

Total No. of Questions : 8]

SEAT No. :

**PB3831**

[Total No. of Pages : 3

[6262]-93

T.E.(E&TC)

**DIGITAL COMMUNICATION**

**(2019 Pattern) (Semester -I) (304181)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

**Q1) a)** What is OFDM? Draw and Explain block diagram of generation and reception of the OFDM. **[8]**

b) Compare BPSK, QPSK and M-ary PSK **[9]**

OR

**Q2) a)** What is M-ary FSK? Draw and Explain Block diagram of generation and reception of the M-ary FSK. **[8]**

b) Calculate bandwidth requirement and minimum separation of signal points in signal space for **[9]**

BPSK

QPSK

16PSK

Given that input bit rate is 8kbps and energy per bit duration is  $1 \times 10^{-4} J$ .

**Q3) a)** Explain spread spectrum transmission and reception process in SS communication with neat block diagram. **[9]**

b) The information bit duration in DS-BPSK spread spectrum communication system is 4ms while the chipping rate is 1 MHz. Assuming an average error probability of  $10^{-5}$  for proper detection of message signal. Calculate the jamming margin. Given  $Q(4.25) = 10^{-5}$  **[9]**

OR

**P.T.O.**

- Q4) a)** Write a short note on following: [9]  
 i) Slow FHSS  
 ii) Fast FHSS

- b) What is PN sequence? Explain properties of PN sequence. [9]

- Q5) a)** Explain difference type of discrete memoryless channel. [8]  
 b) Find coding efficiency of a source encoder generating messages with probability  $1/4, 1/8, 1/2, 1/8$  using Shannon-fano coding technique. [9]

OR

- Q6) a)** A 3 bit PCM system generates 1,000 samples per second, if the quantized samples produced by the system have Probabilites  $\{1/4, 1/4, 1/8, 1/8, 1/16, 1/16, 1/16, 1/16, \}$ . Find the rate of information . If the samples are equiprobable. What will be the rate of information? [8]

- b) Apply Huffman coding for the following message ensemble. [9]  
 $X = [x_1 \ x_2 \ x_3 \ x_4 \ x_5 \ x_6 \ x_7]$   
 $P = [0.45 \ 0.15 \ 0.1 \ 0.1 \ 0.08 \ 0.08 \ 0.04]$  and find coding efficiency

- Q7) a)** For a systematic linear block code, the three parity check digits, are given by [9]

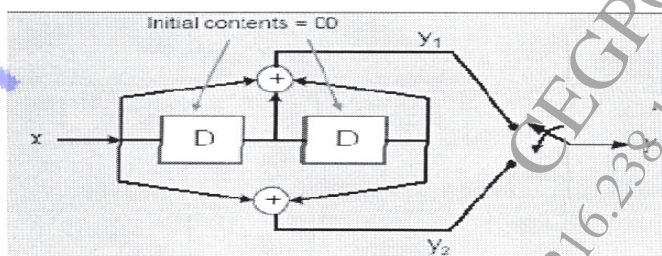
$$C_4 = d_1 \oplus d_2 \oplus d_3$$

$$C_5 = d_1 \oplus d_2$$

$$C_6 = d_1 \oplus d_3$$

- Construct Generator Matrix
- Construct All Code generated by this matrix
- Determine error correcting capability
- Prepare suitable decoding table
- Decode the received words 0 0 0 1 1 0

- b) [9]



For given convolutional encoder draw three graphical representation.

OR  
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- Q8)** a) Draw the encoder and syndrome calculator for the generator polynomial  $g(x) = 1 + x^2 + x^3$  and obtain the syndrome for the received codeword 1 0 0 1 0 1 1 [9]
- b) Explain properties of Linear block code and cyclic codes with suitable example [9]

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