

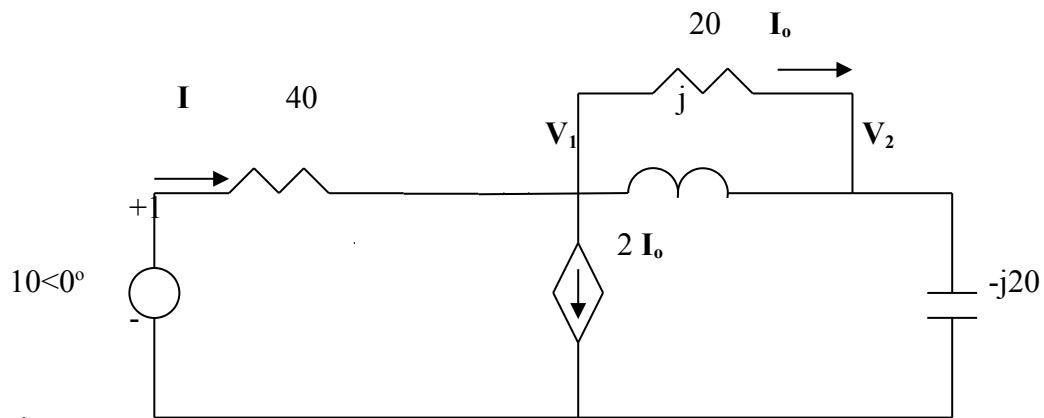
Chapter 11, Solution 79.

The wattmeter reads the power supplied by the source and partly absorbed by the 40- Ω resistor.

$$\omega = 100,$$

$$10 \text{ mH} \longrightarrow j100 \times 10 \times 10^{-3} = j, \quad 500 \mu\text{F} \longrightarrow \frac{1}{j\omega C} = \frac{1}{j100 \times 500 \times 10^{-6}} = -j20$$

The frequency-domain circuit is shown below.



At node 1,

$$\frac{10 - V_1}{40} = 2I_o + \frac{V_1 - V_2}{j} + \frac{V_1 - V_2}{20} = \frac{3(V_1 - V_2)}{20} + \frac{V_1 - V_2}{j} \longrightarrow \quad (1)$$

$$10 = (7 - j40)V_1 + (-6 + j40)V_2$$

At node 2,

$$\frac{V_1 - V_2}{j} + \frac{V_1 - V_2}{20} = \frac{V_2}{-j20} \longrightarrow 0 = (20 + j)V_1 - (19 + j)V_2 \quad (2)$$

Solving (1) and (2) yields $V_1 = 1.5568 - j4.1405$

$$I = \frac{10 - V_1}{40} = 0.2111 + j0.1035, \quad S = \frac{1}{2} V_1 I^* = -0.04993 - j0.5176$$

$$P = \text{Re}(S) = \mathbf{50 \text{ mW}}.$$