



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

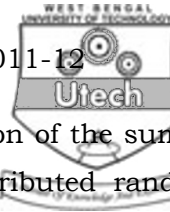
Full Marks : 70

*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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