

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Summer 2018 - 19 Examination

Semester: 6
Subject Code: 03107351
Subject Name: Digital Communication

Date: 14/05/2019
Time: 10:30am to 01:00pm
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (Each of one mark) (15)

1. The average information per message is called _____.
2. Digital communication is _____ to environmental changes?
 - a) Less sensitive
 - b) More sensitive
 - c) Does not depend
 - d) None of the mentioned
3. Nyquist rate = _____.
4. Granular noise occurs when_____.
 - a.) Step size is too small
 - b.) Step size is too large
 - c.) There is interference from the adjacent channel
 - d.) Bandwidth is too large
5. Cumulative distribution function for a discrete random variable is increases from 0 to 1. (True/False)
6. The Delta Modulation is the one bit version of DPCM. (True/False).
7. PAM, PWM and PPM are pulse digital modulation systems. (True/False).
8. $X(t) = 5 \cos 1000 \pi t \cos 5000 \pi t$ maximum information Frequency.
 - a.)1000
 - b.) 2500
 - c.)5000
 - d.) 500
9. If $P[A \cap B] = P[A]P[B]$ then Two events A and B are called independent event. (True/False).
10. PDF is always nondecreasing function. (True/False).
- 11.QPSK system uses a phase shift of
 - a.) Π
 - b.) $\Pi/2$
 - c.) $\Pi/4$
 - d.) 2Π
12. The signal-to quantization noise ratio in PCM system depends upon ____ .
 - a) sampling rate
 - b) number of quantization levels
 - c) message signal bandwidth
 - d) none of above.
13. The Hamming distance between equal codewords is _____.
 - a) 0
 - b) 1
 - c) n
 - d) none of above
14. The process of converting the analog sample into discrete form is called
 - a) Modulation
 - b) Multiplexing
 - c) Quantization
 - d) Sampling
15. In uniform quantization process _____.
 - a.) The step size remains same
 - b.) Step size varies according to the values of the input signal
 - c.) The quantizer has linear characteristics
 - d.) Both a and c are correct

Q.2 Answer the following questions. (Attempt any three) (15)

- a) Explain & Prove properties of PDF.
- b) What is PCM? Draw the block diagram of a PCM Transmitter (encoder).Explain Its operation with waveforms.
- c) What is line coding? What are the ideal requirements from line coding?
- d) Find Nyquist rate, Nyquist interval
 $X(t) = (\sin 200\pi t)/\pi$

Q.3 A) Explain Binary phase-Shift keying (BPSK) signal with necessary equations. (07)

B) Explain the use of Scrambler and unscrambler in digital communication. Draw the circuits and explain the operation with suitable example. (08)

OR

B) What is pulse shaping? Describe any one criterion proposed by Nyquist for pulse shaping to eliminate ISI. (08)

Q.4 A) For the data stream 10111001 draw the following formats. (07)

i) Polar NRZ ii) Split phase manchester iii) AMI NRZ. Discuss the desirable properties for selection of line codes.

OR

A) A voice signal band limited to 3.4 khz is to be transmitted using PCM system. Signaling rate of the PCM is not to exceed 3600 bits/sec.find (07)

a) Approximate value of f_s .

b) The number of Quantization level Q

c) Number of digits per word N

B) Derive equation for channel capacity of discrete memory less channel. (08)