



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/M.Tech (ECE)/SEM-1/MCE-102/2012-13**

**2012**

**ADVANCE DIGITAL COMMUNICATION**

*Time Allotted : 3 Hours*

*Full Marks : 70*

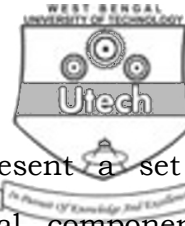
*The figures in the margin indicate full marks.*

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

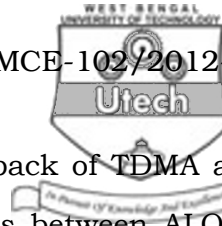
Answer Question No. 1 and any *four* from the rest.

1. Answer any *seven* from the following :  $7 \times 2 = 14$

- a) What do you mean by orthogonal function ?
- b) State Gaussian probability density function.
- c) What is the difference between Delta Modulation and Adaptive Delta Modulation ?
- d) Draw the waveform of Manchester Coding and explain it.
- e) Write the expression for a BFSK modulated signal and sketch the waveform.
- f) What do you mean Gold Sequence ?
- g) What is chip rate ? Why is this term used in Spread Spectrum technology ?
- h) What are the drawbacks of TDMA and FDMA systems ?
- i) Write the difference between CSMA and ALOHA systems.
- j) When Inter-symbol Interference is occurred in a band limited channel ?



2. Explain Gram-Schmidt procedure to represent a set of arbitrary signals by a set of orthonormal components. Explain the Gaussian probability density function. 8 + 6
3. Explain the basic principles of Delta modulation and Adaptive Delta modulation. What is slope overload and how can we avoid this problem ? Briefly discuss about natural sampling of PCM technique and also discuss about quantization noise occurred in this system. 4 + 4 + 6
4. Write down the mathematical expression of BPSK signal generation. Sketch the carrier recovery circuit for BPSK receiver. What is the function of integrator circuit for data recovery in the BPSK receiver ? Draw the waveform for QPSK signals. 2 + 6 + 4 + 2
5. Why is chip rate important in Direct Sequence Spread Spectrum technology ? Briefly discuss generation of direct sequence spread spectrum with a block diagram. What do you mean by Gold sequence in CDMA system ?  
With an example of three stage shift register find the generation of PN sequence in CDMA. Where initial value of  $m_1 = 1, m_2 = 1, m_3 = 1$  ( $m_1, m_2, m_3$  are the stages of shift register) with feedback connections from the stages 2 and 3 through a modulo 2 adder is used for PN sequence. Output is taken from stage 3. Also find the maximal length of the sequence. 2 + 4 + 2 + 6



6. What are the main advantages and drawback of TDMA and FDMA systems ? What are the differences between ALOHA and Slotted ALOHA systems ? Derive the expression for maximum throughput of slotted ALOHA system. Why CSMA technique is used in communication ? 3 + 3 + 4 + 4
  
7. What are different types of noise occurred in communication system ? How power spectral density of Gaussian noise can be found using Fourier series ? Explain with necessary derivation.  
 If input noise power spectral density is given  $G_{ni}(f) = \eta/2$ , then derive the expression for the output noise power when it is passing through a differentiator circuit. 2 + 6 + 6
  
8. Why is ISI occurred in a band limited channel ? What is eye pattern in digital communication ? What do you mean by dibinary pulse ? Briefly discuss partial response of the signal in a band limited channel. 3 + 3 + 2 + 6

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