Sirindhorn International Institute of Technology

Thammasat University at Rangsit

School of Information, Computer and Communication Technology

ECS 203: Problem Set 12

Semester/Year: **2/2014**
Course Title: Basic Electrical Engineering
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Course Web Site: http://www2.siit.tu.ac.th/prapun/ecs203/

Due date: May 1

Instructions

i. Solve all problems. (5 pt)
ii. ONE sub-question will be graded (5 pt). Of course, you do not know which part will be selected; so you should work carefully on all of them.
iii. Late submission will be heavily penalized.
iv. ***Write down all the steps*** that you have done to obtain your answers. You may not get full credit even when your answer is correct without showing how you get your answer.
v. All phasor should be answered in polar form where the magnitude is positive and the phase is between -180° and 180°.
vi. All sinusoid should be answered in the cosine form where the amplitude is positive and the phase is between -180° and 180°.

Questions

1. Reconsider Example 7.6.2 in the lecture notes.
   (a) Find $v_o(t)$ using nodal analysis.
   (b) Find all mesh currents using mesh analysis and then find $v_o(t)$ from the mesh current(s) and some impedance value(s).
2. Use the superposition theorem to find
   (a) $\mathbf{V}_2$ in Example 8.1.6 of the lecture notes
   (b) $\mathbf{I}_o$ in Example 8.1.7 of the lecture notes

3. [Alexander and Sadiku, 2009, Q11.5] Assuming that $v_s(t) = 16\cos(2t - 40°)$ V in the circuit shown in Figure 1, find the average power delivered to each of the passive elements.

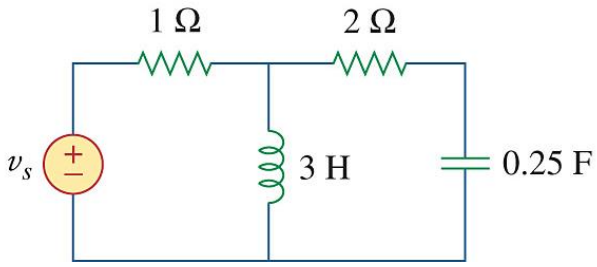

Figure 1

4. [F2010] Consider the circuit below.

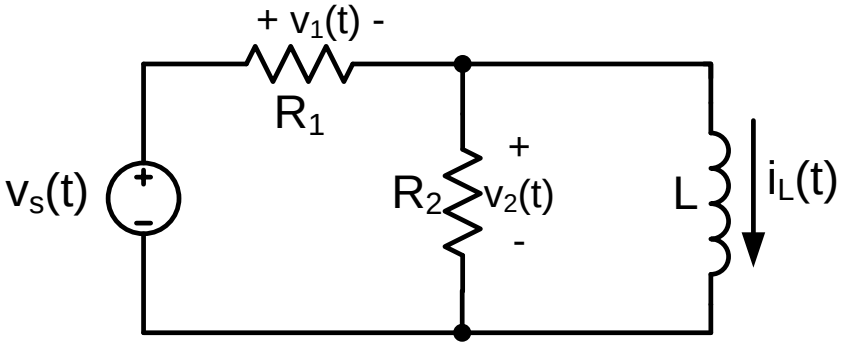

Figure 2

Suppose

$$v_s(t) = 7\cos\left(200t + 30^\circ\right) \text{ V},$$

$R_1 = 6\ \Omega$, $R_2 = 4\ \Omega$, and $L = 5$ mH.

Remark: Note that this is a continuation of a question from the previous assignments. Find the instantaneous power absorbed by R_1.

a. Find the average power absorbed by R_1
b. Find the average power absorbed by L
c. Find the average power absorbed by the voltage source.