

INFORMATION TECHNOLOGY UNIVERSITY
Department of Electrical Engineering

Signal and Systems
Fall 2021

Assignment 3

Deadline: 21-1-2022

Total Points: 25

Question 1 (5 points) (CLO 3)

Answer the following questions in your own words:

- 1) Explain the difference between fourier series and fourier transform?
- 2) What are the real life applications of fourier series?

Question 2 (10 points) (CLO 3)

A discrete-time periodic signal $x[n]$ is real valued and has a fundamental period $N = 5$. The nonzero Fourier series coefficients for $x[n]$ are

$$a_0 = 2, a_2 = a_{-2}^* = 2e^{j\pi/6}, \quad a_4 = a_{-4}^* = e^{j\frac{\pi}{3}}.$$

Express $x[n]$ in the form

$$x[n] = A_0 + \sum_{k=1}^{\infty} A_k \sin(\omega_k n + \phi_k).$$

Question 3 (10 points) (CLO 3)

In the following question, we specify the Fourier series coefficients of a signal that is periodic with period 8. Determine the signal $x[n]$

$$a_k = \cos\left(\frac{k\pi}{4}\right) + \sin\left(\frac{3k\pi}{4}\right)$$