximum.
(b) Give an account on 'Lempel ziv coding'.
(c) What is meant by standard array of linear block codes ? Explain. Give examples.
(d) A (15, 5) linear cyclic code has a generator polynomial

$$g(x) = 1 + x + x^2 + x^4 + x^5 + x^8 + x^{10}.$$

Draw block diagrams of an encoder and syndrome calculator for this code.

- (e) Write the basic properties of Galois field.
(f) Explain the advantages of Reed solomon codes.
(g) What are constraint length and rate efficiency of the convolution codes ? Explain. Give examples.
(h) Construct a convolutional encoder, for $N = 3$, $n = 3$ and $k = 1$, and explain its operation.

(8 × 5 = 40 marks)

- II. (a) (i) Derive the algorithm for Huffman coding. (8 marks)

- (ii) Apply Huffman coding to the following probabilities and compute efficiency :

$$P = \{0.4, 0.1, 0.1, 0.05, 0.05, 0.04, 0.03, 0.03, 0.2\}.$$

(7 marks)

Or

- (b) (i) Derive the expressions for channel capacities for Binary symmetric and Binary erasure channels.

(8 marks)

- (ii) State and derive the properties of entropy.

(7 marks)

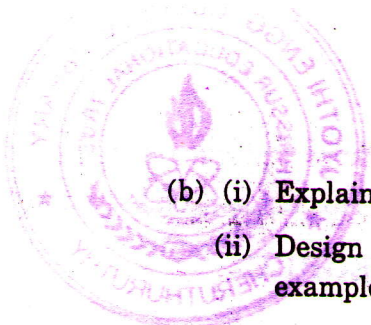
- III. (a) (i) Derive the matrix representation of Linear block codes. (8 marks)

- (ii) Describe in detail the error detection and error correction capabilities of Linear block codes.

(7 marks)

Or

Turn over

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- (b) (i) Explain the procedure for decoding cyclic codes. (8 marks)
- (ii) Design a single-error correcting code with a message block size = 11 and show by an example that the code can correct single errors. (7 marks)

IV. (a) Describe in detail the algorithm and features of BCH codes, with examples.

Or

- (b) (i) Explain in detail the construction of Galois field. (8 marks)
- (ii) Give an account on vector spaces and matrices. (7 marks)
- V. (a) (i) Draw an encoder for $N = 4$, $n = 4$, $k = 1$ and explain its principle. (8 marks)
- (ii) Explain sequential decoding detection of convolutional codes. (7 marks)

Or

- (b) Write short notes on :
- (i) Performance of convolutional codes. (8 marks)
- (ii) Features of trellis code. (7 marks)

[4 × 15 = 60 marks]