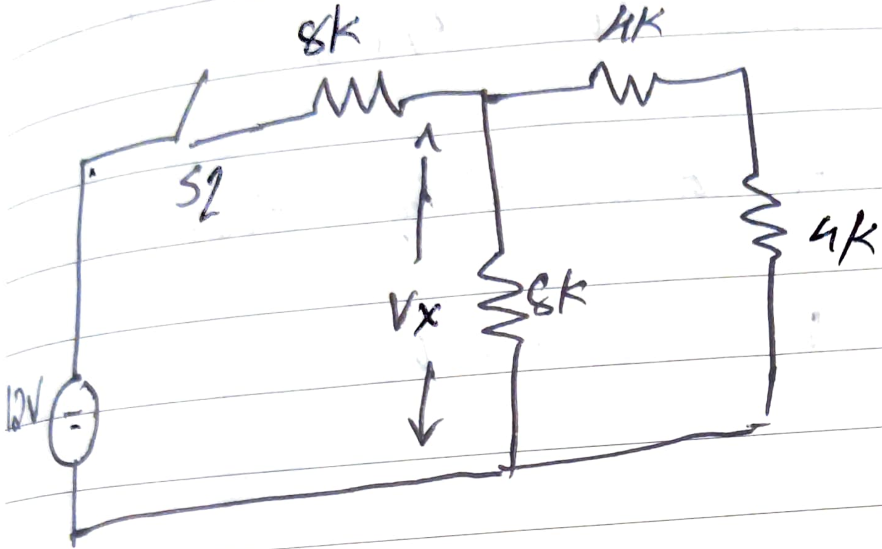
Digital Lone technologies. Date: 04/11/24.



Find Vx

· Instant of closing switch S_1

$$V_x = V_{cc} - \text{drop across } 8k.$$

$$\text{drop across } 8k = 8k \times I$$

$$I = \frac{V_{cc}}{8k + (8k \parallel 4k + 4k)}$$

$$= \frac{12}{8k + 4k} = 0.001\,A$$

$$= 1mA$$

$\therefore$

$$\text{drop across } 8k = 8k \times 1mA = 8V$$

Date:

∴

at the instant of closing the switch S1

$V_x = V_{cc} - 8V = 4V$ //

- steady state after closing the switch. S1

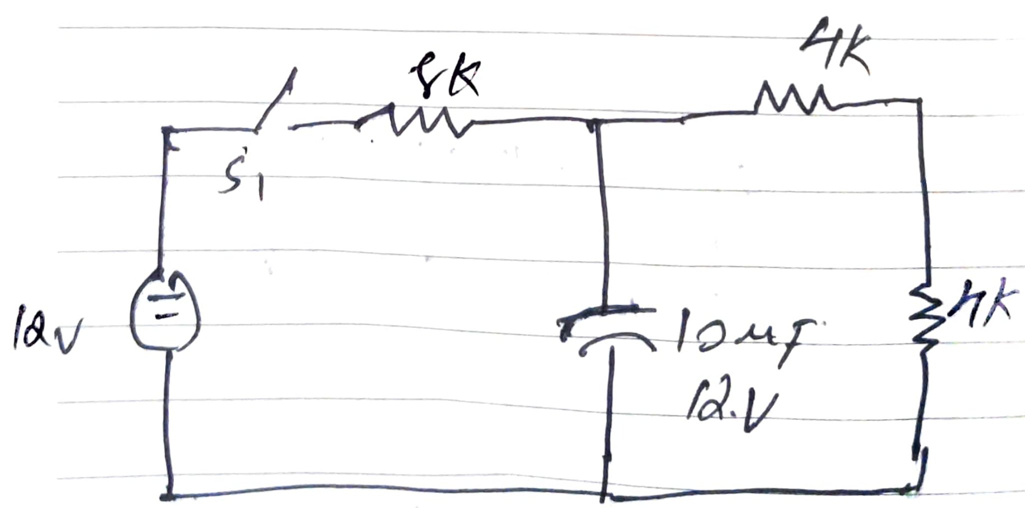
still

$V_x = V_{cc} - 8V = 4V$ //

- Instant of opening the switch S1

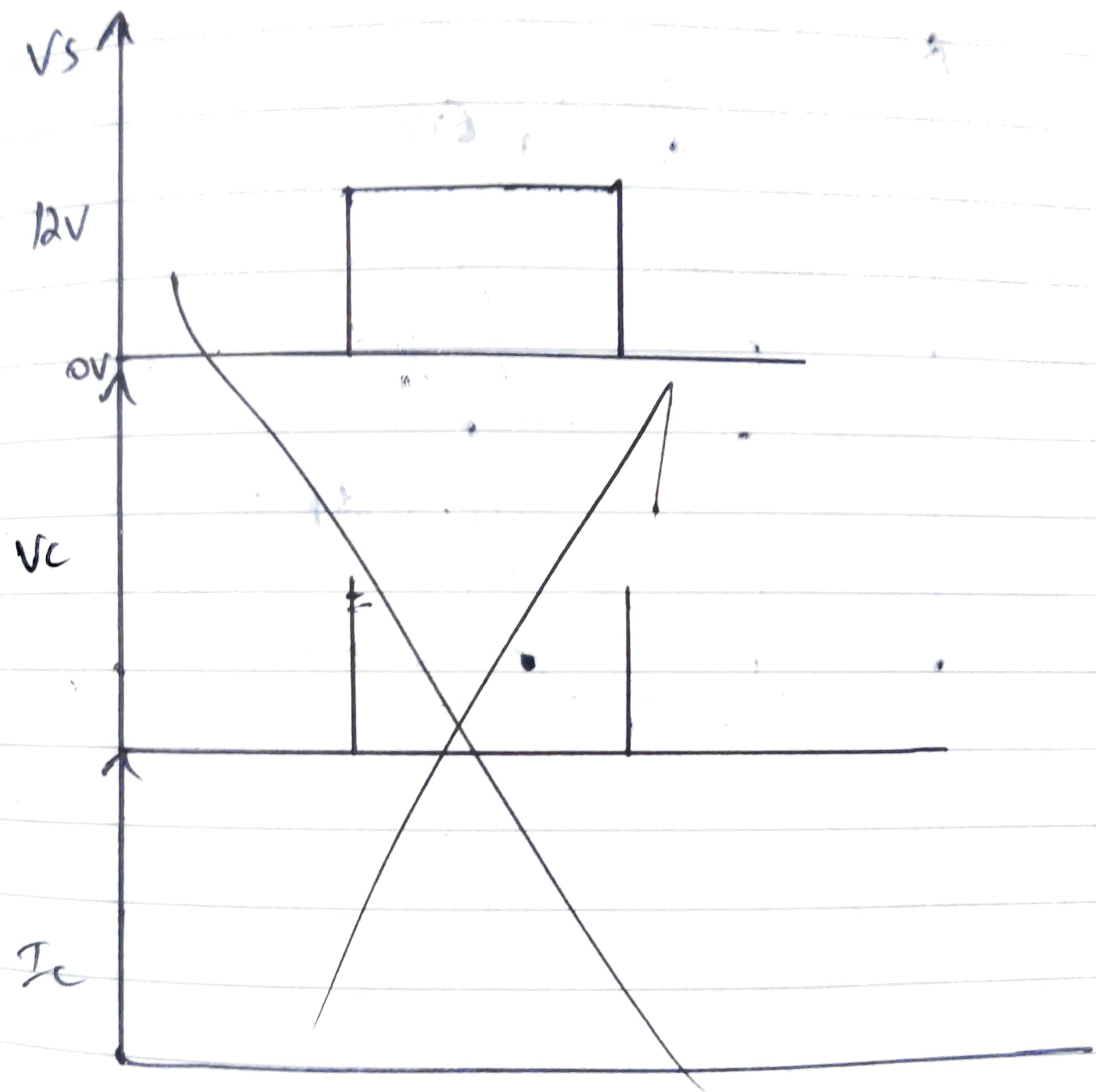
$V_x = 0$ ← No storing. or storage elements.

