Q. P. Code : 38835

(3 Hours) **(Total Marks : 80**

N.B.: (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of remaining five.
(3) All questions carry equal marks.
(4) Assume Suitable data, if required and state it clearly.

1. Attempt any Four:-
   (a) Derive an expression for Entropy 05
   (b) Explain linearity and cyclic property of cyclic code. 05
   (c) How is spread spectrum signal different from normal signal? 05
   (d) Compare: Binary phase shift keying and binary frequency shift keying. 05
   (e) Write short note on equalizers? 05

2. (a) A discrete memoryless source has an alphabet of seven symbols with probabilities for its output as described in Table 10

Symbol	S_0	S_1	S_2	S_3	S_4	S_5	S_6
Probability	0.25	0.25	0.125	0.125	0.125	0.0625	0.0625

Compute the Huffman code for this source moving the "combined" symbol as high as Possible. Explain why the computed source code has an efficiency of 100 percent.

   (b) Explain the necessity of line codes for data transmission. State different types of Line codes. 10

3. (a) Explain in detail 16-QAM Transmitter and receiver system. Also draw Signal constellation diagram for 16 QAM in detail. 10

   (b) Calculate the error probability of matched filters. 10

4. (a) Explain the working of QPSK system with neat block diagrams. 10

   (b) The Parity check matrix of particular (7,4) linear block code is given by : 10

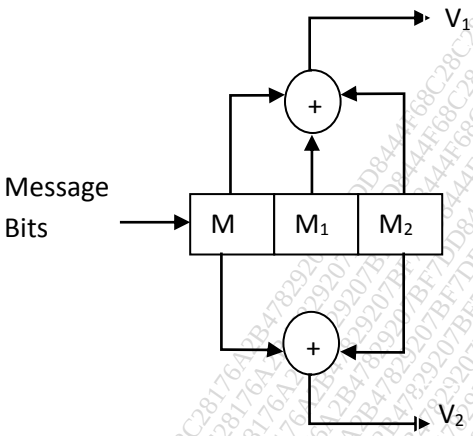
$$H = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

   1. Find the generator matrix (G).
   2. List all code vectors.
   3. What is the minimum distance between the code vectors?
   4. How many error can detected? How many can be corrected?

TURN OVER

5. (a) Encode the message 101 in systematic form using polynomial division and the generator $g(X) = 1 + X + X^2 + X^4$ 10

(b) For the given code show in figure obtain the convolutional code for the bit sequence 1 1 0 1 1 0 1 1 and decode it by constructing the corresponding code tree. 10



6. (a) Draw the block diagram for FH-SS system and explain the working. Differentiate between slow frequency hopping and fast frequency hopping. 10

(b) Draw the block diagram of MSK transmitter. Why MSK is called shaped QPSK. 10