

University of Portland School of Engineering

EE 262
Spring 2018
A. Inan

Homework # 6—Phasors and Fourier Series

(Assigned: Monday, April 2, 2018)
(Due: Friday, April 13, 2018, 9:15a.m.)

These problems are assigned from Engineering Signals and Systems in Continuous and Discrete Time Second Edition by Ulaby/Yeagle (2016) (pages 244-252):

5.1. Part (b). Phasor domain. (See Example 5-1 on pp. 194-195)

5.2. Part (b). Phasor domain. (See Example 5-1 on pp. 194-195)

Inan problem # 17: Phasor domain.

An LTI system is characterized by the differential equation

$$\frac{dy(t)}{dt} + 10^3 y(t) = 10^4 \cos(10^3 t + 45^\circ)$$

Determine $y(t)$ using the phasor-domain approach.

Inan problem # 18: Phasor domain.

An LTI system is characterized by the differential equation

$$\frac{d^2 y(t)}{dt^2} + 4 \times 10^4 \frac{dy(t)}{dt} + 4 \times 10^8 y(t) = 10^3 \frac{dx(t)}{dt}$$

Given the input signal to be $x(t) = 20 \cos(10^4 t - 60^\circ)$, determine the output signal $y(t)$ using the phasor-domain approach.

Inan problem # 19: Phasor domain.

An LTI system is characterized by the differential equation

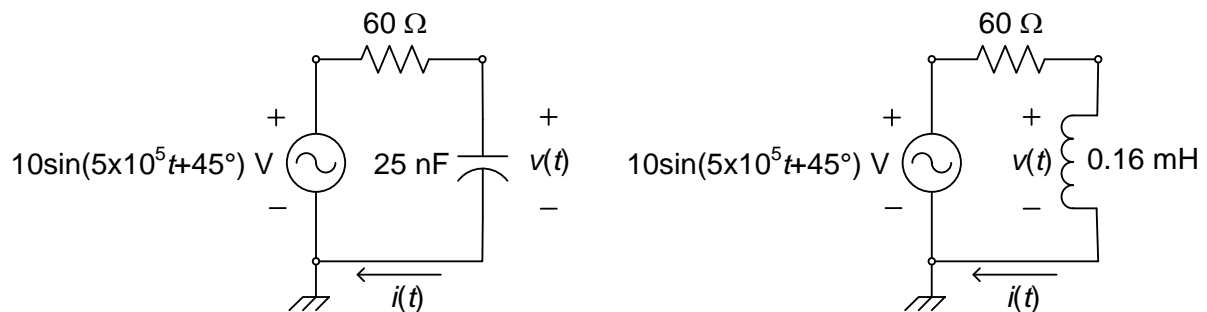
$$\frac{d^2 y(t)}{dt^2} + 3 \times 10^5 \frac{dy(t)}{dt} + 4 \times 10^{10} y(t) = 10^4 \frac{dx(t)}{dt}$$

Using phasor-domain approach, determine $y(t)$ for each of the following input signals:

(a) $x_1(t) = 18 \sin(4 \times 10^5 t + 60^\circ)$; (b) $x_2(t) = 27 \cos(10^5 t - 30^\circ)$; (c) $x_3(t) = x_1(t) + x_2(t)$

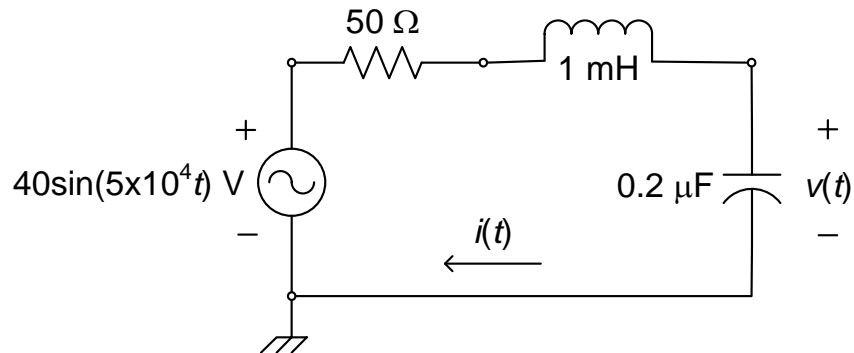
Inan problem # 20: Phasor domain in electric circuits.

For each of the alternating current (AC) electric circuits shown, find the current $i(t)$ and the voltage $v(t)$ using phasor-domain approach.



Inan problem # 21: Phasor domain in electric circuits.

For the alternating current (AC) electric circuit shown, find the current $i(t)$ and the voltage $v(t)$ using phasor-domain approach.



5.6. Fourier Series. (See Example 5-2 on pp. 200-201)

5.21*. Fourier Series properties.

5.23. Fourier Series applied in electric circuits. (See Example 5-7 on pp. 213-214)

5.29*. Fourier Series applied in electric circuits. (See Example 5-7 on pp. 213-214)

***Optional.**

Please use the following guidelines for your homework solutions:

- 1) On the first sheet, at the top center, write: Homework #6-Solutions.
- 2) Provide your full name on the upper right corner of the first sheet.
- 3) Also write: EE 262/Spring 2018 on the upper left corner of the first sheet.
- 4) Solve each problem on a separate sheet unless your solution is very short.
- 5) Box all of your answers.
- 6) Staple your solutions in the above order before you turn them in.

Please turn in your homework on time.