

- 13.45** The switch in the circuit in Fig. P13.45 opens at  $t = 0$ . Find  $i(t)$  for  $t > 0$  using Laplace transforms. **CS**

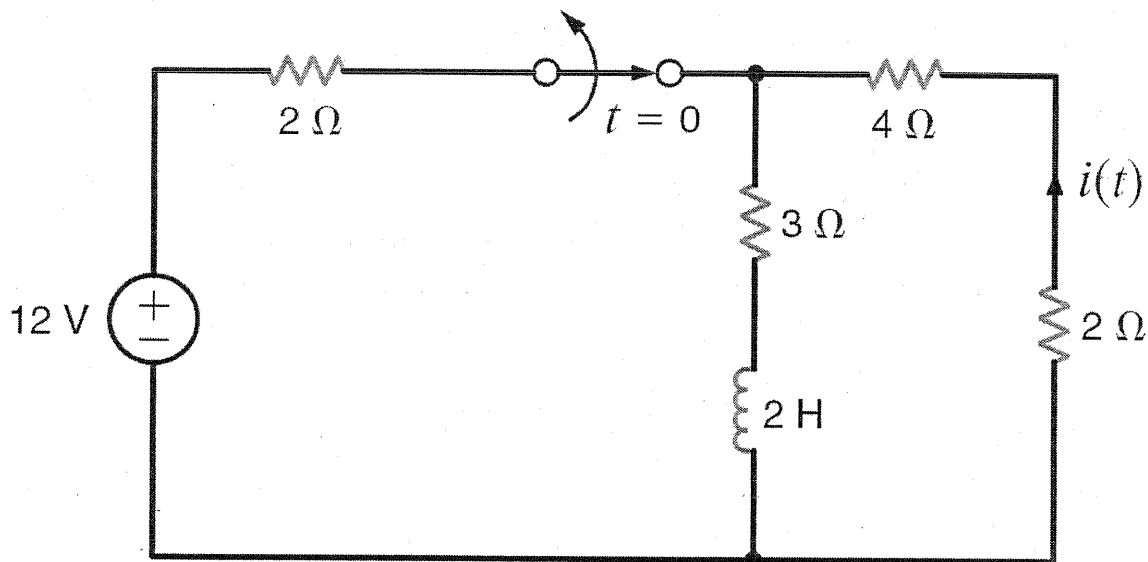
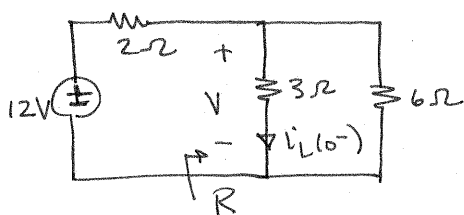


Figure P13.45

SOLUTION: For  $t < 0$ ,

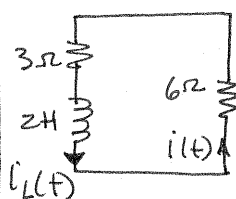


$$R = 3 \parallel 6 = 2 \Omega$$

$$V = 12 \left( \frac{2}{2+2} \right) = 6 \text{ V}$$

$$i_L(0^-) = \frac{V}{3} = 2 \text{ A}$$

For  $t > 0$



$$3i(t) + i(t) + 2 \frac{di}{dt} = 0$$

$$3I(s) + 6I(s) + 2sI(s) - 2i(0^-) = 0$$

$$(9 + 2s)I(s) = 4$$

$$I(s) = \frac{4}{2s+9} = \frac{2}{s+4.5}$$

$$i(t) = 2e^{-4.5t} u(t)$$