

Assignment 5

Q1)

- 11.6** For the circuit in Fig. 11.38, $i_s = 6 \cos 10^3 t$ A. Find the average power absorbed by the $50\text{-}\Omega$ resistor.

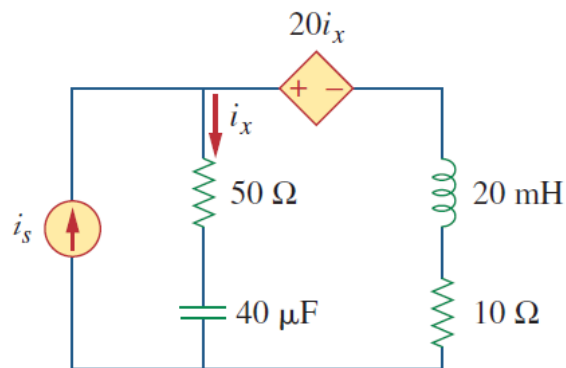


Figure 11.38

For Prob. 11.6.

Q2)

- 11.19** The variable resistor R in the circuit of Fig. 11.50 is adjusted until it absorbs the maximum average power. Find R and the maximum average power absorbed.

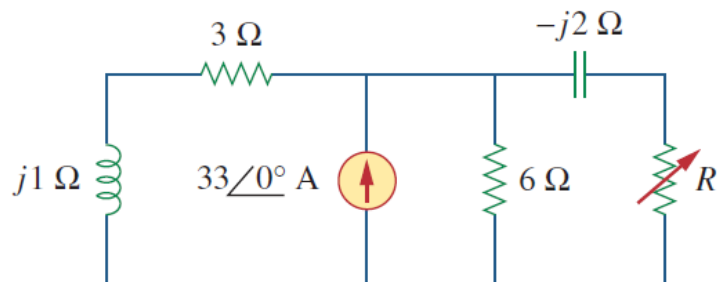


Figure 11.50

For Prob. 11.19.

Q3)

11.15 In the circuit of Fig. 11.46, find the value of $\mathbf{Z}_L$ that will absorb the maximum power and the value of the maximum power.

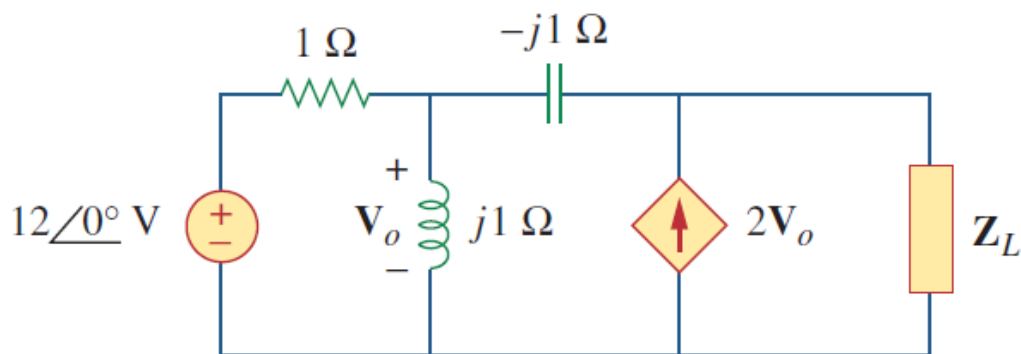


Figure 11.46

For Prob. 11.15.

Q4)

11.17 Calculate the value of $\mathbf{Z}_L$ in the circuit of Fig. 11.48 in order for $\mathbf{Z}_L$ to receive maximum average power. What is the maximum average power received by $\mathbf{Z}_L$?

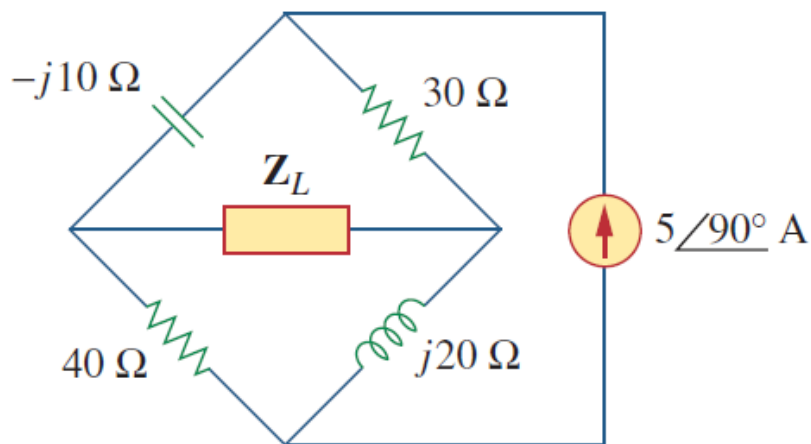


Figure 11.48

For Prob. 11.17.

