M.Tech 1st Semester (ECE) CBCS Scheme

Examination, December–2017

INFORMATION & COMMUNICATION THEORY

Paper-MTECE 21C3

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt any **five** questions in total. All questions carry equal marks.*

1. (a) How entropy is calculated ? Explain various properties of entropy. 10

(b) A channel is described by the following channel matrix : 10

$$[P(Y/X-)] = \begin{matrix} 0.5 & 0.5 & 0 \\ 0 & 0 & 1 \end{matrix}$$

(i) Draw the channel diagram.

(ii) Find the channel capacity

2. (a) Explain the measurement of mutual information and also derive the expression for channel capacity. 10

(b) A discrete source emits one of the eight symbols once every millisecond with probabilities 1/8, 2/8, 3/8, 3/8, 5/8, 6/8, 7/8 and 7/8 respectively. Determine the source entropy and information rate. 10

3. (a) Examine sou coding in detail along with the basic propert codes. 10

(b) Apply the Sha Fano encoding procedure to the following DM 10

$[X] = [x_1, x_2, \ldots x_5, x_6, x_7]$

$[P] = [1/3, 1/\ldots, 1/12, 1/12, 1/12, 1/12]$

4. (a) What is the p e of the Hamming code ? How can we use th nming code to correct a burst error ? 10

(b) Find checksu the following bit sequence. Assume a 16 quence size : 10

(i) 100100 10011

(ii) 100110(01101

5. (a) Draw the en circuit for an (n,k) linear systematic bl de. 10

(b) For the (7,4 ear block code, consider r = 1011010 b eceived vector at the receiver. Calculate the ome and then determine the error vector r 10

6. (a) Explain Burs correcting block codes with suitable diagr 10

(b) For the (6,3) block code with generator matrix : 10

$$G = \begin{matrix} 1 & 0 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 & 0 & 1 \end{matrix}$$

Find the corresponding code words for all possible data words.

7. Explain encoding and decoding procedure of BCH codes. How syndrome computation can be utilized for the BCH codes ? Explain with suitable example. 20

8. Write short notes on : 10×2=20

(a) Performance of convolutional codes.

(b) Error probability Upper and Lower bounds.