a. Which parameter of an input signal should we consider during the sampling process? What is Nyquist Criterion?

Frequency, Sampling frequency should be higher or equal than two times of maximum frequency of a signal.

b. What is Aliasing? Explain its details and relation with Nyquist Criterion considering frequency spectrum of the signal.

Aliasing is overlapping of consequent samples of a signal while sampling frequency becoming less than 0.

c. What kind of effect does Aliasing have on a cosine waveform?

If cosine wave sampled at sampling frequency(Fs) then two samples of cosine wave cant distinguished from each other while one of the signals has alpha and the other has Fs\*k+alpha

d. How does taking a longer sequence(larger number of samples) of a stationary time signal affect the frequency resolution? Consider the sampling rate is fixed.

f=(0:N-1)\*(fs/N) The frequency resolution is defined as Fs/N in FFT. So if we increase the number of samples, we get better resolution of frequency. More data leads to more resolution.

e. Study on Interpolation Techniques(cubic, spline, linear).

f. Study on the Matlab commands given below:zeros(), length(), fft(), fftshift(), linspace(), interp1(), stem(), plot(), figure(), abs().

g. What is the reason of normalization after computing FFT using Matlab command fft()?

a. Study on Uniform Quantization.

b. How many bits are required to represent an analog signal with values ranging from−1 to 1 ifthe resulting quantized signal is to have a resolution of 0.125 ? 4

c. How can we compute Mean Squared Error (MSE) for a quantized signal in Matlab? Note that:MSE=E[(X−XQ)2](1)where E, X,XQrepresent expected value, original signal and quantized signal, respectively.

d. How can we compute Signal to Quantization-Noise Ratio (SQNR) in Matlab? Note that:SQNR=E[(X2)]E[(X−XQ)2](2)

e. How do we represent a quantity in decibel form? 10log(p2/p1)

f. Study on constructing Anonymous Functions (functions in the form of f = @(x,y) ..) in Matlab.

g. Study on how to plot two graphs in the same axis in Matlab.

h. Study on the Matlab commands given below:ceil(), floor(), round(), subplot(), legend(), min(), max(), sum(), log10()