Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech (ECE-VLSI)/SEM-1/MVLSI-105D/2012-13

2012
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 Question No. 1 and any *four* from the rest.

1. a) What are the advantages of digital communication ?

   b) Compare CDMA, TDMA, FDMA.

   c) Name the different communication bands up to 5.8GHz.

   d) What is the difference between SSS and WSS Random Process ?

   e) Under which condition, Probability of error P_e remains same in both PSK and FSK ?

   f) Find Manchester representation of 1011001.

   g) What is PN sequence ? 2 + 3 + 2 + 2 + 2 + 2 + 1

2. a) Compare Energy Spectral Density (ESD) and Power Spectral Density (PSD).

   b) A power signal $x(t)$ has a power spectral density given by $Sg(f) = \infty$ for $|f| < B$

   $= 1$ otherwise

   Determine power spectral density and mean square value of its derivative.

   c) "An Ergodic Process is Wide Sense Stationary (WSS), but the converse is not true." Justify the above statement. 2 + 5 + 7

3. a) State and prove central limit theorem and explain its application in communication Engineering.

   b) The autocorrelation function of a stationary random process X (t) is given by

   Find mean and variance of the process. 8 + 6

4. a) Explain Adaptive Delta Modulation with suitable diagram.

   b) In a binary PCM transmission of a video signal with f_s = 15 MHz. Calculate the signalling rate needed to achieve signal-to-noise ratio (SNR) > 40 db.

   c) Find mean and variance of Raleigh Density Function.

   5 + 3 + 6

5. a) Explain correlation method for the computation of LPC coefficient and also explain a method which will make the computation faster.

   b) What is ISI ? Describe Nyquist Criterion for maximum channel capacity and distortion less binary transmission. 8 + 6

6. a) Compare probability of errors in ASK, PSK, FSK.

   b) Show that one bit error in transmission using DPSK causes two bit error in detection.

   c) Discuss QPSK with suitable diagram. 6 + 4 + 4

7. a) Find the impulse response of the optimum filter.

   b) What is matched filter ?

   c) Find probability of error of matched filter. 6 + 2 + 6