Excersize 1.1



Date:

Find V_x · Instant of closing the switch



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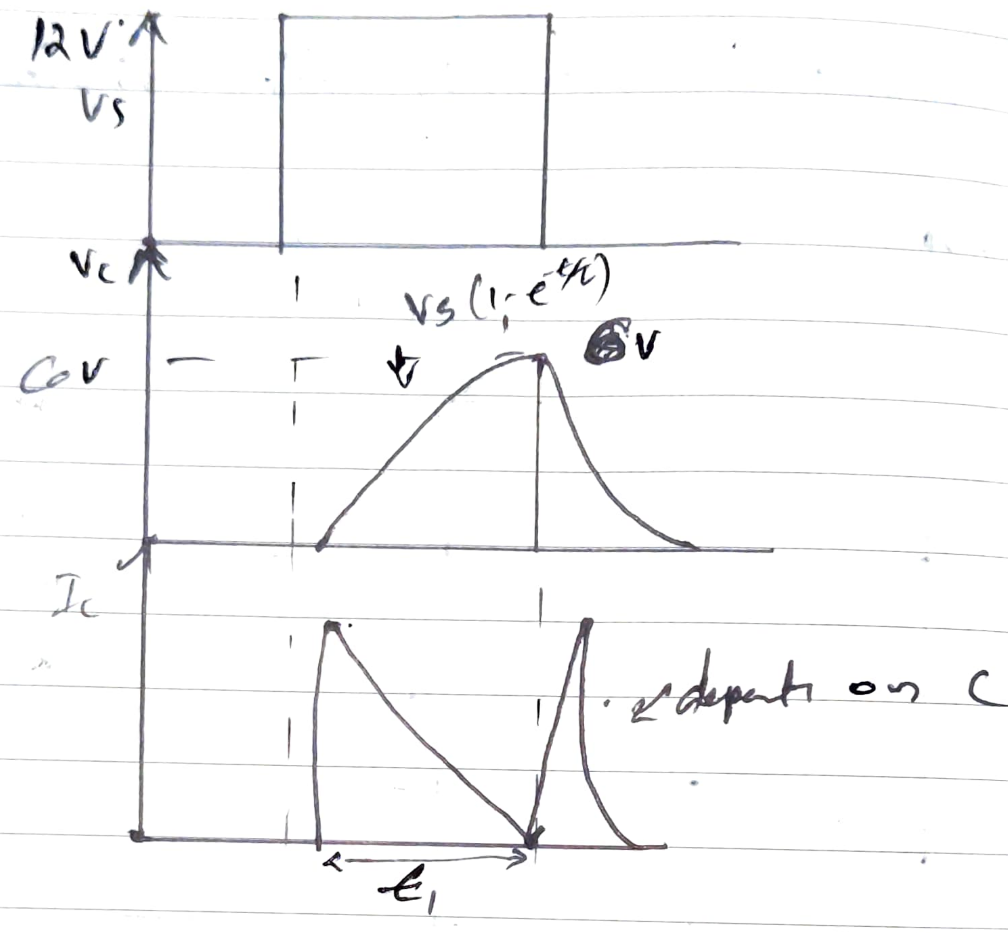
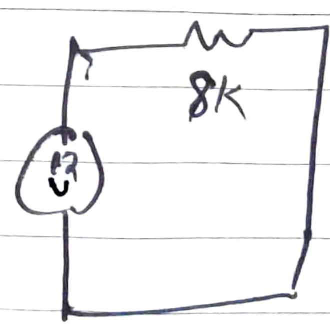


