CENG 3331 Intro to Telecommunication and networks

Homework 3

Due at the beginning of class, 10/5/2022

Q1. (10) What is QAM?

Q2. (10) What is scrambling techniques? Explain B8ZS and HDB3.

Q3. (20) Given the bit pattern 01100, encode this data using ASK, BFSK, and BPSK. Assume two period of waveforms for 1 bit in ASK and BPSK; one period for '0', two periods for '1' in BFSK

Q4: (20) A signal is quantized using 10-bit PCM. Find the signal-to-quantization noise ratio in dB.

Q5: (20) Consider an audio signal with spectral components in the range 300 to 3000 Hz. Assume that a sampling rate of 7000 samples per second will be used to generate a PCM signal.

a. **For SNR=30dB, what is the number of uniform quantization levels needed?**
b. **What data rate is required?**

Q6: (20) A signal contains 4 components, 10 Hz, 30 Hz, 65 Hz, and 105 Hz. If use a sampling frequency 50 Hz to sample the signal, are these components sampled correctly? Please draw in frequency domain of what you observed.

Q7: (Extra 10) Join the discussion of Parallel Computing vs. Distributed Computing on Blackboard. Attach only the screenshot of your answer from Blackboard.