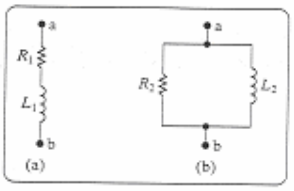
EE202 Homework 2 (Due Tuesday, March 18, 2008)

Solve problems 9.11, 9.23, 9.38, 9.41, 9.44, 9.57, 9.69 (given below) from Nilsson and Riedel, 7th edition.

9.23 a) Show that, at a given frequency ω, the circuits in Fig. P9.23(a) and (b) will have the same impedance between the terminals a,b if

$$R_1 = \frac{\omega^2 L_2^2 R_2}{R_2^2 + \omega^2 L_2^2}, \quad L_1 = \frac{R_2^2 L_2}{R_2^2 + \omega^2 L_2^2}.$$

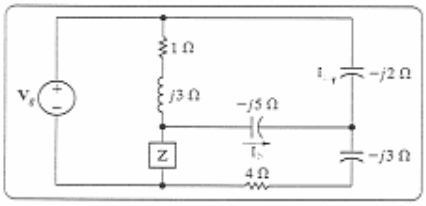
Figure P9.23



b) Find the values of resistance and inductance that when connected in series will have the same impedance at 4 krad/s as that of a 5 kΩ resistor connected in parallel with a 1.25 H inductor.

9.38 Find $\mathbf{I}_b$ and Z in the circuit shown in Fig. P9.38 if $\mathbf{V}_g = 25\angle 0°$ V and $\mathbf{I}_b = 5\angle 90°$ A.

Figure P9.38



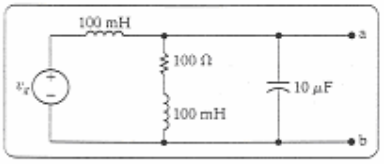
9.41 The sinusoidal voltage source in the circuit in Fig. P9.41 is developing a voltage equal to $247.49\cos(1000t + 45°)$ V.

a) Find the Thévenin voltage with respect to the terminals a,b.

b) Find the Thévenin impedance with respect to the terminals a,b.

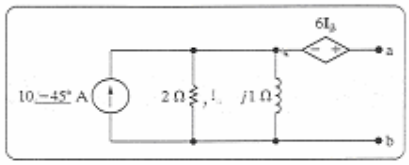
c) Draw the Thévenin equivalent.

Figure P9.41



9.44 Find the Norton equivalent with respect to terminals a,b in the circuit of Fig. P9.44.

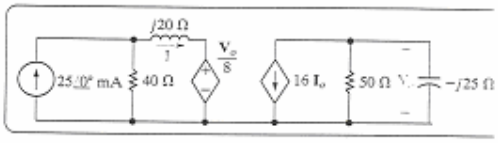
Figure P9.44



9.57

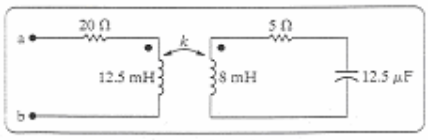
Use the node-voltage method to find $\mathbf{V}_o$ and $\mathbf{I}_o$ in the circuit seen in Fig. P9.57.

Figure P9.57



9.69 The value of k in the circuit in Fig. P9.69 is adjusted so that Z_{ab} is purely resistive when $\omega = 4$ krad/s. Find Z_{ab}.

Figure P9.69



11 Use the concept of the phasor to combine the following sinusoidal functions into a single trigonometric expression:

a) $y = 50\cos(500t + 60°) + 100\cos(500t - 30°)$,

b) $y = 200\cos(377t + 50°) - 100\sin(377t + 150°)$,

c) $y = 80\cos(100t + 30°) - 100\sin(100t - 135°) + 50\cos(100t - 90°)$, and

d) $y = 250\cos\omega t + 250\cos(\omega t + 120°) + 250\cos(\omega t - 120°)$.