I_c = maximum at start

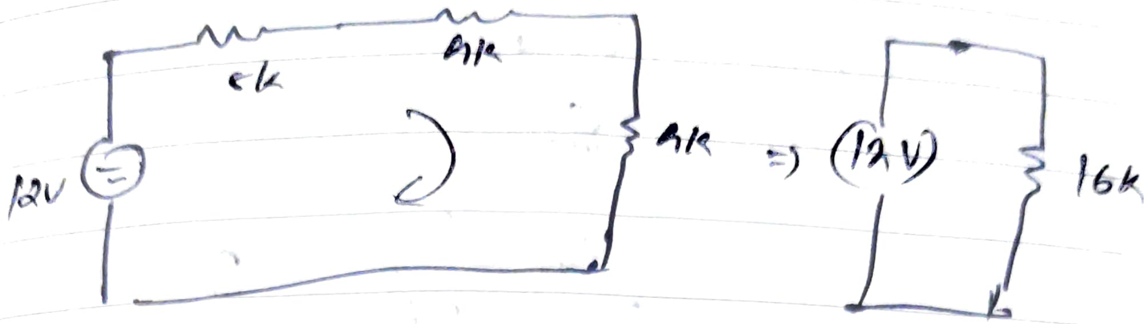
$= \frac{V_s}{8k}$

= 1.5 mA =>



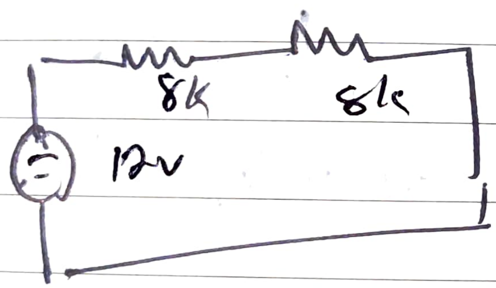
when ~~Vc~~ → when $V_c = V_{c\,max}$.

Date:



$\Rightarrow$ 750 μA.

& Voltage drop : $\Rightarrow$ V_c max =

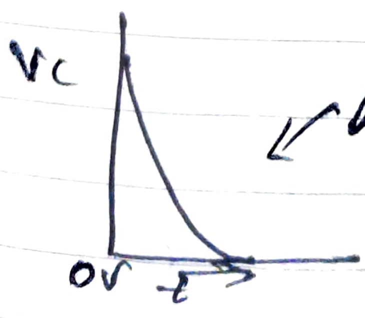


$\Rightarrow$ $\underline{\underline{6V}}$

V_c = 6V

when switch is closed.

V_c = 6V $\rightarrow$ 0V . .

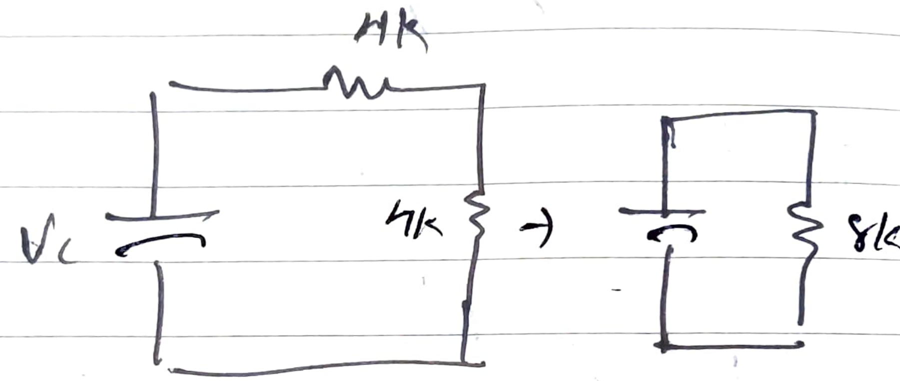


Discharging.

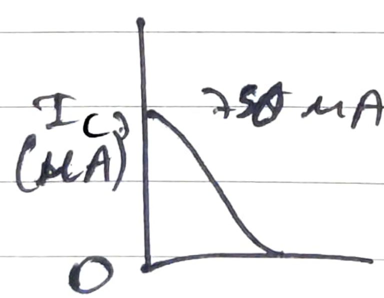
Date:

and $I_c = \dfrac{V_c}{8k}$

$= \dfrac{6V}{8k} = 7.5 \times 10^{-4}$.



which will keep reducing due to capacitor discharge.



