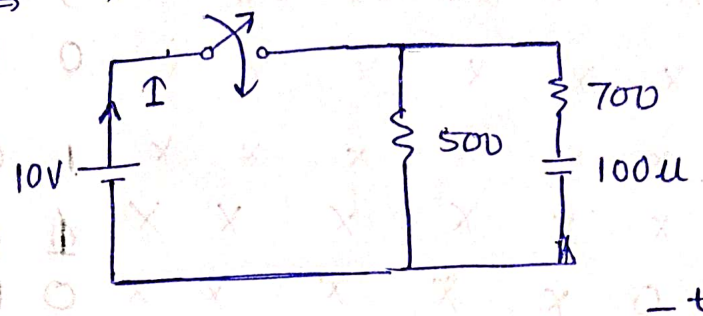
Ques :- 1) t=0sec.



Sol^{n} :-

$$I_c(t) = \frac{V}{R} e^{-t/RC}$$

$$I_c(t=0) = \frac{10}{700} e^{-t/700\times100\times10^{-6}}$$

$$I_c(t) = \frac{10}{500} + \frac{10}{700} e^{-t/7\times10^{-2}}$$

$$I_1(t=0) = \frac{10}{500} A$$

$$25\times10^{-3} = \frac{10}{500} = \frac{10}{700} e^{-t/7\times10^{-2}}$$

$$I_2(t=0) = \frac{10}{700} A$$

$$\Rightarrow \frac{7}{20} = e^{-t/7\times10^{-2}}$$

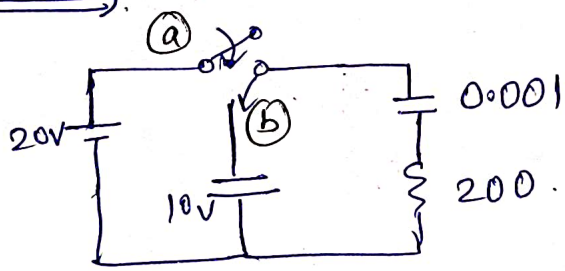
$$I_T(t=0) = \frac{10}{500} + \frac{10}{700} = 34mA.$$

$$\ln\left(\frac{7}{20}\right) = \frac{-t}{7\times10^{-2}}$$

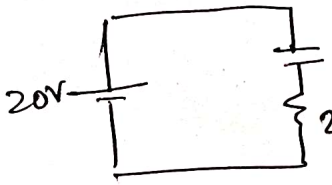
$$-\ln\left(\frac{7}{20}\right) * 7\times10^{-2} = t$$

$$I_c \Rightarrow 0.07348\,A$$

Ques 2



when (a).



$$V_c(t) = V(1-e^{-t/RC})$$

$$V_c(t) = 20(1-e^{-t/200\times1\times10^{3}})$$

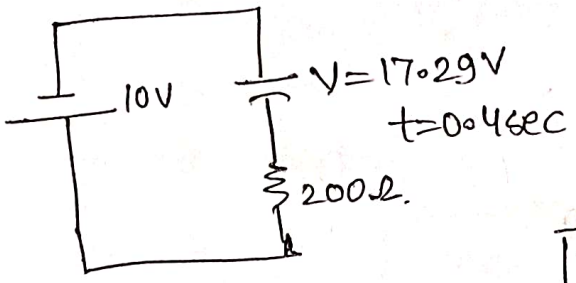
$$V_c(t=0) = 0\,V$$

$$V_c(t=0.4) = 20(1-e^{-0.4/0.2})$$

$$\tau = RC \Rightarrow 200\times10^{-3} \Rightarrow 0.2sec$$

$$V_c(t=0.4) = 17.29V$$

when (b).



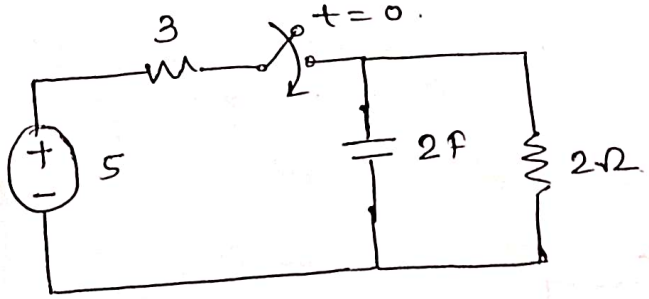
$V_c(t_0) = 17.29V \quad V(\infty) = -10V.$

$$V(t-0.4) = -10-(-10-17.29)e^{\frac{-(t-0.4)}{0.2}}$$

$$\boxed{V_c(t) \Rightarrow -10 + 27.29e^{\frac{-(1-0.4)}{0.2}} \Rightarrow -8.64}$$

W Ans.

