Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS / M.TECH (ECE) / SEM-1 / MCE-102 / 2010-11

2010-11

ADVANCED DIGITAL COMMUNICATION

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer Q.No. 1 and any four questions from the rest.

1. Answer the following questions : $7 \times 2 = 14$

   i) What is a maximum length sequence ? Explain.

   ii) Explain diagrammatically the autocorrelation of a *PN* sequence represented by $R_{PN}(\tau) = E\{g(t)\,g(t+\tau)\}$, where $g(t)$ assumes +/– 1 volt.

   iii) Describe briefly OFDM communication.

   iv) What is the main advantage of Delta modulation over PCM ?

   v) Explain the use of companding in PCM.

vi) What is the standard rate of PCM voice channel ?

vii) If, $g(x) = g_m x^m + g_{m-1} x^{m-1} + \ldots\ldots\ldots + g_0$ is linear generating polynomial of degree $m > 0$, draw the linear feedback shift register diagram representing $g(x)$.

2. a) Explain what do you mean by natural sampling ? Obtain the spectra of a naturally sampled signal.

b) Prove the Parseval's Energy as well as Power theorem.

c) What do you understand by negative frequency ? Explain. 6 + 6 + 2

3. a) Describe Delta Modulation Systems. What are its limitations ? How can they be overcome ?

b) What is Quantization Error ? How does it depend upon the step size ? Suggest some methods to overcome the difficulties encountered when the modulating signal amplitude swing is large. 6 + 8

4. a) Explain PSK and DPSK, compare the two.

   b) Explain FSK. Describe coherent detection of FSK signals. 8 + 6

5. a) What are Optimum Filters and Matched Filters ? Find their transfer function.

   b) Explain the working of an integrated and dump baseband signal receiver. 8 + 6

6. a) What is correlator ? Show that the performance of the correlator and matched filter is identical.

   b) Comment on Probability of error of different methods.

   8 + 6

7. a) Write in short the use of Spectrum and its application.

   b) For a binary PSK signal, explain how the direct sequence spread spectrum signal is obtained.

   c) Compute the error at the output of integrate and dump filter of receiver using DSSS technique in term of effective jamming power and processing gain for a single tone interference. 3 + 5 + 6

8. a) Explain Pseudorandom binary noise sequence in DSSS technique based communication system.

   b) Explain the property of Gold sequence and how such sequence are generated.

   c) Differentiate Kasami sequence from gold sequence and explain its utility. 4 + 5 + 5

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