

D 70179

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Name.....

Reg. No.....

**SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE [09 SCHEME]
EXAMINATION, NOVEMBER 2014**

EC/PTEC 09 701—INFORMATION THEORY AND CODING

Time : Three Hours

Maximum Marks

Answer all questions.

Part A

- I. 1 What is a binary memoryless source ?
2 Define channel capacity.
3 What is a group ?
4 What is the purpose of channel codes ?
5 What is Hamming weight ?

(5 × 2 = 10 marks)

Part B

II. Answer any *four* questions :

- 1 State and prove the properties of self information.
2 Encode the following source using Huffmann procedure :
 $P(X) = \{0.2, 0.1, 0.05, 0.35, 0.3\}$.
3 Discuss BCH coding.
4 Show that minimum hamming distance is equal to minimum hamming weight of a linear block code.
5 Design a convolutional coder of constraint length 8 and rate efficiency $\frac{1}{2}$. Draw its state diagram.
6 Explain about interleaved convolutional codes.

(4 × 5 = 20 marks)

Part C

- III. 1 Explain the following codes with a suitable example for each :
(a) Shannon-Fano.
(b) Lempel-Ziv.

Or

- 2 State and prove channel coding theorem.

Turn over

- 3 Explain Reed Solomon coding and decoding with a suitable example.

Or

- 4 Explain the construction of Galois field. Discuss its properties.
- 5 Assume the following equations to form the parity bits of a (7, 4) linear block systematic coder :

$$p_1 = d_1 \oplus d_2 \oplus d_3$$

$$p_2 = d_2 \oplus d_3 \oplus d_4$$

$$p_3 = d_3 \oplus d_4 \oplus d_1$$

- (a) Write down the Generator matrix and parity check matrix of the coder.
- (b) Find the minimum Hamming distance and minimum hamming weight of the code.
- (c) Draw the hardware arrangement of the coder.

Or

- 6 Find the systematic and non-systematic (7, 4) cyclic code vectors of the data vector (1101). Assume a generator polynomial $x^3 + x^2 + 1$.
- 7 Explain sequential decoding of convolutional codes.

Or

- 8 Explain turbo coding and decoding with a suitable example.

(4 × 10 = 40 marks)