HOMEWORK-2
Due: 30.4.2018

P 12.3-3 ⊕ A Y-connected source and load are shown in Figure P 12.3-3. (a) Determine the rms value of the current $i_a(t)$. (b) Determine the average power delivered to the load.

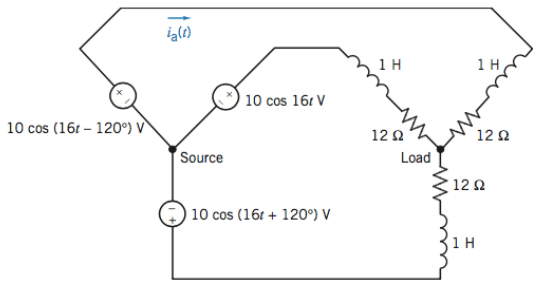

Figure P 12.3-3

P 12.6-2 ⊕ A three-phase source with a line voltage of 45 kV rms is connected to two balanced loads. The Y-connected load has $\mathbf{Z} = 10 + j20\ \Omega$, and the Δ load has a branch impedance of 50 Ω. The connecting lines have an impedance of 2 Ω. Determine the power delivered to the loads and the power lost in the wires. What percentage of power is lost in the wires?

P 12.7-3 ⊕ A three-phase balanced load is fed by a balanced Y-connected source with a line-to-line voltage of 220 V rms. It absorbs 1500 W at 0.8 power factor lagging. Calculate the phase impedance if it is (a) Δ connected and (b) Y connected.

P 12.7-6 A building is supplied by a public utility at 4.16 kV rms. The building contains three balanced loads connected to the three-phase lines:

(a) Δ connected, 500 kVA at 0.85 lagging
(b) Y connected, 75 kVA at 0.0 leading
(c) Y connected; each phase with a 150-Ω resistor parallel to a 225-Ω inductive reactance

The utility feeder is five miles long with an impedance per phase of $1.69 + j0.78$ Ω/mile. At what voltage must the utility supply its feeder so that the building is operating at 4.16 kV rms?

Hint: 41.6 kV is the line-to-line voltage of the balanced Y-connected source.

P 12.8-1 The two-wattmeter method is used to determine the power drawn by a three-phase 440-V rms motor that is a Y-connected balanced load. The motor operates at 20 hp at 74.6 percent efficiency. The magnitude of the line current is 52.5 A rms. The wattmeters are connected in the *A* and *C* lines. Find the reading of each wattmeter. The motor has a lagging power factor.

Hint: 1 hp = 745.7 W

P 14.7-22 Find $v_2(t)$ for the circuit of Figure P 14.7-22 for $t \geq 0$.

Hint: Write the node equations at a and b in terms of v_1 and v_2. The initial conditions are $v_1(0) = 10$ V and $v_2(0) = 25$ V. The source is $v_s = 50 \cos 2t\ u(t)$ V.

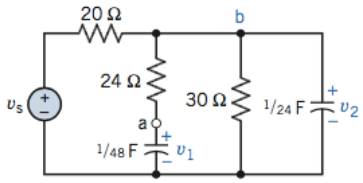

Figure P 14.7-22

P 14.7-25 The circuit shown in Figure P 14.7-25 is at steady state before the switch opens at time $t = 0$. Determine the inductor voltage $v(t)$ for $t > 0$.

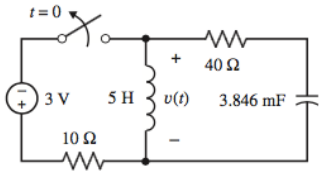

Figure P 14.7-25

P 14.8-8 The input to the circuit shown in Figure P 14.8-8 is the voltage $v_i(t)$, and the output is the voltage $v_o(t)$. Determine the step response of this circuit.

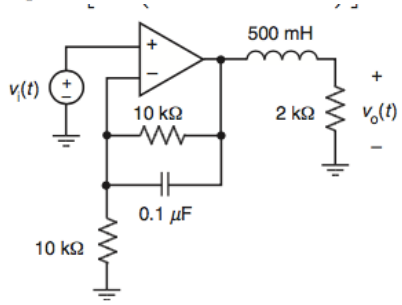

Figure P 14.8-8

P 14.8-24 ⊕ The transfer function of a circuit is $H(s) = \dfrac{12}{s^2 + 8s + 16}$. Determine the step response of this circuit.

P 14.10-3 The input to a linear circuit is the voltage $v_i(t)$ and the response is the voltage $v_o(t)$. The impulse response $h(t)$ of this circuit is

$$h(t) = 30te^{-5t}u(t)\text{V}$$

Determine the steady-state response of this circuit when the input is

$$v_i(t) = 10\cos(3t)\text{ V}$$