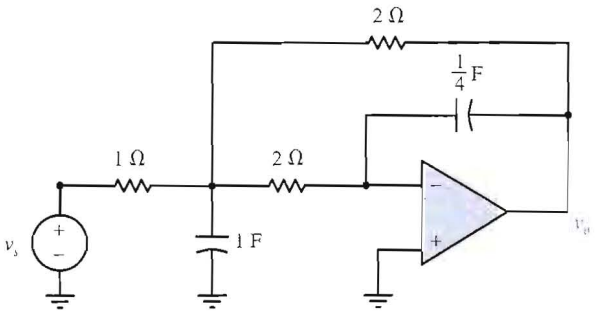

Fig. P4.23

$4.47/-63.4°$ V and $\mathbf{Z}_o = 1.6 + j4.8\ \Omega$. (a) Replace the 4-Ω load resistor by an impedance $\mathbf{Z}_L$ that absorbs the maximum average power, and determine this maximum power. (b) Replace the 4-Ω load resistor with a resistance R_L that absorbs the maximum power for resistive loads, and determine this power.

4.28 For the *RLC* circuit shown in Fig. P4.28, suppose that $v_s(t) = 10 \cos 3t$ V. Find the average power absorbed by the 4-Ω resistor for the case that (a) $C = \frac{1}{6}$ F; (b) $C = \frac{1}{18}$ F; (c) $C = \frac{1}{30}$ F.

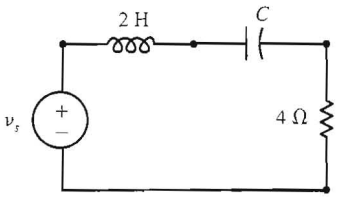

Fig. P4.28

4.29 For the circuit shown in Fig. P4.29, suppose that $v_s(t) = 8 \cos 2t$ V. Find the average power absorbed by each element in the circuit for the case that $\mathbf{Z}_L = 1\ \Omega$.

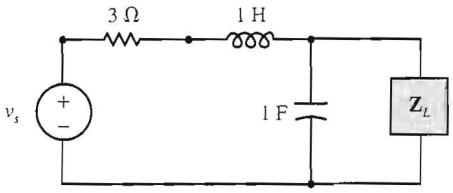

Fig. P4.29

4.30 For the circuit shown in Fig. P4.29, change the value of the resistor to 2 Ω and the value of the capacitor to $\frac{1}{4}$ F. Suppose that $v_s(t) = 8 \cos 2t$ V. (a) Find the load impedance $\mathbf{Z}_L$ that absorbs the maximum average power, and determine this power. (b) Find the load resistance R_L that absorbs the maximum power for resistive loads, and determine this power.

4.31 For the op-amp circuit given in Fig. P4.21, when $v_s(t) = 6 \sin 2t$ V, then the output voltage $v_o(t) = 13.4 \cos(2t - 117°)$ V. Find the average power absorbed by each element.

4.32 For the op-amp circuit given in Fig. P4.22, when $v_s(t) = 3 \cos 2t$ V, then the output voltage $v_o(t) = 10.6 \cos(2t + 135°)$ V. Find the average power absorbed by each element.

4.33 For the op-amp circuit given in Fig. P4.23, when $v_s(t) = 4 \cos(2t - 30°)$ V, then $v_1(t) = 1.6\cos(2t - 66.9°)$ V and $v_o(t) = 1.6\cos(2t + 23.1°)$ V. Find the average power absorbed by each element.

4.34 For the circuit given in Fig. P4.24, when $\mathbf{V}_{s1} = 250\sqrt{2}/-30°$ V, $\mathbf{V}_{s2} = 250\sqrt{2}/-90°$ V, and $\mathbf{Z} = 78 - j45\ \Omega$, then $\mathbf{I}_1 = 6.8/30°$ A and $\mathbf{I}_2 = 6.8/-90°$ A. (a) Find the average power absorbed by each impedance. (b) Find the average power supplied by each source.

4.35 For the circuit given in Fig. P4.25, when $\mathbf{V}_{s1} = 250\sqrt{2}/-30°$ V, $\mathbf{V}_{s2} = 250\sqrt{2}/-90°$ V, and $\mathbf{Z} = 26 - j15\ \Omega$, then $\mathbf{I}_1 = 6.8/30°$ A and $\mathbf{I}_2 = 6.8/-90°$ A. (a) Find the average power absorbed by each impedance. (b) Find the average power supplied by each source.