



ADAMAS UNIVERSITY
END-SEMESTER EXAMINATION: JANUARY 2021
(Academic Session: 2020 – 21)

Name of the Program:	B. Tech	Semester:	V
Paper Title:	Digital Communication	Paper Code:	EEC 43103
Maximum Marks:	40	Time duration:	3 Hrs
Total No of questions:	08	Total No of Pages:	02
(Any other information for the student may be mentioned here)	<ol style="list-style-type: none">1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.3. Assumptions made if any, should be stated clearly at the beginning of your answer.		

Answer all the Groups

Group A

Answer all the questions of the following

5 × 1 = 5

1.
 - a) In a PCM system, the number of quantization levels is 16 and the maximum signal frequency is 4 KHz. What is the bit transmission rate?
 - b) If T_b is the duration of a short pulse, what is the signalling rate of a Manchester code?
 - c) A bag contains 5 white and 3 black balls, and two balls are drawn at random. What is the probability that both are of the same colour?
 - d) What is the bit error probability of BFSK system?
 - e) What is the difference between ISI and ICI in communication systems?

GROUP –B

Answer *any three* of the following

3 × 5 = 15

2.
 - a) Represent QPSK signals in the signal space and find distance between them. What is the significance of each? Explain briefly.
 - b) What is the difference between coherent and non-coherent digital modulation techniques? **[3+2]**
3.
 - a) Consider the binary sequence [0 1 0 0 1 0 1 1]. Draw the waveforms for the following
 - i) Polar NRZ L and NRZ I
 - ii) Differential Manchester Format
 - iii) Polar NRZ signal
 - b) A signal is carrying data in which one data element is encoded as one signal element ($r = 2$). If the bit rate is 500 kbps, what is the average value of the baud rate if c is between 0 and 1? **[3+2]**
4.
 - a) What is Quantization error?
 - b) Derive an expression for maximum Signal to Noise ratio for PCM system that uses linear quantization. **[2+3]**

5. a) What do you mean by Random variables? What are the types? Give an example of each.
b) What is the remedy to reduce ISI? [2+2+1]

GROUP –C

Answer *any two* of the following

2 × 10 = 20

6. a) What are the features of narrowband signals in multiple access techniques?
b) What are the differences between FHSS & DSSS techniques?
c) A continuous random variable has a Probability Density Function (PDF) expressed as, $f_X(x) = ae^{-b|x|}$, here X be the random variable whose values lie in the range $x = -\alpha$ to α .
i) Determine the relationship between a & b.
ii) The probability that outcome lies between 1 and 2.
d) What is ergodic process? [2+2+4+2]
7. a) Draw the block diagram of a BPSK reception and explain its principle of operation.
b) Draw and explain the signal space representation of BFSK signal.
c) Briefly describe how Gaussian MSK (GMSK) is used for GSM wireless communication? [5+3+2]
8. a) What are 'Slope Overload Distortion' and 'Granular Noise' in Delta Modulation?
b) What is companding in digital baseband transmission system?
c) A Delta Modulation (DM) system is designed to operate at five times the nyquist rate for a signal having a bandwidth equal to 3 KHz. Calculate the maximum amplitude of a 2 KHz input sinusoid for which the DM does not have slope overload. Given that the quantizing step size is 250 mV. [4+2+4]
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