Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.TECH(ECE-M.COMM)/SEM-1/MCE-102/2011-12

2011

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) Mention the advantages of digital communication over analog communication.

   b) What do you mean by PSD and ESD of a signal ?

   c) What is Ergodic process ?

   d) Differentiate between random variable and Random process.

   e) What is the utility of coding in digital communication ?

   f) Represent 110010 using Manchester and differential Manchester encoding.

   g) Why is simple NRZ coding not used in Digital Communication ? 2 + 3 + 2 + 2 + 2 + 2 + 1

2. a) Show that the probability density function of the sum of N no. independent and identically distributed random variables will tend to Gaussian irrespective of their individual distribution.

   b) Find the power of the periodic signal defined as $S_1(t) = 1$; $0 < t < 1$; $S_2(t) = 0$, $0 < t < 2$ up to 2nd harmonic.

2 + 7 + 5

3. a) Draw the signalling pattern for the transmitted byte 01001110 using the line codes :

      i) Unipolar NRZ

      ii) Polar RZ

      iii) Bipolar RZ

      iv) AMI

      v) Manchester coding.

   b) What is slope overloading ?

   c) Find Moment Generating Function of Gaussian Random variable.

6 + 2 + 6

4. a) Discuss one method for faster computation of LPC coefficient.

   b) If the independent random variables X and Y have the variances 36 and 16 respectively, find the correlation coefficient between $X + Y$ and $X - Y$.

8 + 6

5. a) Make a comparison of BPSK, QPSK and DPSK.

   b) Find duo-binary encoded sequence for the data [0 0 1 0 1 1 0].

   c) Find probability of error in Phase Shift Keying (PSK) with imperfect bit synchronization.

4 + 4 + 6

6. a) Find the transform of the output of the matched filter for the input of $S_1(t) = A,\ 0 < t < T;\ S_2(t) = 0$ otherwise. Find the maximum SNR.

   b) Derive probability of error of matched filter. 6 + 8

7. a) What are the key factors of different multiple access schemes in mobile communication ?

   b) What is chip ? Name three types of PN chip sequences and briefly explain the function of any one of them.

   c) What is the special feature of a CDMA receiver in terms of power requirement ?

   d) Differentiate between DSSS and FHSS. 3 + 4 + 2 + 1 + 4

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