Homework-1:
Return: 18.3.2019
EHB 232E CRN: 20949

P 10.5-9 Figure P 10.5-9 shows an ac circuit represented in both the time domain and the frequency domain. Suppose

$$\mathbf{Z}_1 = 15.3\angle -24.1^\circ\ \Omega \quad \text{and} \quad \mathbf{Z}_2 = 14.4\angle 53.1^\circ\ \Omega$$

Determine the voltage $v(t)$ and the values of R_1, R_2, L, and C.

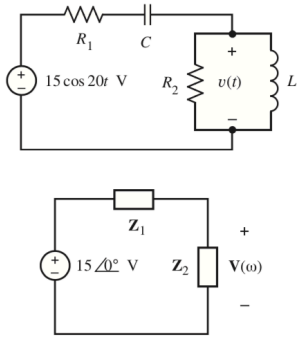

Figure P 10.5-9

P 10.5-13 The big toy from the hit movie *Big* is a child's musical fantasy come true—a sidewalk-sized piano. Like a hopscotch grid, this once-hot Christmas toy invites anyone who passes to jump on, move about, and make music. The developer of the toy piano used a tone synthesizer and stereo speakers as shown in Figure P 10.5-13 (Gardner, 1988). Determine the current $i(t)$ for a tone at 796 Hz when $C = 10\,\mu$F.

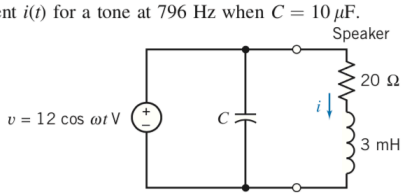

Figure P 10.5-13 Tone synthesizer.

P 10.5-23 Determine the steady-state current $i(t)$ for the circuit in Figure P 10.5-23.

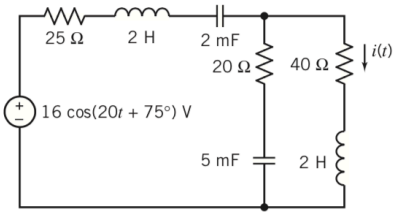

Figure P 10.5-23

P 11.8-3 The capacitor has been added to the load in the circuit shown in Figure P 11.8-3 to maximize the power absorbed by the 4000-Ω resistor. What value of capacitance should be used to accomplish that objective?

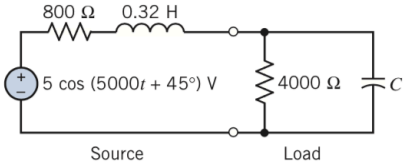

Figure P 11.8-3

P 11.5-14 The source voltage in the circuit shown in Figure P 11.5-14 is $\mathbf{V}_s = 24\angle 30^\circ$ V. Consequently,

$$\mathbf{I}_1 = 3.13\angle 25.4^\circ \text{ A},\ \mathbf{I}_2 = 1.99\angle 52.9^\circ \text{ A} \quad \text{and} \quad \mathbf{V}_4 = 8.88\angle -10.6^\circ \text{ V}$$

Determine (a) the average power absorbed by $\mathbf{Z}_4$, (b) the average power absorbed by $\mathbf{Z}_1$, and (c) the complex power delivered by the voltage source. (All phasors are given using peak, not rms, values.)

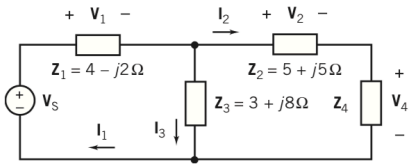

Figure P 11.5-14

P 11.6-4 Manned space stations require several continuously available ac power sources. Also, it is desired to keep the power factor close to 1. Consider the model of one communication circuit, shown in Figure P 11.6-4. If an average power of 500 W is dissipated in the 20-Ω resistor, find (a) V_{rms}, (b) $I_{s\ \text{rms}}$, (c) the power factor seen by the source, and (d) $|\mathbf{V}_s|$.

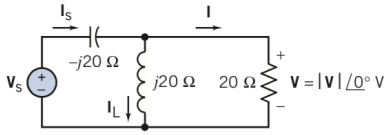

Figure P 11.6-4

P 11.6-5 Two impedances are supplied by $\mathbf{V} = 100\angle 160^\circ V_{\text{rms}}$, as shown in Figure P 11.6-5, where $\mathbf{I} = 2\angle 190^\circ$ A rms. The first load draws $P_1 = 23.2$ W, and $Q_1 = 50$ VAR. Calculate $\mathbf{I}_1$, $\mathbf{I}_2$, the power factor of each impedance, and the total power factor of the circuit.

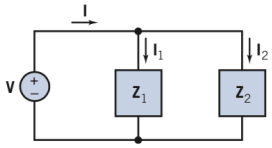

Figure P 11.6-5

P 11.5-6 For the circuit of Figure P 11.5-6, determine the complex power of the R, L, and C elements and show that the complex power delivered by the sources is equal to the complex power absorbed by the R, L, and C elements.

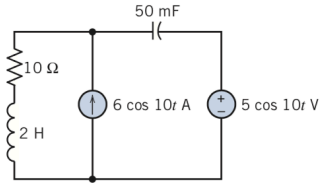

Figure P 11.5-6