Chapter 10, Solution 58.

For the circuit depicted in Fig. 10.101, find the Thevenin equivalent circuit at terminals *a-b*.

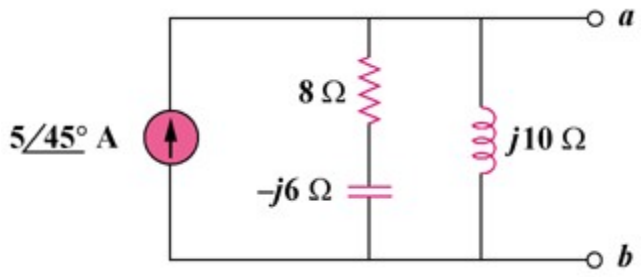
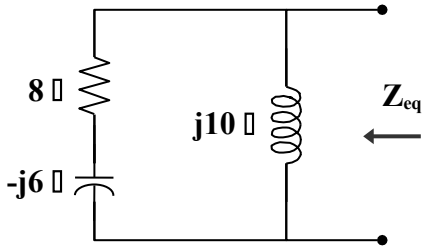


Figure 10.101
For Prob. 10.58.

Solution

Consider the circuit in Fig. (a) to find $\mathbf{Z}_{eq}$.

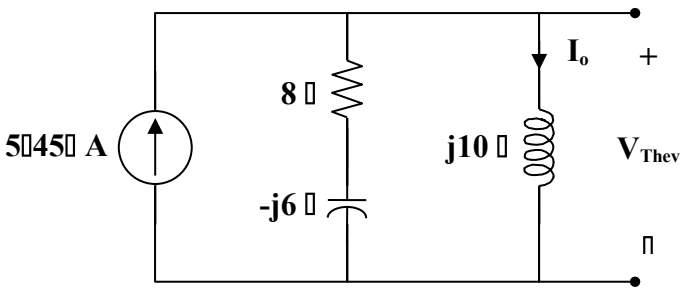


(a)

$$\mathbf{Z}_{eq} = j10 \,\|\, (8 - j6) = \frac{(j10)(8 - j6)}{8 + j4} = 5(2 + j)$$

$$= \mathbf{11.18\angle 26.56^\circ\ \Omega}$$

Consider the circuit in Fig. (b) to find V_{Thev}.



(b)

$$\mathbf{I}_o = \frac{8 - j6}{8 - j6 + j10}(5\angle 45°) = \frac{4 - j3}{4 + j2}(5\angle 45°)$$

$$\mathbf{V}_{Thev} = j10\,\mathbf{I}_o = \frac{(j10)(4 - j3)(5\angle 45°)}{(2)(2 + j)}$$

$$= \mathbf{55.9\angle 71.56°\ V}$$