Total No. of Questions : 8]

SEAT No. :

P2856

[Total No. of Pages : 3

[4958]-1042
T.E.(E&Tc)
DIGITAL COMMUNICATION
(2012Pattern) (End Semester)(Semester-I)

Time :2 ½Hours] *[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 overcomed 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(ω_mt) 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 ρ_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 chiping 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 assummed 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]**