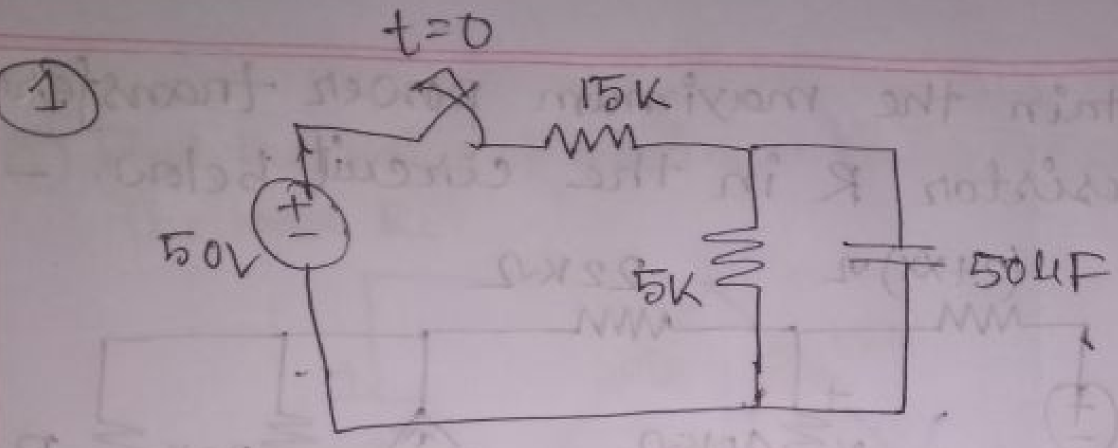
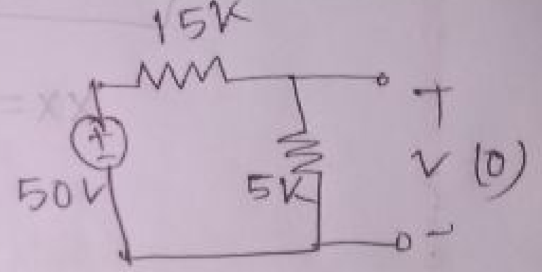
(1)

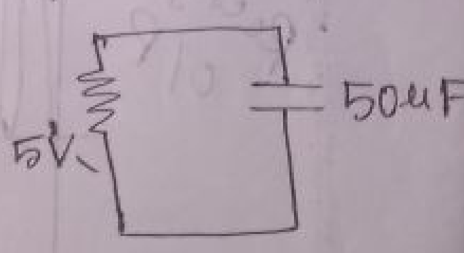


for $t<0$, switch closed, capacitor open,



$$\therefore V(0) = \frac{5 \times 50}{5+15} = \frac{250}{20} = 12.5V$$

for $t>0$, switch open, capacitor discharges

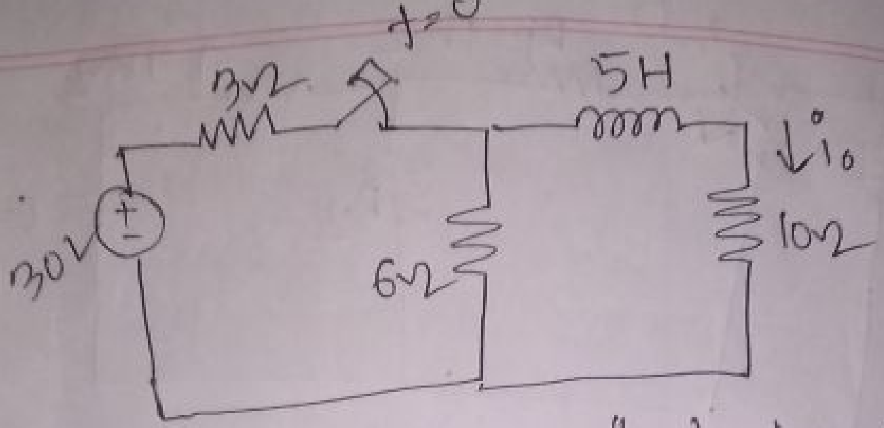


$\therefore$ $R_{th} = 5k\Omega$

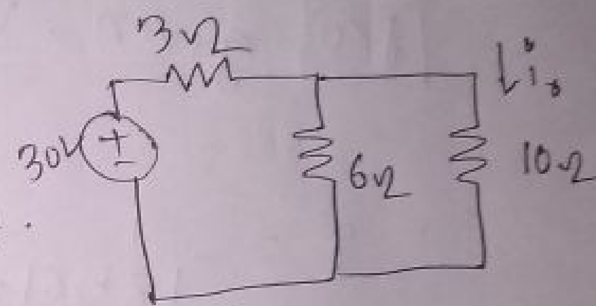
$$\therefore \tau = R_{th} \times C$$
$$= 5 \times 10^3 \times 50 \times 10^{-6}$$
$$= 0.25 sec$$

$$\therefore v(t) = 12.5 e^{-4t} \text{ volt}$$

(2)



