

Total No. of Questions : 8]

SEAT No. :

P2856

[4958]-1042

[Total No. of Pages : 3

T.E.(E&Tc)

DIGITAL COMMUNICATION

(2012Pattern) (End Semester)(Semester-I)

Time : 2 ½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Attempt 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 are the limitations of Delta modulation? How are they overcome in Delta sigma modulation and Adaptive Delta modulation? Explain with necessary diagrams. [7]

b) What is Equalizer? Explain Adaptive equalizers. [7]

c) Write short note on

i) Thermal Noise or Johnson Noise

ii) White Gaussian Noise [6]

OR

Q2) a) Consider a sinusoidal signal $X(t) = A \cos(\omega_m t)$ applied to a delta modulator with a step size δ . Show that the slope overload distortion

will occur if $A > \frac{\delta}{\omega_m T_s}$ where T_s is the sampling period. [7]

b) Draw and explain CCIT hierarchy of multiplexing. [7]

c) Explain in detail about stationary, wide sense stationary and ergodic process with suitable mathematical expressions. [6]

Q3) a) Derive the expression for signal to noise ratio of integrates and dump receives [8]

P.T.O.

- b) A bipolar signal $\rho_i(t)$ is a +1V or -1V pulse during the interval (0,T). Additive white Gaussian noise of $\eta/2=10^{-5}$ w/Hz is added to the signal. Determine the maximum bit rate which can be sent with $p_e \leq 10^{-4}$. Take $Q[3.71]=10^{-4}$ [8]

OR

- Q4)** a) Explain Gram- Schmidt Procedure. [8]
b) State the various properties of matched filter. Explain the impulse response in detail. [8]

- Q5)** a) Derive the expression for error probability of BPSK system. [8]
b) If the digital message input data rate is 24 kbps and average energy/ bit is 0.05 unit. Find Bandwidth and Euclidean distance for the following modulation schemes.
i) BPSK ii) 8-PSK
iii) MSK iv) 16QAM [8]

OR

- Q6)** a) Explain with the help of block diagram and waveforms DPSK modulation. [8]
b) Compare the performance of BPSK,FSK M-ary PSK, M-ary FSK with respect to following parameters.
i) Bandwidth
ii) PSD
iii) Probability of error [8]

- Q7)** a) The bit duration in DS-SS BPSK Communication system is 4ms and the chipping rate is 1 Mbps. Considering average error probability of 10^{-5} for detecting the message signal, calculate the processing gain and Jamming margin Given $Q(4.25)=10^{-5}$. [9]

b) Write short note on.

i) Wireless standards

ii) Personal communication system. [9]

OR

Q8) a) Generate the PN sequence for transmitting message through FHSS system. The period of PN sequence is $2^4-1=15$. The initial content of shift register are assumed to be 1 1 0 0

Draw PN sequence generator with waveform. [9]

b) i) Compare DSSS with FHSS

ii) What is need of spread spectrum modulation technique. [9]