∴

- Instance of closing S1

  $V_x = 0\,V$

- Steady state after closing the switch

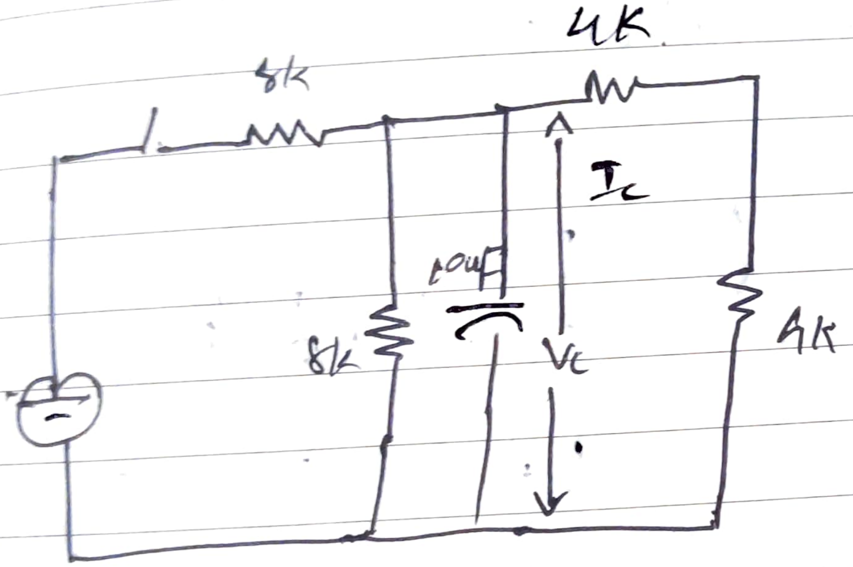
  $V_c = 6V\big|_{t \to t_s}$

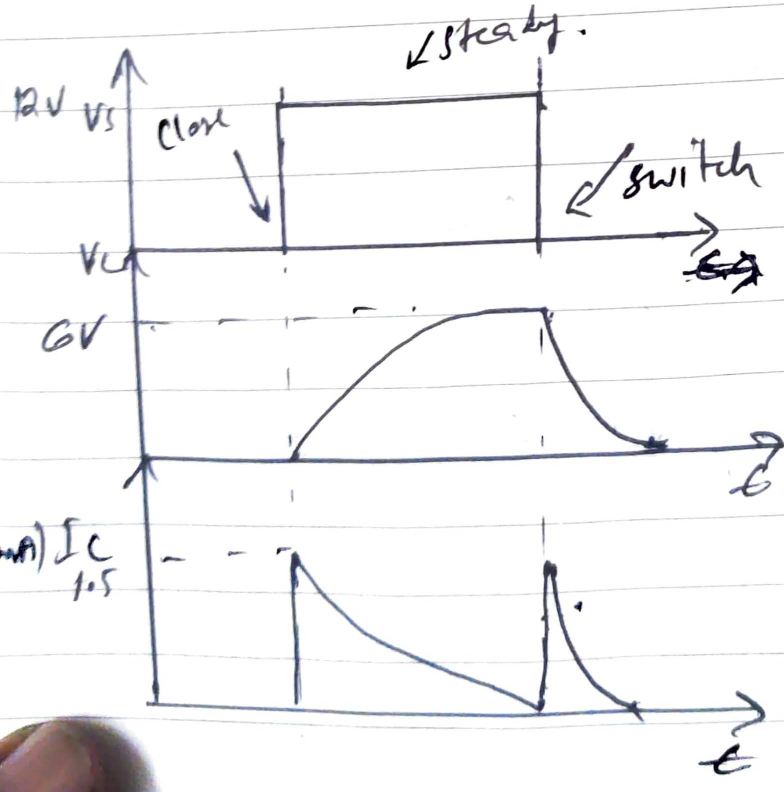
Date:

• Instant of opening the switch

$V_c = 6V$

Excersise 1.2: If a resistor is added ‖ to capacitor





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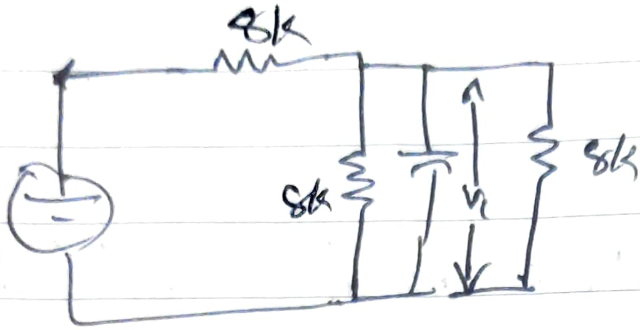
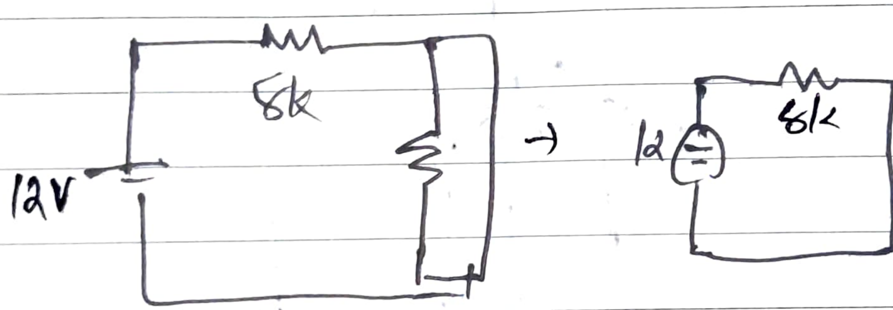


- when the switch is closed.

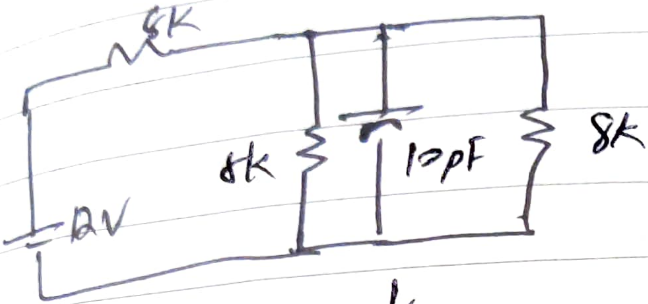


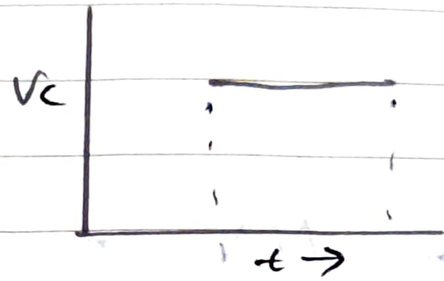
$V_c = 0\,V$

$I_c = \frac{12}{8k} = 1.5\,mA$

- when steadystate has reached

Date:





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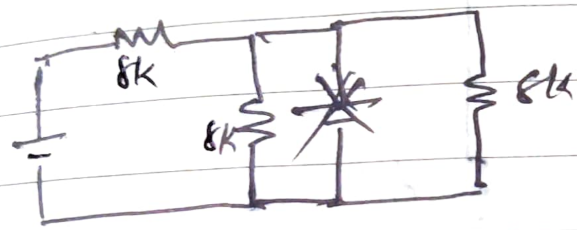

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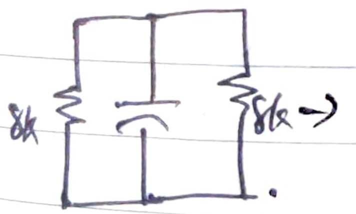
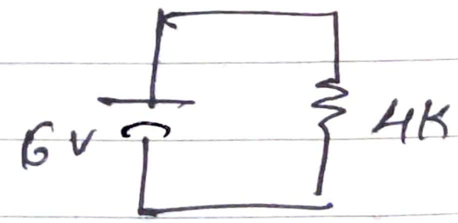
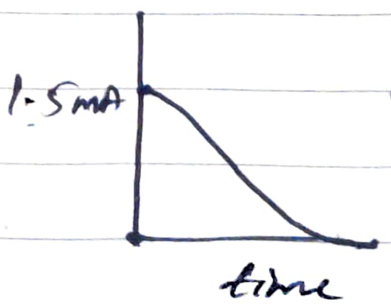
$V_c = 6 \cdot V$