Q5)

11.22 Find the rms value of the offset sine wave shown in Fig. 11.53.

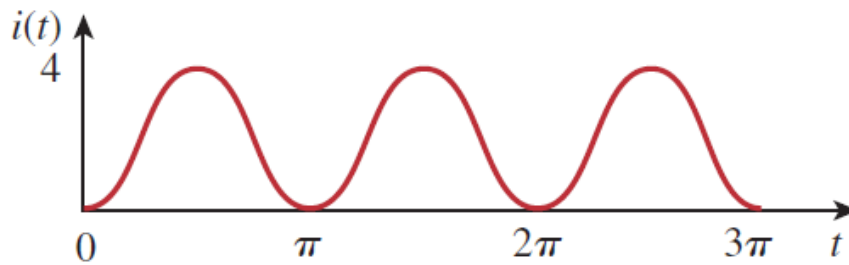


Figure 11.53

For Prob. 11.22.

Q6)

11.28 Find the rms value of the voltage waveform of Fig. 11.59 as well as the average power absorbed by a $2\text{-}\Omega$ resistor when the voltage is applied across the resistor.

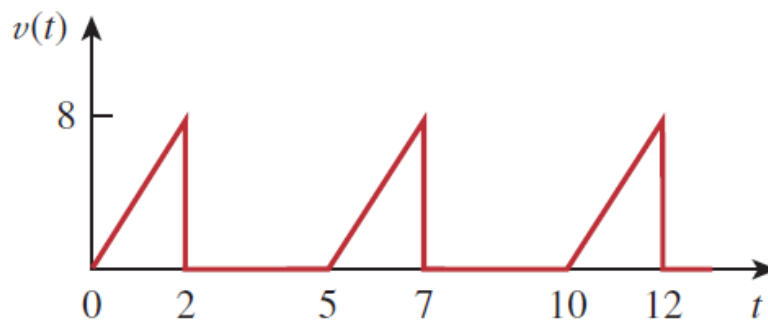


Figure 11.59

For Prob. 11.28.

Q7)

11.45 The voltage across a load and the current through it are given by

$$v(t) = 20 + 60 \cos 100t \text{ V}$$

$$i(t) = 1 - 0.5 \sin 100t \text{ A}$$

Find:

- (a) the rms values of the voltage and of the current
- (b) the average power dissipated in the load

Q8)

11.47 For each of the following cases, find the complex power, the average power, and the reactive power:

(a) $v(t) = 112 \cos(\omega t + 10^\circ) \text{ V},$

$$i(t) = 4 \cos(\omega t - 50^\circ) \text{ A}$$

(b) $v(t) = 160 \cos 377t \text{ V},$

$$i(t) = 4 \cos(377t + 45^\circ) \text{ A}$$

(c) $\mathbf{V} = 80 \angle 60^\circ \text{ V rms}, \mathbf{Z} = 50 \angle 30^\circ \Omega$

(d) $\mathbf{I} = 10 \angle 60^\circ \text{ A rms}, \mathbf{Z} = 100 \angle 45^\circ \Omega$

Q9)

11.56 Obtain the complex power delivered by the source in the circuit of Fig. 11.75.



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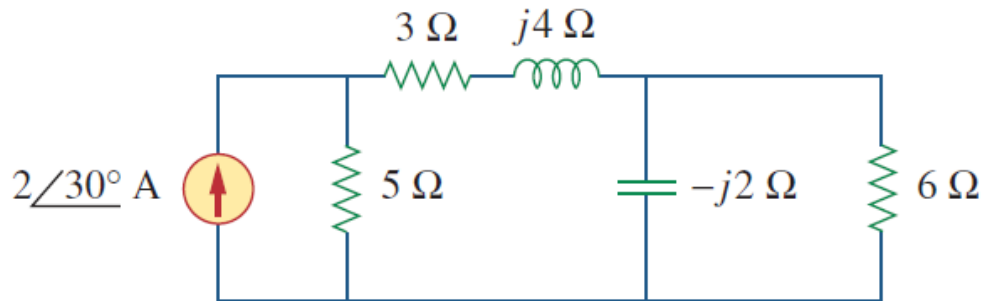


Figure 11.75

For Prob. 11.56.

Q10)

11.59 Calculate the reactive power in the inductor and capacitor in the circuit of Fig. 11.78.



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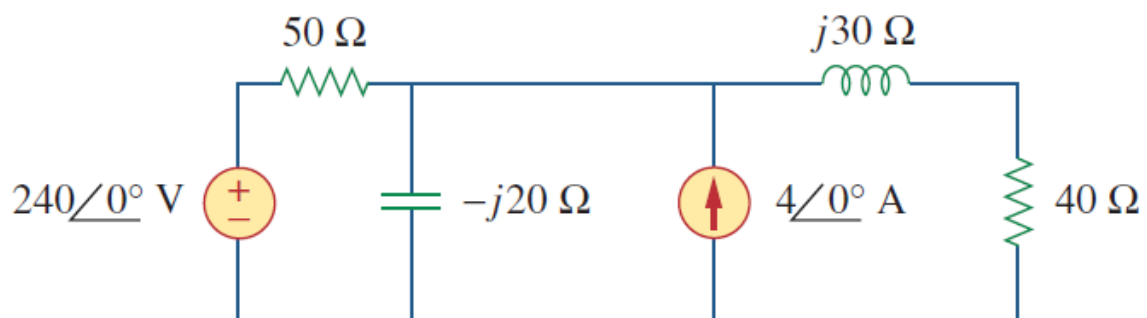


Figure 11.78

For Prob. 11.59.

