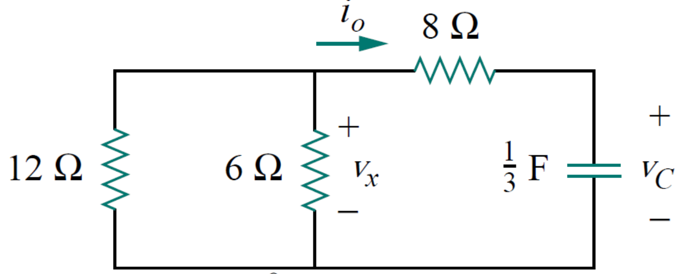
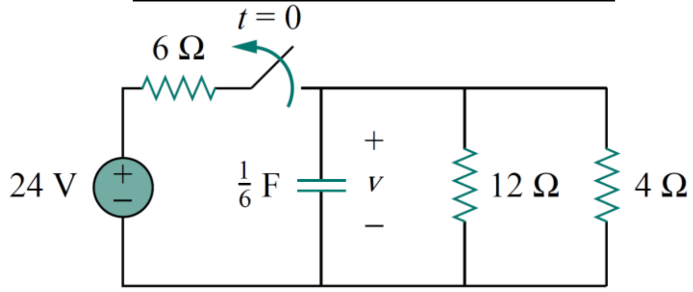
باسمه تعالی

تمرین های سری ششم درس مدارهای الکتریکی ۱،   نام استاد: حسن خانی

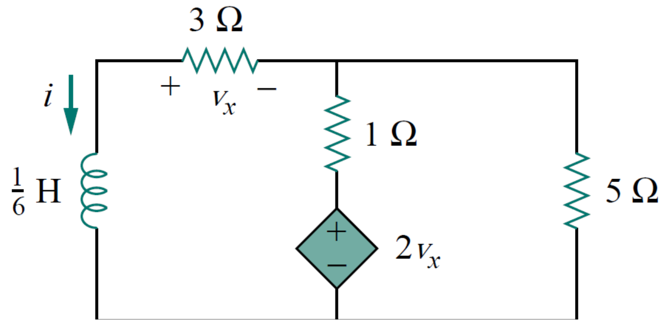
1- Refer to the opposite circuit. Let $v_c(0)$=30 V. Determine v_c, v_x, and i_o for $t \geq 0$.
Answer: $30e^{-0.25t}$ V, $10e^{-0.25t}$ V, $-2.5e^{-0.25t}$ A.



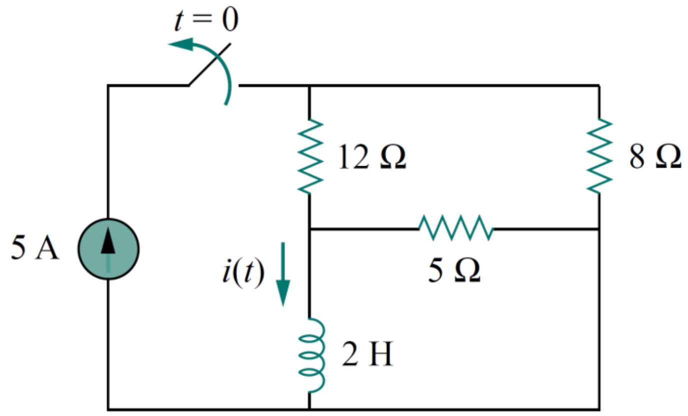
2- If the switch in the opposite circuit opens at $t = 0$, find $v(t)$ for $t \geq 0$ and $w_c(0)$.
Answer: $8e^{-2t}$ V, 5.33 J.



3- Find i and v_x in the opposite circuit. Let i(0)=5 A. **Answer**: $5e^{-53t}$ A, $-15e^{53t}$ V.



