Total No. of Questions : 8]

P757

[5870]-1061

T.E. (Electronics & Telecommunication) DIGITAL COMMUNICATION

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

Time : 2¹/₂ Hours]

[Max. Marks : 70

[4]

[Total No. of Pages : 3

SEAT No. :

Instructions to the condidates:

- 1) Answers Q1 or Q2, Q3 or Q4, Q5 or Q6, and Q7 or Q8.
- 2) Figures to the right side indicate full marks.
- 3) Assume suitable data, if necessary.

Q1) a) Explain how eye pattern can be used to study ISI.

b) Find the maximum value of error probability Pe for16-PSK, 16-FSK (orthogonal) and 16-QAM if energy per bit duration is 5×10–5 J and double sided power spectral density (PSD) of AWGN is 10-9 W/Hz. [6]

Given:

erfc (3.1622) = 0.00000774819erfc (1.9634375) = 0.00549erfc $(7.0710678) = 1.5239709 \times 10^{-23}$

c) Describe with the help of block diagram, MSK transmitter along with waveforms. Mention the bandwidth requirement. [8]

OR

- *Q2*) a) Compare MSK & QPSK.
 - b) With the help neat block diagram explain OFDM transmitter and receiver system. [8]
 - c) Write short note on : Raised cosine function: a solution to Inter Symbol Interference (ISI) and mention its limitations. [6]

P.T.O.

[4]

- Q3) a) A BPSK-DSSS system using coherent detection is used to transmit data at 250bps & system has to work in a hostile jamming environment with minimum error performance of one error in 20000 bits. Determine the minimum chipping rate if the jamming signal is 300 times stronger than the received signal.
 - b) Write a short note on :
 - i) PN sequence Generator
 - ii) Frequency hop Spread spectrum

OR

- Q4) a) Information bit duration of DS-BPSK SS system is 1 MHz. Assuming an average error probability of 10^{-5} . Calculate jamming margin if $Q(4.25) = 10^{-5}$. [9]
 - b) Explain DSSS based CDMA.

[8]

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[8]

- (Q5) a) Given the messages X_1, X_2, X_3, X_4, X_5 with respective probabilities of 0.4, 0.19, 0.16, 0.15 and 0.1 Construct codeword by minimum variance Huffman code. Compute source entropy, codeword length, efficiency, redundancy and variance. [10]
 - b) Calculate the capacity of an AWGN channel whose bandwidth is 1 MHz and S/N ratio of 40 dB.
 - c) State and explain channel coding theorem.

OR

Q6) a) Compute Shannon Fano code for following message ensemble. [10]

Symbols	X ₁	X ₂	X ₃ X ₄
Probabilities	0.4	0.3	0.2 0.1

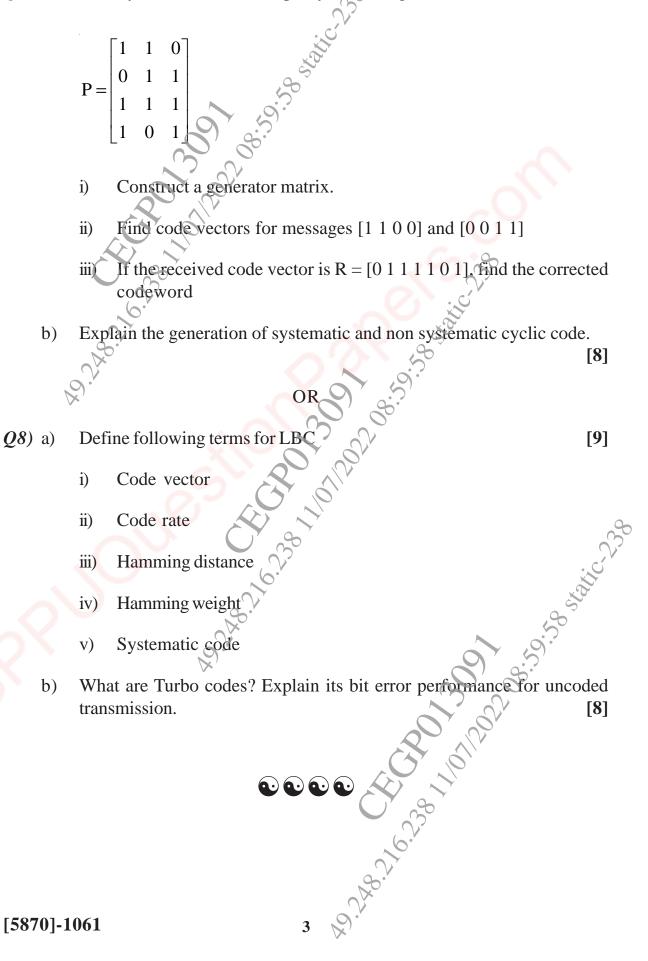
Compute average codeword length, Entropy and coding efficiency.

- b) State and explain Information Capacity theorem. [4]
- c) Compare between source coding and Channel coding. [4]

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