

Total No. of Questions : 8]

PD4294

SEAT No. :

[Total No. of Pages : 2

[6403]-92
T.E. (E & TC)
DIGITAL COMMUNICATION
(2019 Pattern) (Semester - V) (304181)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answers any one question out of 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)** Explain the working of minimum shift keying (MSK), modulator and demodulator with the help of block diagram and waveform. **[8]**
- b)** What is Inter Symbol Interference (ISI)? Explain Causes of ISI. **[9]**

OR

- Q2) a)** Compare M-ary PSK and M-ary QAM. **[8]**
- b)** What is OFDM? Draw and Explain block diagram of generation and reception of the OFDM. **[9]**
- Q3) a)** What is PN sequence? Explain properties of PN sequence. **[9]**
- b)** The bit duration in DS SS BPSK communication system is 4 ms and chipping rate is 1 Mbps. Considering average error probability of $P_e = 10^{-5}$ for detecting the message signal, calculate the processing gain and Jamming margin Assume $Q(4.25) = 10^{-5}$ **[9]**

OR

- Q4) a)** Write a short note on following. **[9]**
- i) Slow FHSS
 - ii) Fast FHSS
- b)** Explain DSSS BPSK System in detail. **[9]**

P.T.O.

Q5) a) What is Entropy and Mutual Information, and What are a properties of Entropy and Mutual Information. [8]

b) A discrete source transmits messages x_1 and x_2 with probability $\frac{3}{4}$ and $\frac{1}{4}$. The source connected to the binary symmetrical Channel with $p(y_1/x_1) = 2/3$. Calculate all entropies and mutual information. [9]

OR

Q6) a) Compare Shannon-Fano and Huffman coding techniques [8]

b) Apply Huffman coding for the following message ensemble.

$X = [x_1 x_2 x_3 x_4 x_5 x_6 x_7]$

$P = [0.45 0.15 0.1 0.1 0.08 0.08 0.04]$ and find coding efficiency. [9]

Q7) a) For a systematic linear block code, (7,4) the parity matrix is given by [110;011;111;101] [9]

i) Construct Generator Matrix

ii) Find code vectors for messages 1100, 0011

iii) If the received code vector $R = 01111101$, find corrected codeword.

b) Define and Explain following terms [9]

i) Hamming distance

ii) Hamming weight

iii) Code rate

iv) Constraint length

v) Generator polynomial

OR

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 Code with example.[9]

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