• When switch is opened





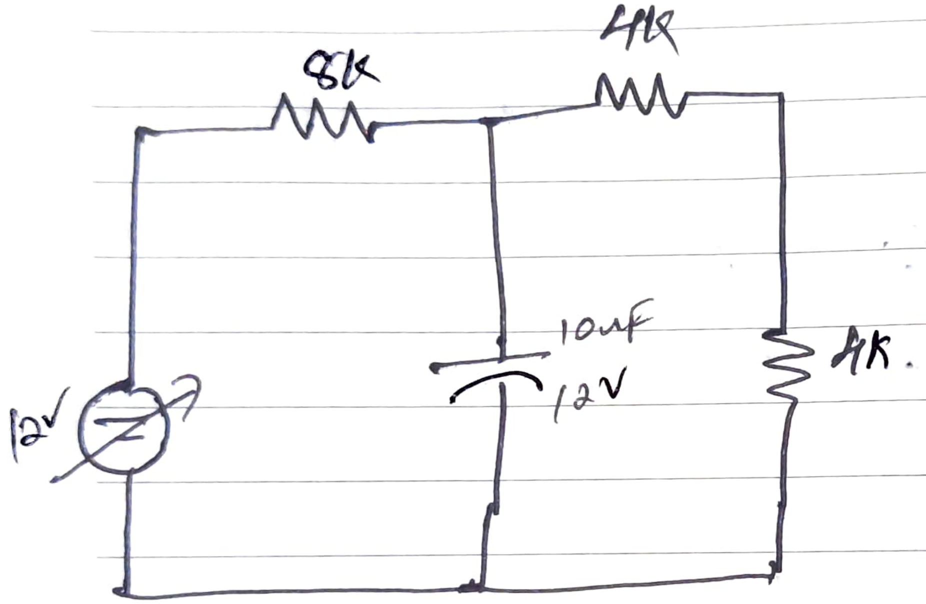
$I_c = 1.5\ mA$

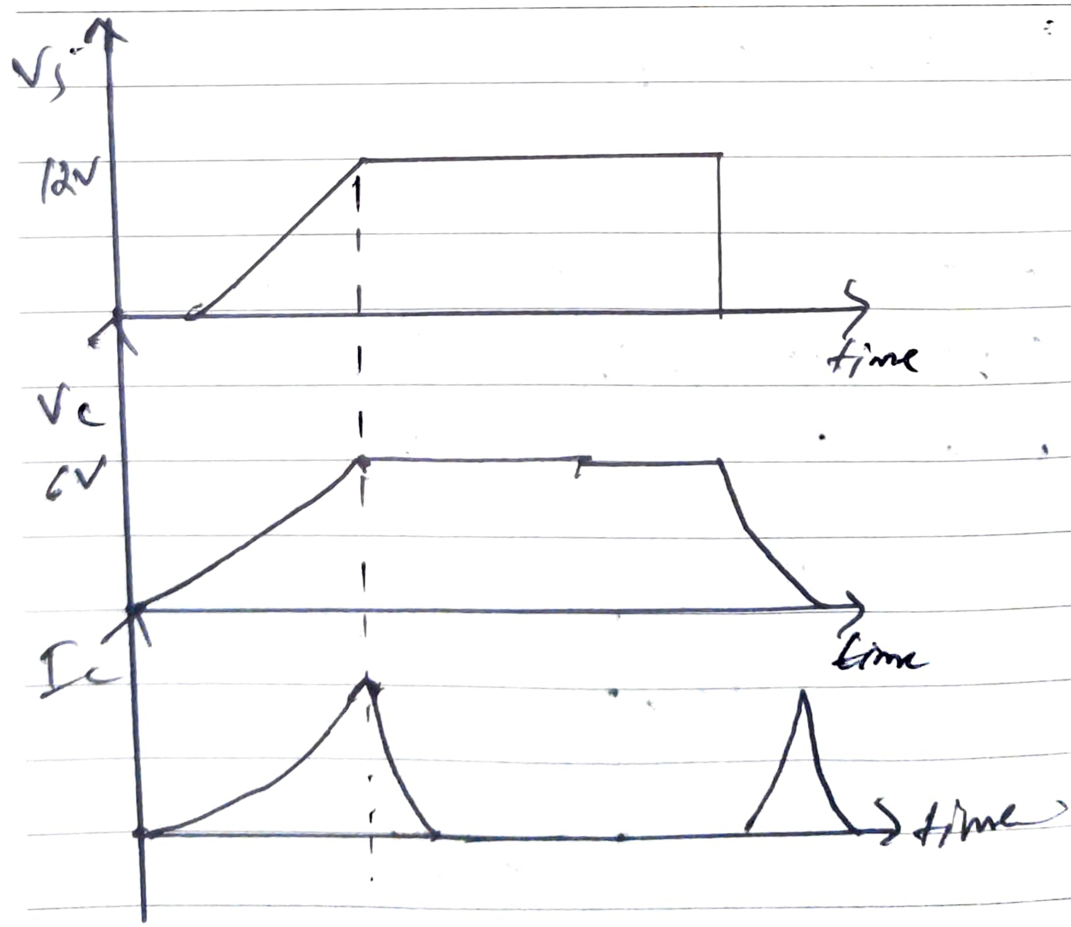


Date:

~~Excom~~

Exercise 1.3

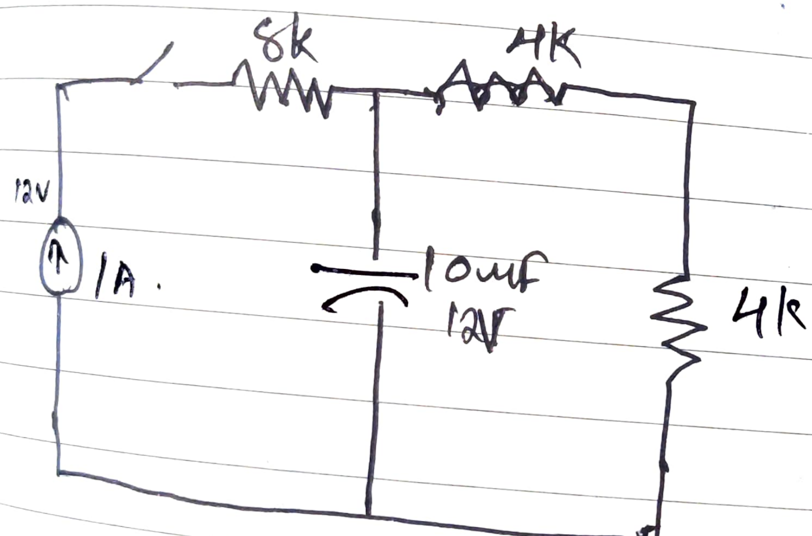




Date:

