22662

M.Tech. 1st Semester (ECE) CBCS Scheme
Examination, December–2018

INFORMATION AND COMMUNICATION THEORY

Paper– MTECE 21C3

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

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

1. (a) Explain the concept of information and uncertainty.   10

   (b) An analog signal band limited to 5 KHz is quantized is 8 levels of a PCM system with probabilities of 1/4, 1/5, 2/5, 1/10, 3/10, 1/20, 7/20 and 1/40 respectively. Find entropy and rate of information.   10

2. (a) Explain discrete and continuous entropy in detail. Also give out difference between them.   10

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

3. (a) Explain Shannon-Fano encoding algorithm with suitable example.   10

   (b) Apply Shannon binary procedure for encoding following message ensemble: 10

   $[X] = [x_1, x_2, x_3, x_4, x_5]$
   $[P] = [0.4, 0.3, 0.15, 0.1, 0.05]$

4. (a) Discuss the two dimensional parity check and types of error it can and cannot detect.   10

   (b) The code 11110101101 is received. Using the Hamming encoding algorithm, what was the original code sent.   10

5. (a) Explain with example, how block codes are used to detect and correct errors.   10

   (b) Find the generator matrix G, for the (7,4) block code and find the code vector for the data vector 0010, 1101, 1001 and 0111.

6. (a) Explain Syndrome calculation for Linear block code in details with example.   10

   (b) Explain briefly about Hamming codes and weight enumerator.   10

7. (a) Explain Read Solomon codes.   10

   (b) Discuss structural properties of convolutional codes.   10

8. Write short notes on: 10×2=20

   (a) Performance of Linear block codes.

   (b) Error probability Upper and Lower bounds.