STAMFORD UNIVERSITY BANGLADESH

Department of Computer Science and Engineering

Semester Final Examination, Summer-2022

CSe330: Data Communication and Computer Networking

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Date and Time: 12/12/2022 & 8:00 PM-10:30 PM

Batch: MCSE **Campus:** Siddeswari

Duration: 2.30 hours **Full Marks: 40**

(There are **FOUR** questions. Answer all of them. Figures in the right margin indicate marks

1. a) Draw the graph of the ***2BIQ*** scheme using each of the following data streams, assuming that the last signa11evel has been positive. From the graphs, guess the bandwidth for this scheme using the average number of changes in the signal level. [04]
   I. 0101010101010101
   II. 0011001100110011
   b) What is the result of scrambling the sequence 11100000000000 using one of the following scrambling techniques? Assume that the last non-zero signal level has been positive. [04]
   i. B8ZS
   ii. HDB3 (The number of nonzero pules is odd after the last substitution)
   c) A cable company uses one of the cable TV channels (with a bandwidth of 6 MHz) to provide digital communication for each resident. What is the available data rate for each resident if the company uses a 64-QAM technique? [02]
2. a) We have sampled a low-pass signal with a bandwidth of 200 KHz using 1024 levels of quantization. [04]
   i. Calculate the bit rate of the digitized signal.
   ii. Calculate the SNR (dB) for this signal.
   b) We have a baseband channel with a 1-MHz bandwidth. What is the data rate for this channel if we use one of the following line coding schemes? [04]
   i. NRZ-L
   ii. Manchester
   iii. MLT-3
   iv. 2B1Q
   c) Which characteristics of an analog signal are changed to represent the digital signal in each of the following digital-to-analog conversion? [02]
   i. ASK
   ii. FSK
   iii. PSK
   iv. QAM
3. a) Compare and contrast PCM and DM. [02]
   b) What is the Nyquist sampling rate for each of the following signals? [03]
   i. A low-pass signal with bandwidth of 200 KHz?
   ii. A band-pass signal with bandwidth of 200 KHz if the lowest frequency is 100 KHz?
   c) We have sampled a low-pass signal with a bandwidth of 200 KHz using 1024 levels of quantization. [05]
   i. Calculate the bit rate of the digitized signal.

ii. Calculate the SNRdB for this signal.
iii. Calculate the PCM bandwidth of this signal

4 a) Calculate the baud rate for the given bit rate and type of modulation. [03]
i. 6000 bps, QPSK
ii. 36,000 bps, 64-QAM

b) The telephone line has 4 KHz bandwidth. What is the maximum number of bits we can send using each of the following techniques? Let d = O. [03]
i. QPSK
ii. 16-QAM
iii. 64-QAM

c) A corporation has a medium with a I-MHz bandwidth (lowpass). The corporation needs to create 10 separate independent channels each capable of sending at least 10 Mbps. The company has decided to use QAM technology. What is the minimum number of bits per baud for each channel? What is the number of points in the constellation diagram for each channel? Let d =O. [04]