Total No. of Questions : 8]

SEAT No. :

PF-4957

[Total No. of Pages : 2

[6626]-92
T.E. (E & TC)
DIGITAL COMMUNICATION
(2019 Pattern) (Semester - V) (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 and 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 generation and reception of M-PSK system with block diagrams. State the expression for probability of error and discuss its bandwidth requirement. **[8]**

b) Compare MSK and QPSK. **[9]**

OR

Q2) a) What is continuous-phase modulation? Explain how MSK ensures continuous phase transitions. Draw the MSK waveform and discuss its bandwidth advantages. **[8]**

b) What is pulse shaping? Explain Raised Cosine pulse and its effect on ISI. **[9]**

Q3) a) Define PN sequence. Explain its properties and importance in DSSS. **[9]**

b) A DS-SS BPSK system uses a spreading factor (chips per bit) of 31. The bit rate is 3 kbps and the jammer power is 15 times the signal power. Calculate : **[9]**

i) Processing gain

ii) Jamming margin

Assume suitable values wherever necessary.

OR

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Q4) a) Write short notes on : **[9]**

i) Slow Frequency Hopping Spread Spectrum

ii) Fast Frequency Hopping Spread Spectrum

b) Explain DSSS BPSK System in detail. **[9]**

Q5) a) Explain with neat diagram : **[8]**

i) Descrete Memory less channel

ii) Binary symmetric channel

iii) Noise free channel

iv) Useless channel

b) State Shannon's Third theorem.A Gaussian channel has bandwidh of 1 Mhz. Calculate capacity of channel if signal power to noise spectral density ratio is 10^5Hz. **[9]**

OR

Q6) a) A discrete source has symbols A and B with probabilities 0.6 and 0.4. The source is connected to a BSC with error probability p = 0.2. Calculate: H(X), H(Y), H(X|Y), H(Y|X), I(X;Y), Channel capacity. **[8]**

b) Apply Huffman coding to the following message ensemble and find coding efficiency : **[9]**

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

P = [0.30 0.25 0.15 0.12 0.10 0.08]

Q7) a) For a (6, 3) systematic linear block code, the three parity check digits, are given by **[9]**

$C_4 = m_1 \oplus m_2$

$C_5 = m_1 \oplus m_2 \oplus m_3$

$C_6 = m_1 \oplus m_3$

i) Determine Generator Matrix code

ii) Determine and Comment on error detection and error correcting capability of the code

iii) If received sequence is 1 0 1 1 0 1, determine the message of word

b) Designing convolution encoder of (1/2, 3) and g1 (111), g2 (1 0 1) and using Viterbi algorithm decode the received sequence 1 1 0 0 1 1 1 1. **[9]**

OR

Q8) a) Construct a systematic (7, 4) cyclic code using generator polynomial $g(x) = 1 + x^2 + x^3$ for the message i) 1 0 1 0 ii) 1 0 0 0. **[9]**

b) Write a short note on Turbo Codes & LDPC Codes. **[9]**

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