Total No. of Question	ns : 8]
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P2856

[4958]-1042 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 overcomed in Delta sigma modulation and Adaptive Delta modulation? Explain with necessary diagrams.
  - 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  $\delta$ . 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.
- 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.

[7]

	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 $p_e \le 10^{-4}$ . Take Q[3.71]=10 <sup>-4</sup> [8]							
				OR					
Q4)	a)	Explain Gram- Schmidt Procedure.					[8]		
	b)	State the various properties of matched filter. Explain the impul in detail.							
Q5)	a)	Derive the expression for error probability of BPSK system					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 modul								
	b)	Compare the performance of BPSK,FSK M-ary PSK, M-ary FSK wrespect to following parameters.							
	i) Bandwidth								
		ii)	PSD						
		iii)	Probability of e	rror			[8]		
Q7)	a)	chip for	oing rate is 1 Mb <sub>l</sub>	os. Considerin lessage signal	g ave	rage error pro	tem is 4ms and the bability of 10 <sup>-5</sup> occessing gain and [9]		

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- 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<sup>4</sup>–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]

