Benha University
Faculty of Engineering at Shoubra
Electrical Engineering Department

Electronic Engineering Fundamentals
2st Year Communications
(Signal analysis) (2015-2016)

Sheet 8

1. What is the Nyquist sampling rate for each of the following signals?
   a. A low-pass signal with bandwidth of 200 KHz?
   b. A band-pass signal with bandwidth of 200 KHz if the lowest frequency is 100 KHz?

2. We have sampled a low-pass signal with a bandwidth of 200 KHz using 1000 levels of quantization.
   a. What is the required number of bits for each sample?
   b. Calculate the bit rate of the digitized signal.

3. A sine wave signal that has the highest frequency component of 1 KHz and a peak to peak value of 4 volts is transmitted using a binary PCM. The number of quantization levels is 8.
   a. Design the PCM system.
   b. What is the max quantization Error?
   c. What is the Nyquist sampling rate and sampling time?
   d. What is the code word length?
   e. Bite rate.

4.

The values of the voltage v volts at different moments in a cycle are given by:

Angle $\theta°$	0	30	60	90	120	150	180	210	240	270	300	330
Voltage v	−5.0	−1.5	6.0	12.5	16.0	16.5	15.0	12.5	6.5	−4.0	−7.0	−7.5

Draw the graph of voltage v against angle θ and analyse the voltage into its first three constituent harmonics, each coefficient correct to 2 decimal places.

Good Luck