- When turned on $V_c = 0$
- steady state $V_c = 6V$
- when turned off $V_c = 6V$

Exercise 1.4



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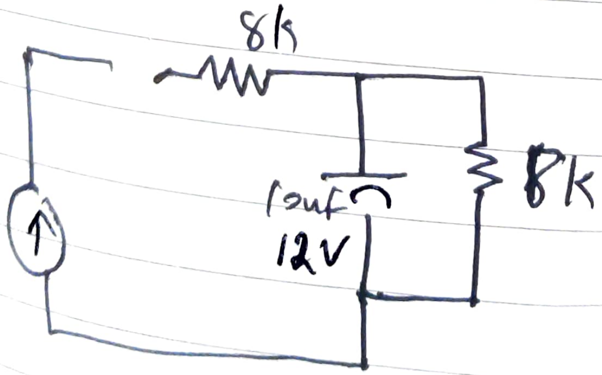

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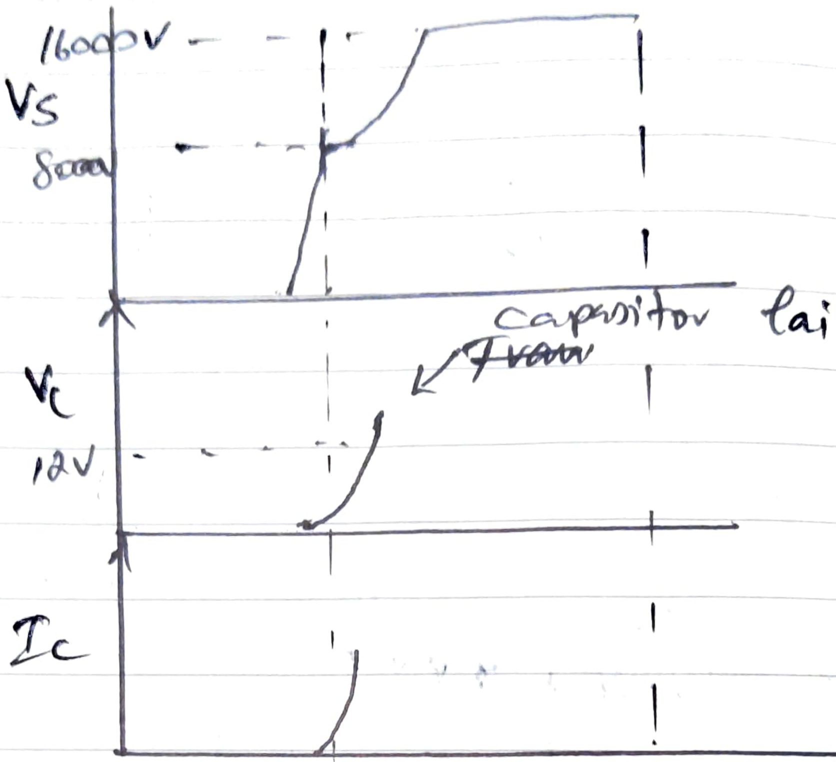
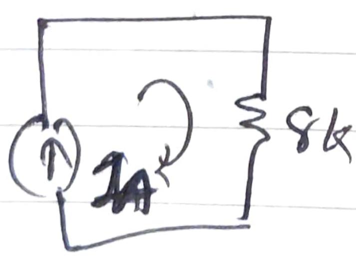


•A switch close. (S_1 = close)

$I_s = 1A$



⇒ 8000V

$V_s = 8000V$

• Steady state

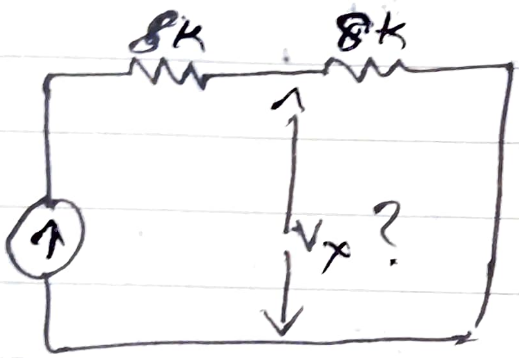
$V_c = V_{c\,max}$ (12V)

Date:

~~the maximum~~ ~~value~~ possible maximum value of $V_c = 12V$. But

there will be 8000V across the V_c which will break the capacitor. either short circuit or open

$\Downarrow$



$\Rightarrow$ 8000V

$V_S = 16000V$

~~$V_x = 18000V$~~

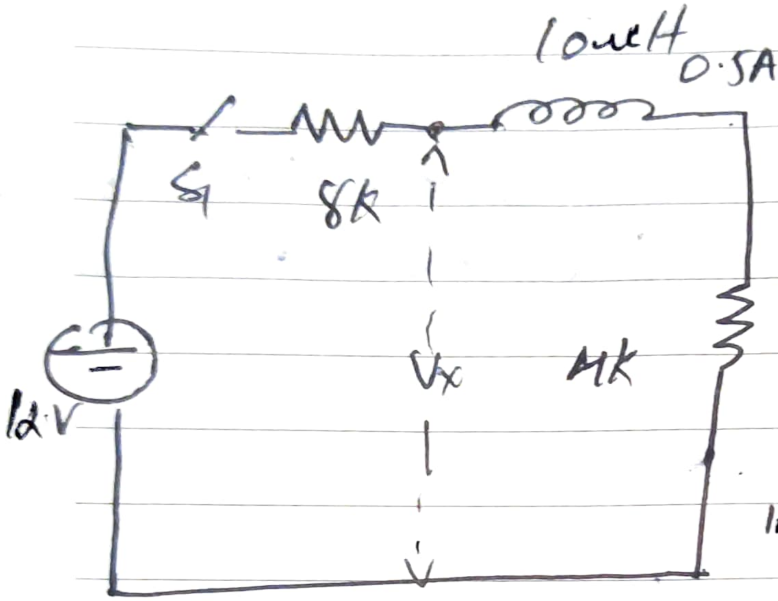
$V_x = 8000V$?

