

Problem Set # 8.1 - Sampling

Consult NCEES® FE Reference Handbook – Pages 225 and 376 while solving these questions

Problem 8.1 a) For perfect reconstruction of a band limited signal, it must be _____

(A) Sampled at or above Nyquist rate

(B) Passed through ideal low pass filter

(C) Modulated with high frequency signal

(D) Options A and B are correct

Problem 8.1 b) The minimum sampling frequency required for perfect reconstruction of the message signal $\text{sinc}(1000\pi t) + \text{sinc}(2000\pi t)$ is 2000 Hz.

Problem 8.1 c) Sampling continuous time signal $\cos(3000\pi t + \theta)$ at 2000 Hz will result in _____

(A) Nyquist sampling

(B) Critical sampling

(C) Aliasing

(D) Oversampling

Problem 8.1 d) In the previous problem, recovered signal will be _____ if sampling rate is 2000Hz.

(A) $\cos(3000\pi t + \theta)$

(B) $\cos(3000\pi t - \theta)$

(C) $\cos(1000\pi t + \theta)$

(D) $\cos(1000\pi t - \theta)$

Problem 8.1 e) Determine the aliased frequency of $x(t) = \cos(500\pi t + \theta)$ if it is sampled at 500 Hz.

(A) 500 Hz

(B) 250 Hz

(C) 0 Hz

(D) There will be no aliasing

Problem 8.1 f) In the previous problem, recovered signal will be _____ if sampling rate is 200Hz.

(A) $\cos(500\pi t + \theta)$

(B) $\cos(500\pi t - \theta)$

(C) $\cos(100\pi t + \theta)$

(D) $\cos(100\pi t - \theta)$

Problem 8.1 g) Determine the aliased frequency of $x(t) = \cos(400\pi t + \theta)$ if it is sampled at 300 Hz.

(A) 200 Hz

(B) 300 Hz

(C) 100 Hz

(D) 400 Hz

Problem 8.1 h) In the previous problem, recovered signal will be _____ if it is sampled at 150 Hz.

(A) $\cos(400\pi t + \theta)$

(B) $\cos(400\pi t - \theta)$

(C) $\cos(100\pi t + \theta)$

(D) $\cos(100\pi t - \theta)$