ET 372 R

B.Tech. DEGREE EXAMINATION, NOVEMBER 2009.

Seventh Semester

Electronics and Communication Engineering

INFORMATION THEORY AND CODING

Time : Three hours Maximum : 75 marks

Answer any FIVE questions choosing ONE full from each Unit.

All questions carry equal marks.

UNIT I

1. State and prove the properties of entropy. (15)

Or

2. (a) Explain about measure of information. (8)

(b) Calculate the entropy rate of a conventional telegraph source with the dash twice as long as a dot and half as probable, given e_{dot} = 0.2 sec. (7)

UNIT II

3. (a) Find the channel capacity of a binary symmetric channel (i) P = 0.9 (ii) P = 0.6. (10)

(b) Check whether the given channel is symmetric or not with reason. (5)

$$P[Y/X] = \begin{bmatrix} 1/3 & 1/6 & 1/3 & 1/6 \\ 1/6 & 1/3 & 1/6 & 1/3 \end{bmatrix}$$

Or

4. Explain about the noiseless channel and the channel with independent input and output. (15)

UNIT III

5. (a) State and prove Shannon Hartley theorem. (10)

(b) Explain about the Neyman Pearson Test. (5)

Or

6. Explain and derive the expression for Baye's criterion. (15)

UNIT IV

7. (a) Apply Huffman coding procedure for

$$S = \{S_1, S_2, S_3, S_4, S_5, S_6\}$$

$$P = \left\{\frac{1}{3}, \frac{1}{4}, \frac{1}{8}, \frac{1}{8}, \frac{1}{12}, \frac{1}{12}\right\} \quad X = \{0,1,2\}$$

Calculate its redundancy and efficiency. (10)

(b) Explain about the coding and its advantages of source coding. (5)

Or

8. (a) State Shannon first and second fundamental theorem. (5)

(b) Apply Shannon fano encoding procedure

$$S = \{S_1\, S_2\, S_3\, S_4\, S_5\, S_6\, S_7\, S_8\, S_9\}$$

$$P = \{0.49, 0.14, 0.14, 0.07, 0.07, 0.04, 0.02, 0.02, 0.01\}$$

$X = \{0,1\}$. Calculate its efficiency. (10)

UNIT V

9. (a) The generator matrix for $a(6, 3)$ block code is given below. Find all the code vectors of the code

$$G = \left[\begin{array}{ccc:ccc} 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 1 \end{array}\right] \quad (7)$$

(b) The generator polynomial of a (7, 4) cyclic code is $g(x) = 1 + x + x^3$. Find the 16 codewords of this code. (8)

Or

10. (a) Write short notes about :

(i) BCH codes

(ii) Convolution codes. (8)

(b) Explain and design a block code with a minimum distance of three and a message block size of eight bits. (7)
