

14.59 Find the steady-state response $v_o(t)$ for the circuit shown in Fig. P14.59. **PSV**

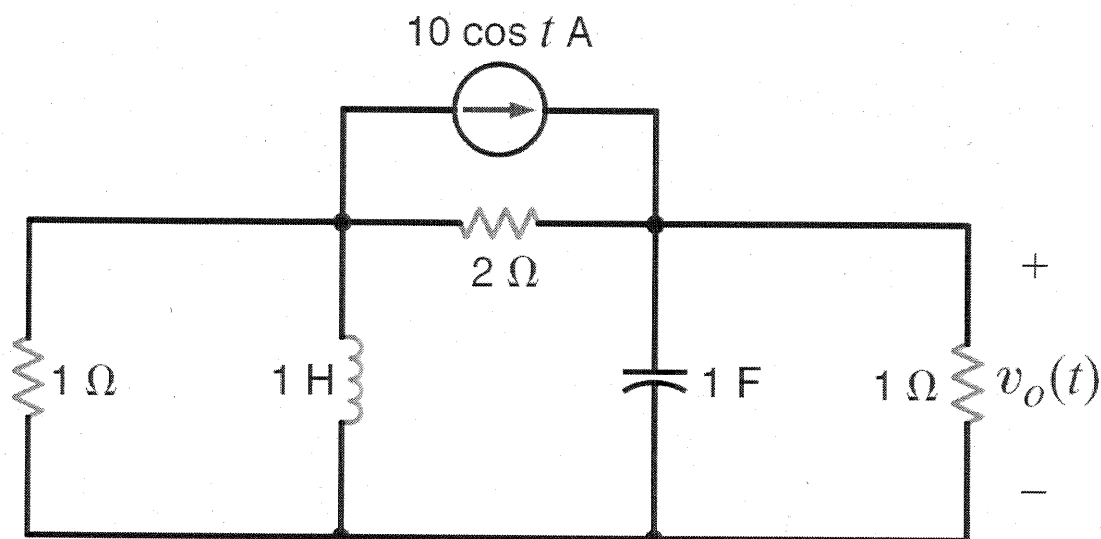
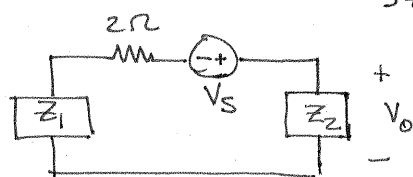


Figure P14.59

SOLUTION: Let $Z_1 = \frac{s}{s+1}$ & $Z_2 = \frac{1}{s+1}$



Eventually V_s is a phasor $\Rightarrow 20 \angle 0^\circ \text{ V}$

$$V_o = V_s \left(\frac{Z_2}{Z_1 + Z_2 + 2} \right) = V_s \left(\frac{1}{s+1+2s+2} \right) = V_s \left(\frac{1/3}{s+1} \right)$$

In steady state, $s \rightarrow j\omega$

$$V_o = 20 \angle 0^\circ \left[\frac{1/3}{1+j\omega} \right] \quad V_o = 4.71 \angle -45^\circ \text{ V}$$

$$v_o(t) = 4.71 \cos(t - 45^\circ) \text{ V}$$