For $t<0$, switch close, inductor short



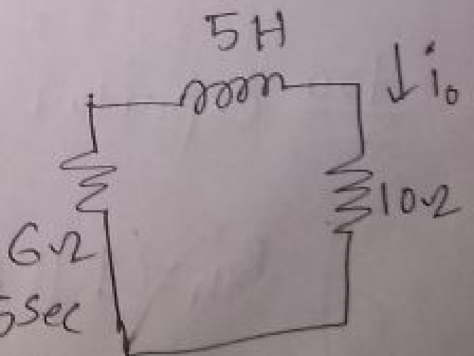
$R_{total} = 6.75\Omega$

$\therefore I_{total} = \frac{30}{6.75} = 4.44A$.

$\therefore i_o = \frac{6 \times 4.44}{6+10} = 1.67\ A$

$\therefore i(0) = 1.67\ A$.

For $t>0$, switch open,

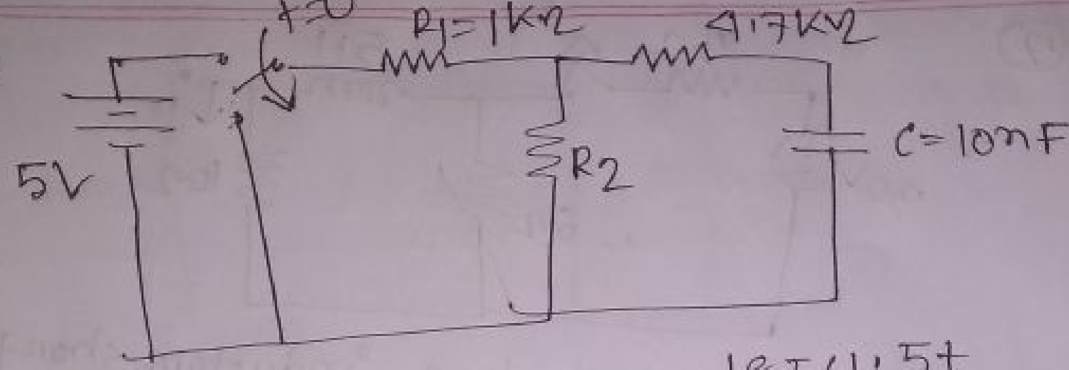


$R_{th} = 10+6 = 16\Omega$

$\therefore \tau = \frac{L}{R} = \frac{5}{16} = 0.3125 sec$

$\therefore i_o(t) = 1.67\, e^{-3.2t}\ A$ Ans

(3)



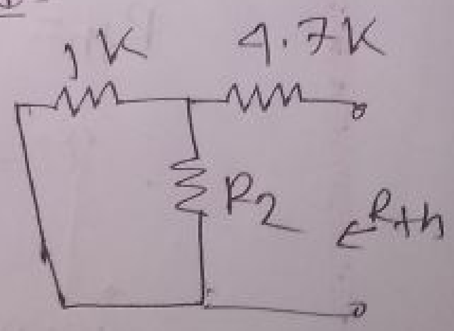
$\boxed{t<0}$ given, $V_c = 3.437 e^{-18561.5t}$ volt.

$\therefore \tau = \frac{1}{18561.5} = 5.387 \times 10^{-5}$ sec

$\Rightarrow R_{th}C = 5.387 \times 10^{-5}$

$\Rightarrow R_{th} = 5387.49\,\Omega = 5.387 K\Omega$

$\underline{t>0}$ capacitor opens. [We calculate R_{th} for $t>0$]



$\therefore R_{th} = (1 \parallel R_2) + 4.7$

$\Rightarrow 5.387 = \frac{1 \times R_2}{1+R_2} + 4.7$

$\Rightarrow 0.687 = \frac{R_2}{1+R_2}$

$\Rightarrow 0.687 + 0.687 R_2 = R_2$

$\Rightarrow 0.3125 R_2 = 0.687 \quad \therefore R_2 = 2.2 K\Omega$ Ans