Chapter 11, Solution 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.

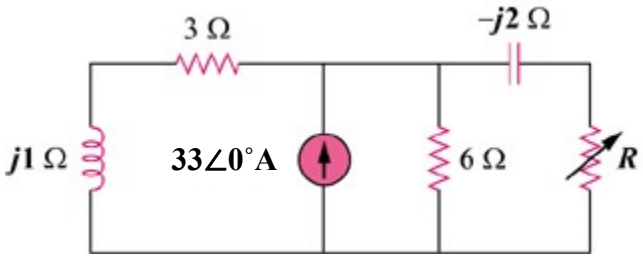

Figure 11.50
For Prob. 11.19.

Solution

At the load terminals,

$$\mathbf{Z}_{Th} = -j2 + 6 \,||\, (3 + j) = -j2 + \frac{(6)(3 + j)}{9 + j}$$

$$\mathbf{Z}_{Th} = 2.049 - j1.561$$

$$R_L = \left|\mathbf{Z}_{Th}\right| = \mathbf{2.576\ \Omega}$$

To get $\mathbf{V}_{Th}$, let $\mathbf{Z} = 6 \,||\, (3 + j) = 2.049 + j0.439$.

By transforming the current sources, we obtain

$$\mathbf{V}_{Th} = (33\angle 0°)\mathbf{Z} = 67.62 + j14.487 = 69.16\angle 12.09°$$

$$P_{max} = \left|\frac{69.16}{2.049 - j1.561 + 2.576}\right|^2 \frac{2.576}{2} = \mathbf{258.5\ W}.$$