ASSIGNMENT 2

(DUE DATE: 26TH MARCH 2019)

Q1: A sensor in a jet engine produces voltage between 3V and -1V.When we sample the sensor output with an ADC, we need to ensure that the maximum quantization error per sample does not exceed 1micro volt. How many bits should the ADC have?

(2 Marks)

Q2: A multi level digital communication system sends one of 16 possible levels over the channel every 0.8 ms, and then what is the bit rate for the signal?

(2 Marks)

Q3: Consider a Delta Modulation (DM) system used to transmit a voice signal, which is uniformly sampled at the rate of 64 KHz.

Voice signal bandwidth = 4 KHz
Maximum Signal Amplitude = 10Volt

(i) To avoid slope overload distortion, what is the maximum permissible value of the step size used in the system?

(ii) Determine the average power of the granular noise.
(Assume noise is uniformly distributed)

(2 Marks)

Q4: A message signal of 4cos (pi*10^5t) is transmitted by using PCM. Each sample is encoded with 3 bits.

(i) Find the parameters of PCM.

(ii) Given sampled values -3.5V, -2.6V, -1.1V, 0.9V, 2.2V, 3.8V. Find the corresponding quantizer and encoded output.

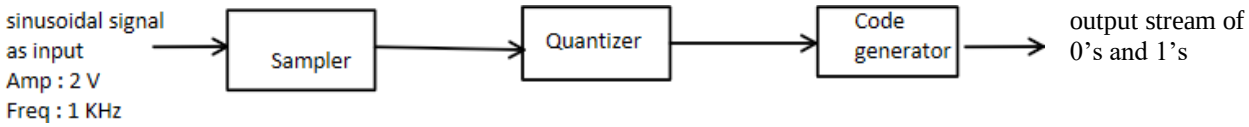
(iii) Plot the mid rise quantizer characteristics.

(2 Marks)

MATLAB QUESTIONS

Instructions:

1. Comments should be written properly.
2. Publish the matlab files and submit the PDFs only. No need to submit .m file.



Q1. An analog sinusoidal signal needs to be digitized. Steps to be followed are shown in figure. For Quantizer chose 8 levels. Code generator should produce bits corresponding to quantized levels. Plot

a) Analog input signal
b) Sampled signal and input signal
c) Quantized signal over input signal.

All three plots should be in one figure. Calculate quantization error. And display in output.

What will be the impact on quantization error if :

a) Quantizing levels are increased
b) Sampling frequency is increased.

(8 marks)

Q2. Take the input signal of Q 1 and plot phase modulation using carrier frequency as suitable. Plots a) message signal b) phase modulated signal

(4 marks)