Q11)

11.61 Given the circuit in Fig. 11.80, find $\mathbf{I}_o$ and the overall complex power supplied.

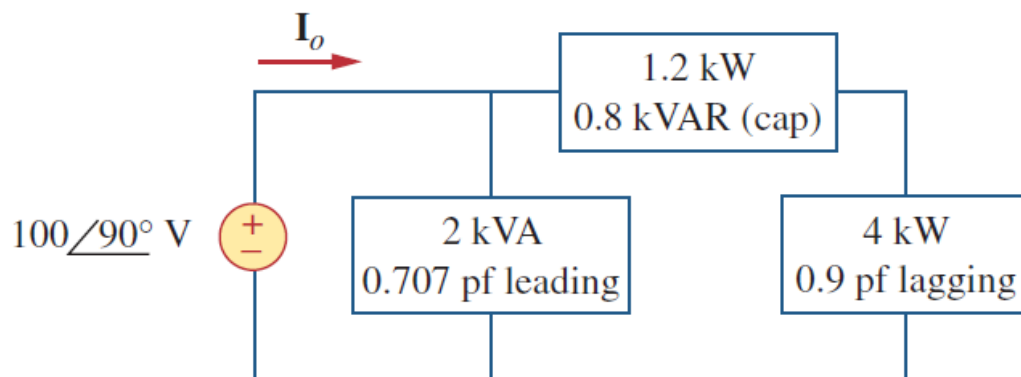


Figure 11.80

For Prob. 11.61.

Q12)

11.64 Determine $\mathbf{I}_s$ in the circuit of Fig. 11.83, if the voltage source supplies 2.5 kW and 0.4 kVAR (leading).

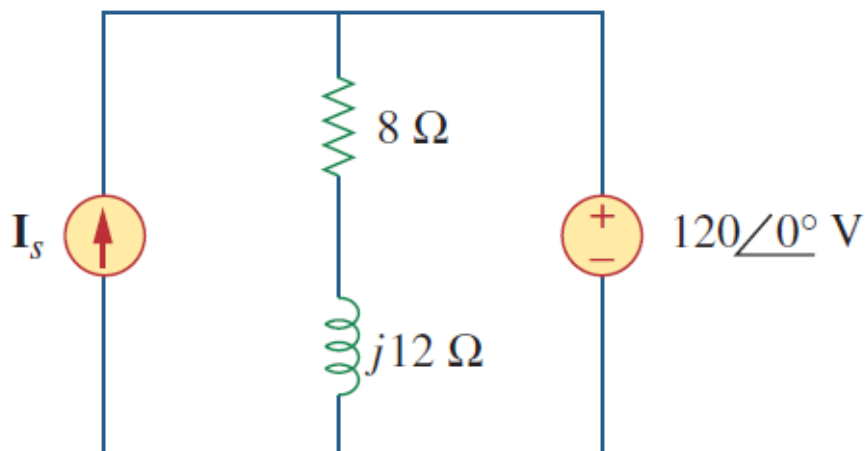


Figure 11.83

For Prob. 11.64.

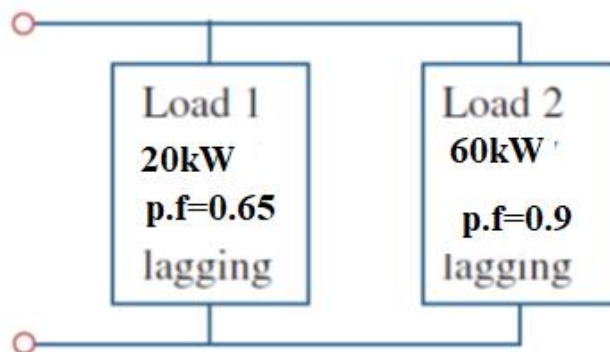
Q13) 11.73 A 240-V rms 60-Hz supply serves a load that is 10 kW (resistive), 15 kVAR (capacitive), and 22 kVAR (inductive). Find:

- (a) the apparent power
- (b) the current drawn from the supply
- (c) the kVAR rating and capacitance required to improve the power factor to 0.96 lagging
- (d) the current drawn from the supply under the new power-factor conditions

Q14)

A 120-V rms 60-Hz source supplies two loads connected in parallel, as shown in Fig. 11.89.

- (a) Find the power factor of the parallel combination.
- (b) Calculate the value of the capacitance connected in parallel that will raise the power factor to unity.



Q15)

- 11.72 Two loads connected in parallel draw a total of 2.4 kW at 0.8 pf lagging from a 120-V rms, 60-Hz line. One load absorbs 1.5 kW at a 0.707 pf lagging. Determine: (a) the pf of the second load, (b) the parallel element required to correct the pf to 0.9 lagging for the two loads.