QP Code : 4416

(3 Hours)   [Total Marks :100

(Old Course)

N.B.:   (1) Question No. **1** is **compulsory**.

(2) Answer any **four** of remaining questions.

(3) Assume **suitable** data if **necessary**.

1.   (a) Calculate a [7, 4] code whose generator matrix is :   10

$$\overline{\overline{G}} = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 & 0 \end{bmatrix}$$

Find all the code vectors of the code.

Determine error correction and detection capability

Find the parity-check matrix of the code.

(b) Explain with neat diagram BPSK modulation and demodulation.   10

2.   (a) Construct Huffmann code for the DMS with symbol set {0·25, 0·25, 0·125, 0·125,   10
0·125, 0·0625, 0·0625} and find entropy, average code word length and code
efficiency.

(b) Describe the principle of working of Digital Communication transmitter and receiver   10
with suitable diagram.

3.   (a) Given a binary sequence 1101100011, draw RZ, NRZ, AMI and Manchester   10
waveforms.

(b) Explain following terms w.r.t. to block codes   10

(i)   systematic code

(ii) Hamming weight

(iii) Hamming distance

(iv) Non systematic code

4.   (a) Derive expression for Power spectral density of NRZ signal.   10

(b) Explain Viterbi decoding for convolutional codes.   10

5.   (a) State and explain source coding theorem.   5

(b) Compare QPSK and 16 QAM.   5

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(c) A binary data stream 0010100111 is applied to a duobinary encoder with precoder. Construct duobinary coder and decoder output. 10

6. (a) Given $g(x) = 1 + x + x^3$ for a (7, 4) cyclic code, draw block diagram of encoder and Syndrome decoder. Find encoded message for input message 1001. 10

   (b) Derive expression for probability of error of integrate and dump filter. 10

7. Write short notes on any **two** :— 20

   (a) ISI

   (b) Matched filter

   (c) BFSK.

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