Total No. of Questions : 8]

SEAT No. :

P1723

[Total No. of Pages : 2

[5460]-551
T.E. (E & TC)
DIGITAL COMMUNICATION
(2015 Pattern) (Semester - I)

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) Derive Mathematical expression for Signal to noise ratio in PCM System. **[8]**

b) Compare PCM and DM systems. **[6]**

c) What is a strictly stationary process? Explain. **[6]**

OR.

Q2) a) What is bit synchronization? Explain Early –late and early gate method? **[8]**

b) A binary channel with 64 kbps bit rate is available for PCM Voice transmission find **[8]**

i) Number of quantization levels
ii) Number of bits per sample
iii) Sampling frequency, the voice signal is band limited to 3.4 kHz.

c) What are the properties of line codes. **[4]**

Q3) a) Explain Maximum likelihood ratio test. (LRT) **[4]**

b) Derive the expression of SNR and Probability of error for Matched Filter in presence of AWGN noise channel. **[8]**

c) Define Gaussian process state its properties. **[4]**

OR

P.T.O.

Q4) a) Explain geometrical representation of signal and Gram-Schimitt Procedure. **[4]**

b) Derive expression of SNR for Integrator and Dump circuit. **[8]**

c) State the various properties of Match filter. **[4]**

Q5) a) Find the probability of error for coherent FSK when amplitude of I/P at coherent optimal receiver is 10mv and frequency 10 MHz, the signal corrupted with white noise of PSD 10^{-9} W/Hz , the data rate is 100 kbps. [erfc(1.01) = 0.1531, erfc(1.11)=0.1164, erfc(1.22) = 0.0844, erfc(1.33) = 0.0599]. **[8]**

b) Explain QPSK generation with neat diagram and waveform. **[4]**

c) Compare the performance of modulation schemes, BPSK, BFSK, QPSK, DPSK, M-ary PSK, M-ary FSK w.r.t. **[6]**

i) BW
ii) PSD
iii) Probability of Error
iv) Application Bit rate

OR

Q6) a) Derive the expression of Probability of error for BPSK receiver in presence of AWGN noise channel. **[8]**

b) Explain coherent binary FSK signal generation **[4]**

c) Explain M-ary PSK transmitter and receiver. **[6]**

Q7) a) What is PN sequence? Explain its properties with 4-stage Shift register. **[6]**

b) What are the advantages of FHSS. **[4]**

c) Explain the concept of spread spectrum in advanced digital communication system. **[6]**

OR

Q8) a) Explain the concept of Processing gain, Probability of error and Concept of jamming. **[6]**

b) Explain Fast and Slow frequency hopping techniques. **[6]**

c) Derive PSD for DSSS system and enlist its disadvantages. **[4]**

✷ ✷ ✷