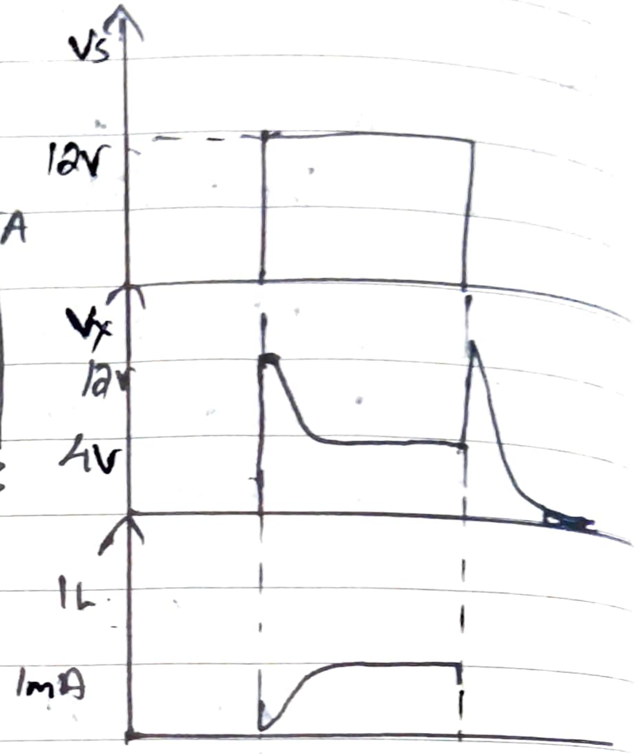
$V_c \Rightarrow$? failed.

$I_c = 0A$ //

Date:

Exercise 2-1





Find Vx @

• Instant of Closing the switch S1

The inductor will resist the sudden change in current so ~~[illegible]~~ at the instant it will act as open circuit then short circuit

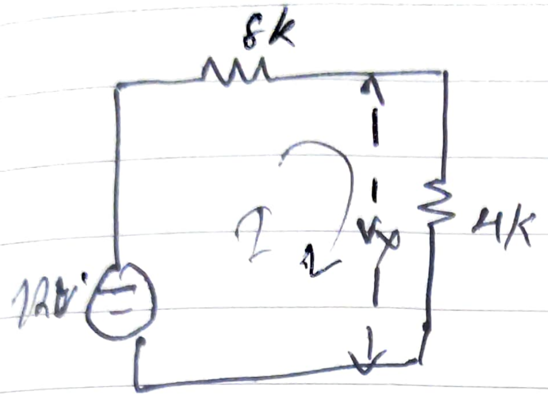
i,e,

$$V_x = V_s$$

$I_H = 0$ ← Current through the inductor.

• Steady state

Date:



$I = \frac{12V}{12k} = 1mA$

$V_x = V_s - 8k \times 1mA$

or

$4k \times 1mA$

$= 4V$

• When switch closes the inductor will try to oppose those sudden change in current & produces an emf

But there is no path to discharge the current. therefore Voltage will get multiplied by a constant (DC booster Concept)

$W = \frac{1}{2} LI^2 \Rightarrow \frac{1}{2} \times 10mH \times 0.001^2$

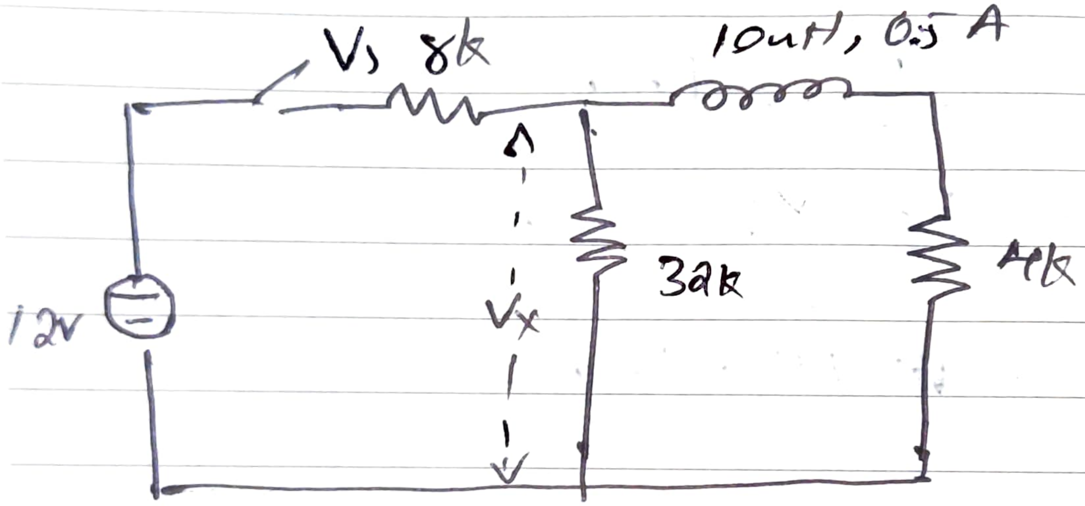
$= \frac{1}{2} \times 10 \times 10^{-6} \times 10^{6}$

Date:

