K15F 0231

Reg. No. : .....

Name : .....

VII Semester B.Tech. Degree (Reg./Sup./Imp.-Including Part Time) Examination, November 2015
(2007 Admn. Onwards)
PT2K6/2K6 EC 703 : INFORMATION THEORY AND CODING

Time : 3 Hours Max. Marks : 100

***Instruction** : Answer **all** questions. Questions of Part **A** carries **5** marks and Part **B** carries **15** marks.*

PART – A

I. 1) Define Entropy. List its properties.

2) State and explain Kraft's inequality.

3) Construct mod-5 multiplication table.

4) Define irreducible polynomial. Give an example polynomial of degree 3.

5) Describe the structural details of a cyclic code generator matrix.

6) Explain the error detection and correction capabilities of linear block codes.

7) Sketch a rate $\frac{1}{2}$, constraint length 4 convolution encoder for $g_1(x) = 1 + x^2 + x^3$ and $g_2(x) = 1 + x + x^2 + x^3$.

8) What is interleaving ? Explain. Mention any two methods. **(8×5=40)**

PART – B

II. A) Find conditional probability, conditional entropy and joint entropy for the given system and verify the relationship between various entropies.

y \ x				
p(x, y)	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{4}$
	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{16}$	0
	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{1}{16}$	0
	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{1}{16}$	0

15

OR

P.T.O.

B) i) Explain algorithm of Huffman coding principle. 5

ii) Make Shannon-Fano code for alphabets A to H with respective probabilities 0.3, 0.2, 0.15, 0.12, 0.10, 0.07, 0.04 and 0.02. Also find efficiency and redundancy. 10

III. A) Construct an extended field GF(2^5), using a primitive polynomial $p(x) = 1 + x + x^5$. 15

OR

B) i) Find subspace and its null space of vector space V_5, with 2-dimensions. 8

ii) If 'β' is the root of a polynomial over GF(2^m) with power 'm'. Then show that β^{2^l}, $l > 0$ are also roots of the same polynomial. 7

IV. A) i) Give the general structure of a (7, 4) linear block code generator matrix and parity check matrix. 5

ii) Sketch the block diagram of a (7, 4) linear block code generator and explain the coding principle. 10

OR

B) i) With block diagram, explain the working of a cyclic decoder for systematic codes. 7

ii) Explain the method of syndrome generation and formation of decoding table. 8

V. A) i) Describe Viterbi decoding algorithm. 5

ii) Explain decoding of convolution codes using Viterbi algorithm, over a Trellis diagram. 10

OR

B) Briefly explain principle of turbo coding and decoding. (8+7)

(4×15=60)