

When $t < 0$, $i_s = I_0$

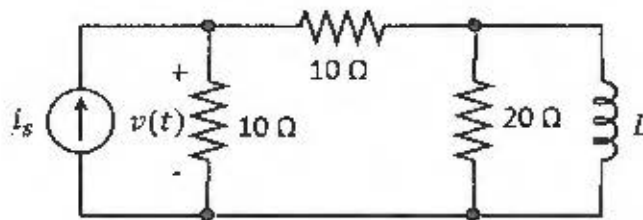
$$I_0 = 4 \text{ A}$$

When $t > 0$, $i_s = I_1$

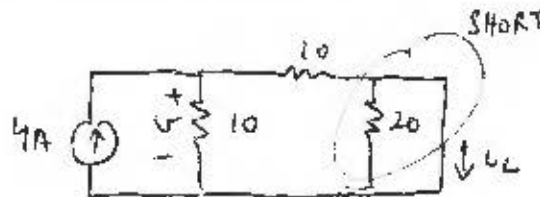
$$I_1 = 6 \text{ A}$$

Find $v(t) = A \cdot e^{-t/\tau} + B$ for $t > 0$

$$L = 0.25 \text{ uH}$$



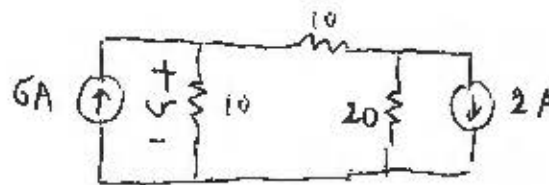
(a) $t = 0^-$



$$v(0^-) = (4 \text{ A}) \cdot (10 // 10) = 20 \text{ V}$$

$$i_L(0^-) = (4 \text{ A}) \cdot \frac{10}{10 + 10} = 2 \text{ A}$$

(b) $t = 0^+$



$$i_L(0^+) = 2 \text{ A}$$

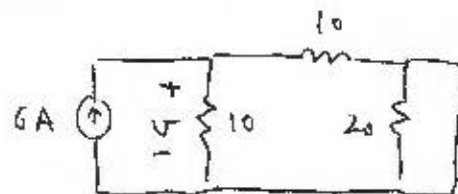
SUPERPOSITION

$$v_1 = 6 \cdot (10 // 30) = 6 \cdot \frac{30}{4} = 45 \text{ V}$$

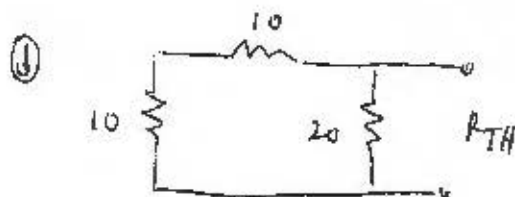
$$v_2 = (-2) \cdot (20 // 20) \cdot \frac{1}{2} = -10 \text{ V}$$

$$v(0^+) = v_1 + v_2 = 35 \text{ V}$$

(c) $t = \infty$



$$v(\infty) = 6 \cdot (10 // 10) = 30 \text{ V}$$



$$R_{TH} = 20 // 20 = 10 \Omega$$

$$\tau = \frac{L}{R_{TH}} = \frac{0.25 \cdot 10^{-6}}{10} = 25 \cdot 10^{-9}$$

$$\tau = 25 \text{ ns}$$

$$B = v(\infty) \Rightarrow$$

$$B = 30 \text{ V}$$

$$A + B = v(0^+) \Rightarrow$$

$$A = 5 \text{ V}$$