$= \frac{1}{2} \times 10^{-12}$

=

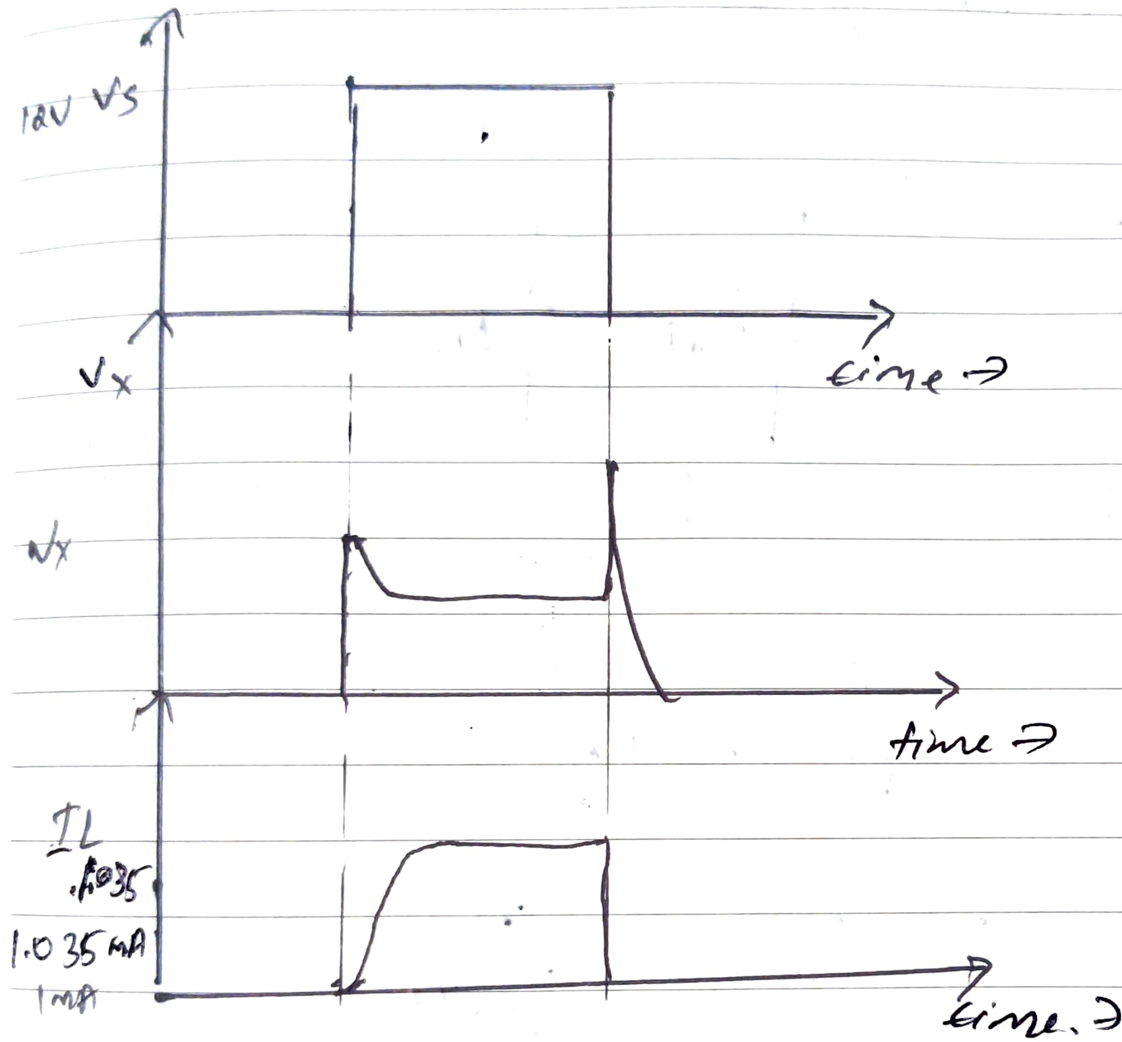
Exercise. 2.2



find V_x @

- Instant of closing the switch S_1
- Steady state after closing the switch S_1
- Instant of opening the switch S_1

Date:



• Instant of closing S_1

$$V_x = V_s \times \frac{32k}{32k+8k}$$

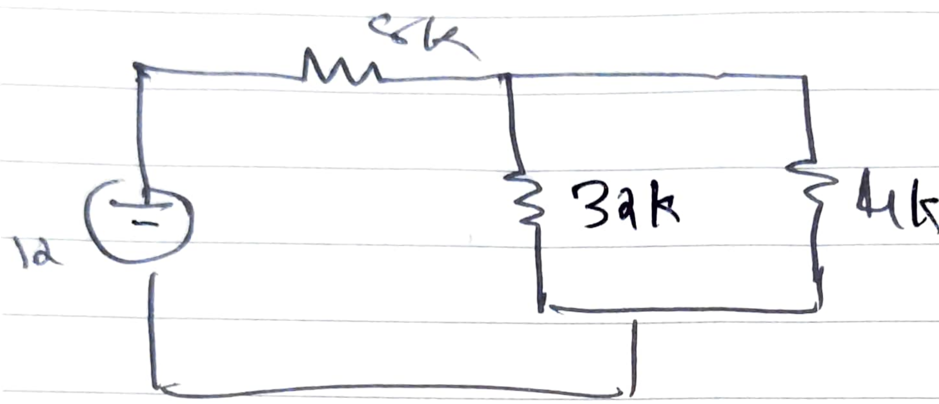
$$= \frac{12 \times 32}{40} = 9.6V$$

$$I_s = \frac{V_s}{(32+8)k} \rightarrow \frac{12}{40} = .3\,mA$$

$\therefore V_x = 9.6\,V$

Date:

• At steady state



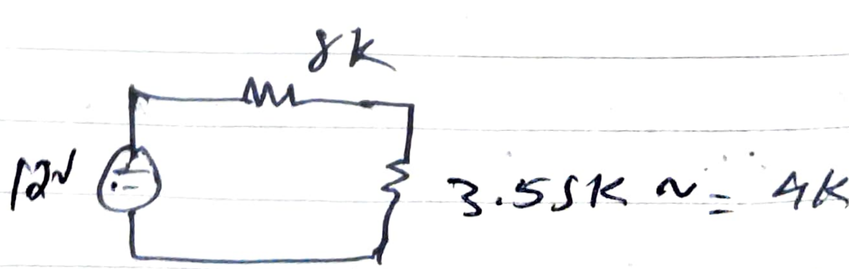
$$I_s = \frac{12}{8k\ (32k \| 4k)}$$

$$32 \| 4k \Rightarrow \frac{36}{32 \times 4}$$

$$\simeq 3555.55\ \Omega$$

$$= 3.55\ K\Omega$$

$\Downarrow$



$\therefore I = 1\ mA$

Date:

$V_x = 3.55 \times 1mA$

or $\sim 4000 \times 1mA$

$\simeq \underline{\underline{4V}}$

or $3.692\,V$ //

· when switch lased.

$I = 0$

$V = \uparrow \quad E/t$