14.6 For the network shown in Fig. P14.6, find $v_o(t)$, $t > 0$, using node equations. **PSV**

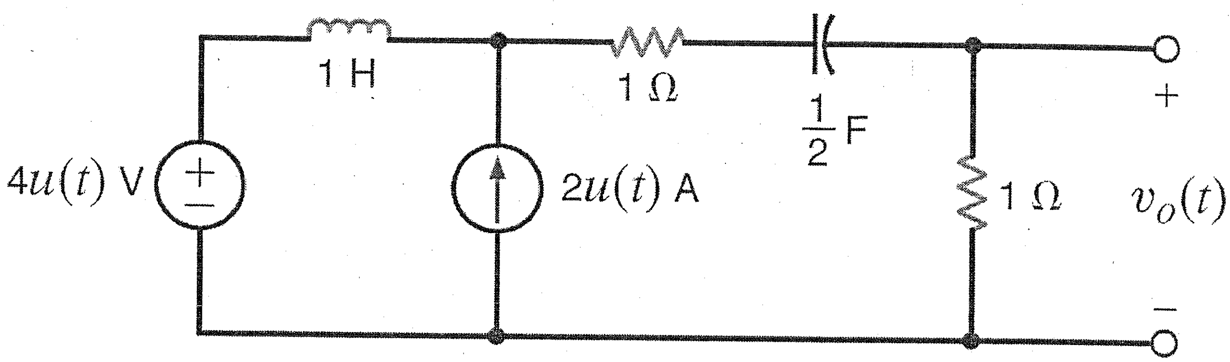
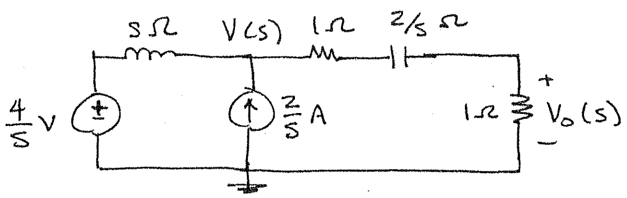


Figure P14.6

SOLUTION: at $t = 0^-$, no excitation. So initial conditions $= 0$.



$$\frac{V - 4/s}{s} + \frac{V}{2 + \frac{2}{s}} = \frac{2}{s}$$

$$\frac{V}{s} + \frac{Vs}{2(s+1)} = \frac{2}{s} + \frac{4}{s^2}$$

$$V\left[s(s+1) + \frac{s^3}{2}\right] = 2s(s+1) + 4(s+1) = 2s^2 + 6s + 4$$

$$\frac{V}{2}\left[s^3 + 2s^2 + 2s\right] = 2(s^2 + 3s + 2) \Rightarrow V = \frac{4(s+1)(s+2)}{s(s^2+2s+2)}$$

$$V_o = V\left[\frac{1}{2 + 2/s}\right] = V\left[\frac{s}{2(s+1)}\right] = \frac{2(s+2)}{(s+1-j1)(s+1+j1)}$$

$$V_o = \frac{K_1}{s+1-j1} + \frac{K_1^*}{s+1+j1} \qquad K_1 = \frac{2(1+j1)}{j2} = \sqrt{2}\,\angle -45^\circ$$

$$v_o(t) = \left[\sqrt{2}\, e^{-t} \cos(t - 45^\circ)\right] u(t) \checkmark$$