Ques 3:-



$V_c(0^-) = 0 \quad , \quad I_c(0^-) = 0 \quad , \quad V_{2\Omega} = \frac{2\times5}{5} = 2V$

$\boxed{V_\infty = 2V.}$

$V_c(t) \Rightarrow V_c(0) \mp (V_c(0^+) - V_c(0))e^{-t/RC}.$

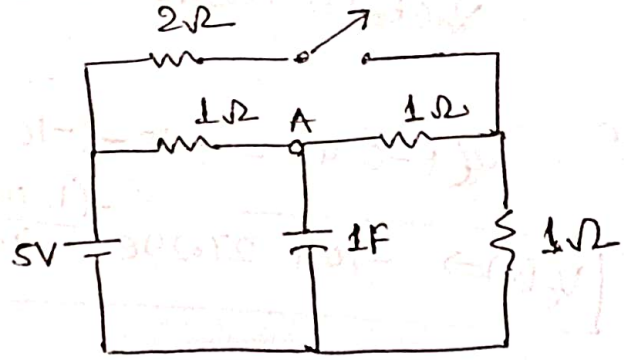
$\tau \Rightarrow R_{eq} * C \Rightarrow 1.02\times2 = 2.04$

$\rightarrow 2 + (0-2)e^{-t/2.4}.$

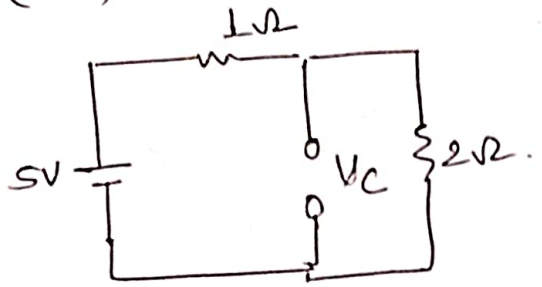
$\rightarrow V_c(t) \Rightarrow \frac{4}{2.04} e^{-t/2.4}.$

$$\boxed{V_c(t) = 1.96V}$$

Ques 4



Before (t=0)



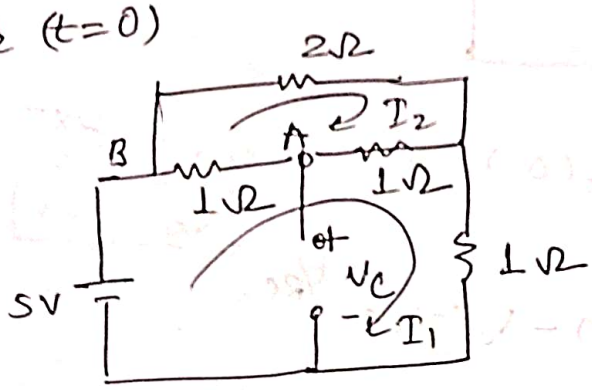
$$V_c(t) = V(1-e^{-t/Rc})$$

$$V_c = 2\Omega = \frac{2}{3} \times 5 \Rightarrow \frac{10}{3} V$$

So,

$$V_c(0) = \frac{10}{3} V$$

After (t=0)



$$\Rightarrow \quad 5 - 2I_2 - I_2 + I_1 + I_1 - I_2 = 0$$

$$5 - I_1 + I_2 - I_1 + I_1 = 0$$

$$I_1 = 5/2$$

$$I_2 = 5/4.$$

from

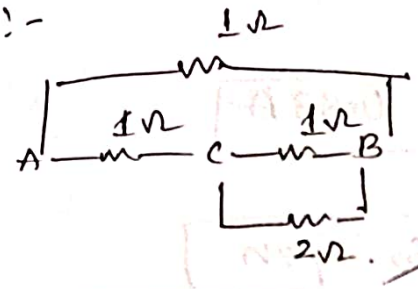
$$\overrightarrow{A \text{ to } B} \Rightarrow \frac{5}{4} \text{ A (Resultant)}$$

$$\therefore \quad 5 - \frac{5}{4} = V_c(\infty).$$

formula

$$V_c(t) = V_e(\infty) - [V_c(\infty) - V_c(0)]\, e^{-t/RC}$$ Ans.

