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06EC61

Sixth Semester B.E. Degree Examination, June / July 2014
Digital Communication

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Prove that if a signal g(t) contains no frequency greater than W hertz, then it is completely described by its instantaneous sample values uniformly spaced in time with a period $T_S \leq \left[\frac{1}{2\omega}\right]$. Also show that the signal can be constructed from the sample waveform by passing it through a LPF with bandwidth B where $W < B < [f_s - W]$ with $f_s = \left[\frac{1}{T_S}\right]$. **(10 Marks)**

b. With necessary waveforms and equations, explain flat top sampling. **(07 Marks)**

c. Fig. Q1 (c), shows the spectrum of low pass signal g(t), the signal is sampled at a rate of 2.5 Hz and then applied to a low pass reconstruction filter with cutoff frequency at 2 Hz. Plot the spectrum of the resulting signal. **(03 Marks)**

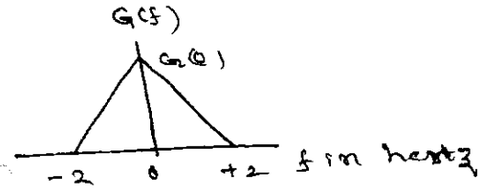

Fig. Q1 (c)

2 a. With a neat diagram, explain time division multiplexing of PCM system. **(04 Marks)**

b. Prove that the signal to quantization noise ratio of uniform quantizer is, $[SNR]_{dB} = 1.76 + 6n$ where n = number of bits / sample. **(06 Marks)**

c. Explain the need for non uniform quantization. Also explain compounding techniques. **(06 Marks)**

d. Show that for $\mu = A$, the μ low and A low have the same compounding gain G_C. **(04 Marks)**

3 a. With necessary equations explain slope over load distortion and granular noise in Delta modulation. **(08 Marks)**

b. Explain T_1 – carrier system. **(07 Marks)**

c. For the binary bit sequence 0111011, draw the waveforms using,
i) RZ unipolar ii) RZ polar iii) NRZ polar iv) NRZ bipolar v) Manchester. **(05 Marks)**

4 a. What is a Inter Symbol Interference (ISI)? Explain ideal solution for zero ISS. **(10 Marks)**

b. What is equalization? Explain adaptive equalization for data transmission. **(06 Marks)**

c. Briefly explain eye pattern. **(04 Marks)**

PART – B

5 a. Draw the neat diagram of binary PSK transmitter and receiver and derive an expression for probability of error in PSK system. **(10 Marks)**

b. With a neat block diagram, explain the coherent QPSK system and also draw the signal space diagram. **(10 Marks)**

6 a. Explain the Gram-Schidt procedure in calculating the orthonormal functions. **(10 Marks)**

b. With a diagram, explain the model of communication system. **(06 Marks)**

c. For the signals $S_1(t)$, $S_2(t)$, $S_3(t)$ and $S_4(t)$ shown in Fig. Q6 (c). Apply Gram-Schidt procedure to obtain orthonormal basis functions. **(04 Marks)**

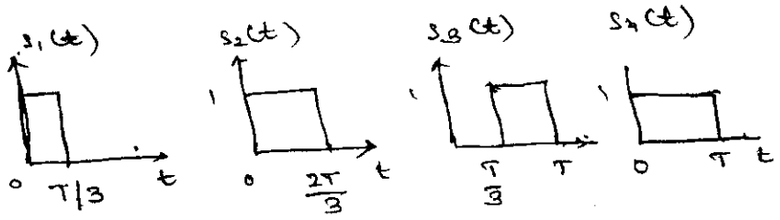

Fig. Q6 (c)

7 a. With a neat diagrams, explain correlation receiver and matched filter receiver. **(10 Marks)**

b. Explain the detection of known signals in noise. **(05 Marks)**

c. Briefly explain the applications of spread spectrum system. **(05 Marks)**

8 a. Define spred spectrum. Mention the properties of maximal length sequence and verify the properties for the shown Fig. Q8 (a). **(08 Marks)**

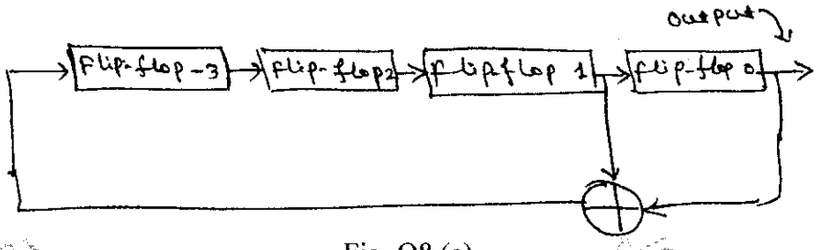

Fig. Q8 (a)

b. Explain the frequency hop spread spectrum system. **(08 Marks)**

c. A fast FH/MFSK has the following parameters. The number of bits per MFSK symbol = 4. The number of hops per MFSK symbol = 5. Calculate the processing gain of the system. **(04 Marks)**

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