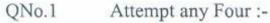
T. E/Sem VI/ EXTL/ DC/21/11/17 Q. P. Code: 24894

Duration: 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.



- 2.0
- a What is matched filter? Mentation two properties of Matched filter.
- b State the significance of minimum distance block code.
- c Describe how channels can be classified briefly explain each.
- d How is spread spectrum signal different from normal signal?
- e Explain the following terms in digital modulation techniques: Probability of error, Power spectra, Bandwidth efficiency.

Q No.2 a Explain the Huffman encoding procedure. A discrete memoryless source 10 (DMS) has five symbols with probabilities for its output as described in Table.

Symbol	X_1	X ₂	X ₃	X ₄	X_5
Probability	0.4	0.19	0.16	0.15	0.1

Construct a Huffman code for X and calculate the efficiency of the code.

- b Why do we need to use the line code formats? State the important properties of 10 line codes.
- Q No.3 a Sketch PSK and QPSK signals for the input bit sequence 10011010. What are 10 the similarities between them? How do they differ to each other?
 - b A polar NRZ waveform has to be received with the help of a matched filter. 10 Here, binary 1 is represented by a rectangular positive pulse. Also, binary zero is represented by a rectangular negative pulse. Determine the impulse response of the matched filter. Also, sketch it.
- Q No.4 a Draw the block diagram of binary Frequency shift Keying (BFSK) generation. 10 And also explain the Spectrum of BFSK signal.

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

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

- i. Find the generator matrix (G)
- ii. List all the codevectors
- iii. What is the minimum distance between the code vectors?
- iv. How many errors can be detected? How many errors can be corrected?
- Q No.5 a For the systematic (7, 4) cyclic code, determine the generator matrix and parity check matrix. Given generator $g(x) = x^3 + x + 1$.
 - b Generator vectors for a rate 1/3 convolutional encoder are: 10 $g^1 = (1,0,1), g^2 = (1,1,0), g^3 = (1,1,1)$
 - Draw encoder diagram.
 - ii. Draw trellis diagram.
- Q No.6
- b Explain M-Ary FSK with the help of following.

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- i. Block diagram
- ii. Spectrum of M-Ary FSK
- iii. Bandwidth of M-Ary FSK
- c Explain with block diagram, direct sequence spread spectrum technique.
