TE - sem - V (old) electronics - DCC 1

19/12/16

Q.P. Code : 590100

(3 Hours) [Total Marks : 100

N.B. : (1) **Q.1** is **Compulsory.**
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume suitable data wherever required but justify the same.

1. Attempt **any four** form the following :
   (a) Justify : MSK is called as shaped QPSK - signal.
   (b) Justify : In DEPSK transmission, error always exists in pairs.
   (c) Differentiate between systamatic and non systamatic cyclic codes with suitable examples.
   (d) State and explain Random variable, mean and variance of Random variables.
   (e) Write a note on PN sequence generator.

2. (a) Consider five messages given by the probabilities

$$M = m1, m2, m3, m4, m5$$

$$P = \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{16}$$

   (i) Calculate H (Entropy)
   (ii) Use the shannon - fano algorithm to develop an efficient code. For the that code, calculate the average numbers of bits/message. Compare with 'H'.

   (b) Consider sources has an alphabet of five symbols with probabilities as shown.

Symbol :	S1	S2	S3	S4	S5
Probabilities :	0.15	0.11	0.19	0.40	0.15

   (i) Calculate Hufman code and calculate efficiency and redundancy of the code.
   (ii) Repeat the same for arranging probabilities in ascending order. Compare both results.

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3. (a) For binary data sequence 110110 sketches waveforms of -
   (i) NRZ (Polar)
   (ii) BASK
   (iii) BFSK
   (iv) QPSK

   (b) Explain BPSK system with respect to transmitter and receiver block diagram, Bandwidth, signal spaces representation and euclidian distance.

4. (a) The parity check matrix of a (7,4) linear block code is given by

$$H = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 & 0 & 0 & 1 \end{bmatrix}$$

   (i) Find the generator matrix
   (ii) List all code words
   (iii) For received codeword R = 1011110 find the syndrome.

   (b) A (7,4) cyclic code is generated using a polynominal $x^3 + x + 1$.
   (i) Generate the systamatic cylic code for the data 1100.
   (ii) Draw enconder and show how parity bits are generated for the data sequence 1100.
   (iii) Draw the decoder for the same and obtain the syndrome for the received codeword 1011010.

5. (a) Explain the Nyquist criteria for distortion less base band transmission.
   (b) What is duo binary enconding. Explain with neat block diagram. How the duobinary encoder reduces the bandwidth requirement.

6. (a) With neat block diagram explain DSSS techniques. What is processing gain and Jamming margin.
   (b) With a neat block diagram explain QPSK transmmiters and receiver systems.

7. Write short note **(Any Four)**
   (a) Eye diagram
   (b) Viterbi algorithm
   (c) LZ coding
   (d) Differentiate between source coding and channel coding
   (e) Explain the following terms :
      (i) Code rate
      (ii) Code efficiency
      (iii) Hamming distance
      (iv) Hamming weight
      (v) Entropy

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