Find Req:-

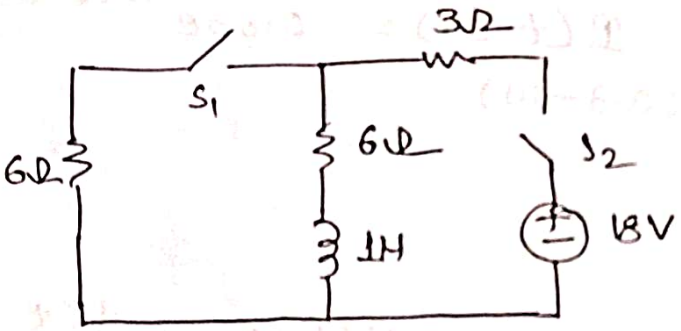


Req ⇒ 0.625Ω ← 1 + 2/5 Ω

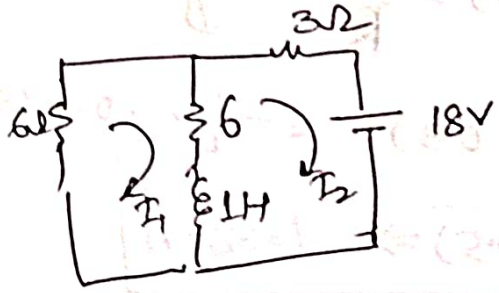
⇒ 5/3 // 1Ω

⇒ $\frac{5/3 \times 1}{5/3 + 1}$

5)



t=0, S_1 → closed S_2 → closed



$I_c(t=0) = 0A$

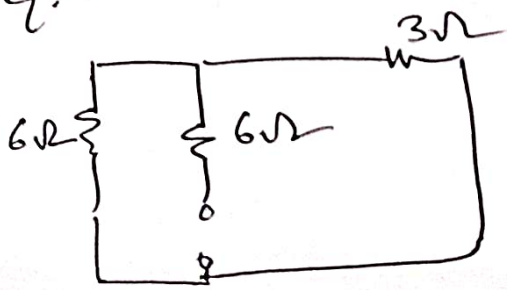
$I_c(t=\infty) = 1.5A$

$12I_1 - 6I_2 = 0$

$9I_2 - 6I_1 = -18$ } $I_1 = -3/2$, $I_2 = -3$.

∴ $I_c(t=\infty) \Rightarrow 3 - 3/2 \Rightarrow 1.5A$

Req:-



Req ⇒ $\frac{6 \times 3}{9} = 2\Omega + 6 \Rightarrow$ 8Ω

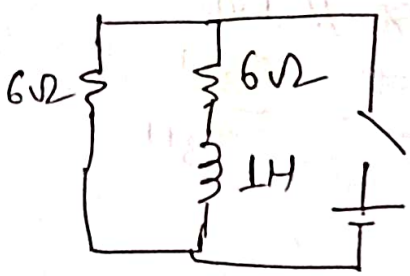
$$I(t) = 1.05 - (1.05-0)\,e^{-8/1\,t}$$

$$\boxed{I(t) = 1.05(1-e^{-8/1\,t})}$$

↳ $t = 0.1$

$$\boxed{I \Rightarrow 0.83\,A}$$

$t = 0.1$ sec $\boxed{S_1 - \text{closed} \quad S_2 - \text{open}}$



$$I(t_0) = 0.83A$$

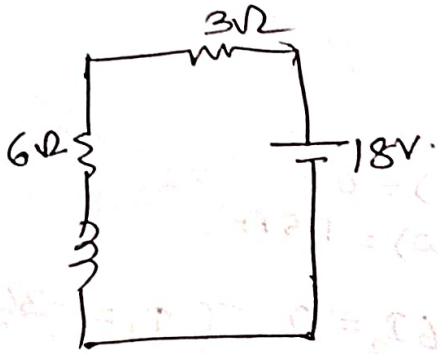
$$I(t=\infty) = 0\,A$$

$$I(t-0.1) = 0 - (0-0.83e^{-12(t-0.1)})$$

$$I(t-0.1) = 0.83e^{12(t-0.1)}$$

$$I(t=0.3) \Rightarrow 0.83\,e^{12(0.3-0.1)}$$

$$\boxed{\hookrightarrow 0.0753A}$$



$$\Rightarrow I_L(0.3) = 0.0753A \Rightarrow I(t=t_0).$$

$$I_L(\infty) = \frac{V}{R} \Rightarrow \frac{18}{9} = 2A$$

$$I(t-0.3) = 2 - [2-0.0753]e^{-9(t-0.3)}$$

$$\boxed{I(t-0.5) \Rightarrow 1.682A}$$

Ans.