14.23 Use Thévenin's theorem to determine $i_o(t)$, $t > 0$, in the circuit shown in Fig. P14.23. **PSV**

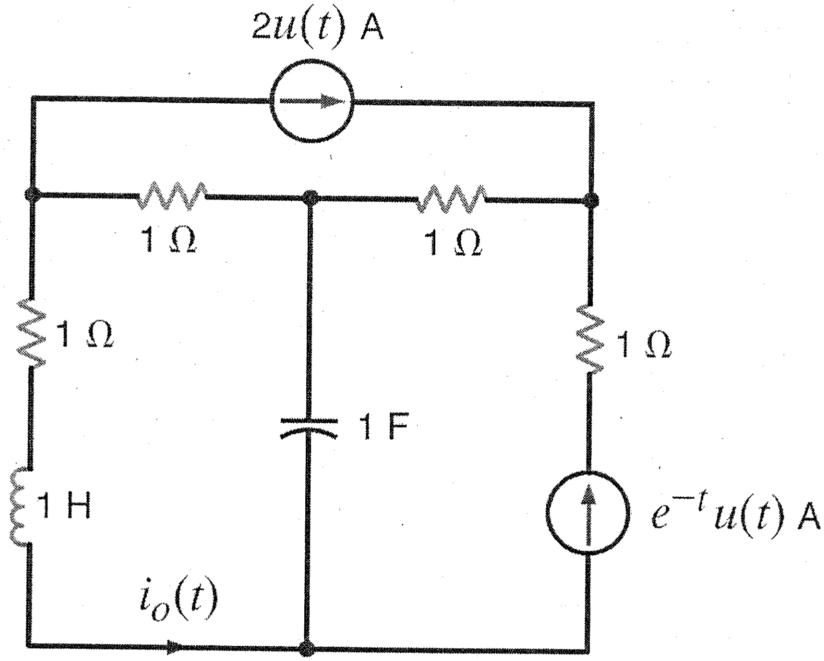
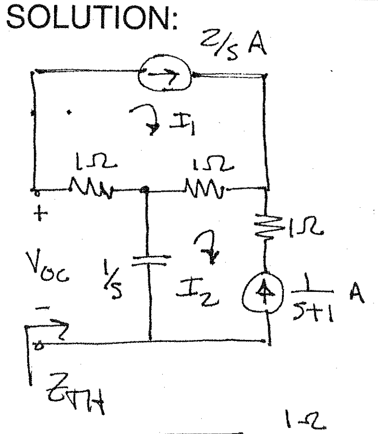


Figure P14.23

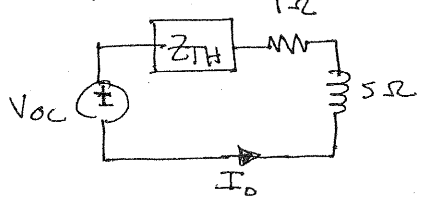
SOLUTION:



$$I_1 = \frac{2}{s} \qquad I_2 = -\frac{1}{s+1}$$

$$V_{oc} = (1)(-I_1) - \frac{1}{s} I_2 = -\frac{2}{s} + \frac{1}{s(s+1)} = \frac{-(2s+1)}{s(s+1)}$$

$$Z = 1 + 1/s = (s+1)/s$$



$$I_o = \frac{-V_{oc}}{Z + 1 + s} = \frac{(2s+1)}{(s+1)^3}$$

$$I_o = \frac{K_1}{(s+1)^3} + \frac{K_2}{(s+1)^2} + \frac{K_3}{s+1} = \frac{-1}{(s+1)^3} + \frac{2}{(s+1)^2}$$

$$\boxed{i_o(t) = \left[2te^{-t} - \frac{1}{2}t^2 e^{-t}\right] u(t) \text{ A}}$$