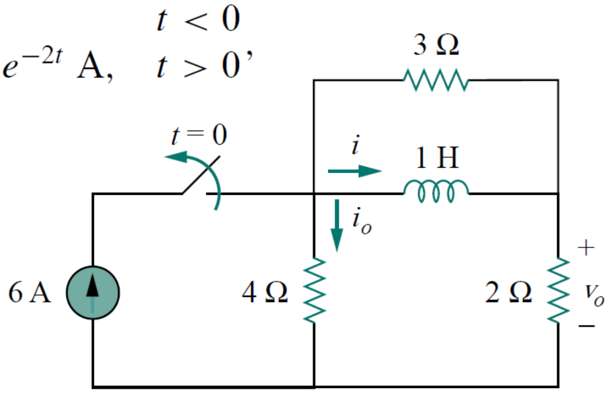
4- For the opposite circuit, find $i(t)$ for $t > 0$.
Answer: $2e^{-2t}$ A, $t > 0$



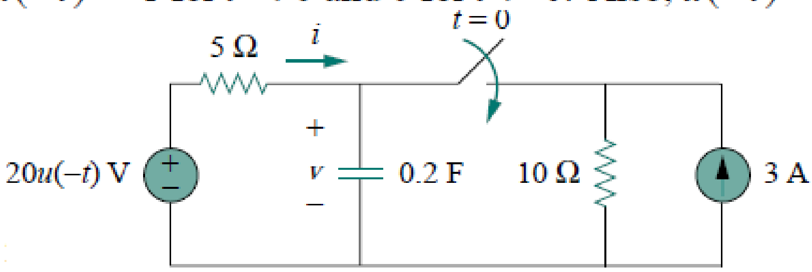
5- Determine i, i_o, and v_o for all t in the circuit shown in Fig. 7.22. Assume that the switch was closed for a long time.

Answer: $i = \begin{cases} 4\text{ A}, & t < 0 \\ 4e^{-2t}\text{ A}, & t \geq 0 \end{cases}, \quad i_o = \begin{cases} 2\text{ A}, & t < 0 \\ -(4/3)e^{-2t}\text{ A}, & t > 0 \end{cases},$

$$v_o = \begin{cases} 4\text{ V}, & t < 0 \\ -(8/3)e^{-2t}\text{ V}, & t > 0 \end{cases}$$



6- The switch in Fig. 7.47 is closed at $t = 0$. Find $i(t)$ and $v(t)$ for all time. Note that $u(-t) = 1$ for $t < 0$ and 0 for $t > 0$. Also, $u(-t) = 1 - u(t)$.

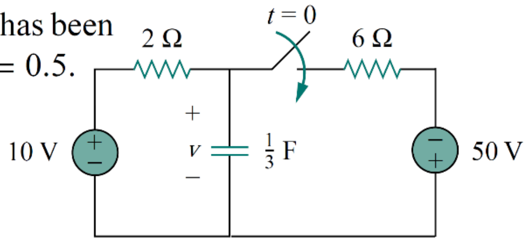


Answer: $i(t) = \begin{cases} 0, & t < 0 \\ -2(1 + e^{-1.5t}) \text{ A}, & t > 0 \end{cases}$,

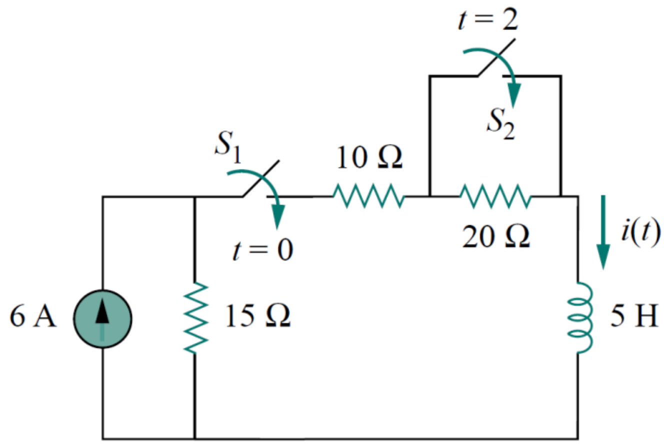
$$v = \begin{cases} 20 \text{ V}, & t < 0 \\ 10(1 + e^{-1.5t}) \text{ V}, & t > 0 \end{cases}$$

7- Find $v(t)$ for $t > 0$ in the circuit in Fig. 7.44. Assume the switch has been open for a long time and is closed at $t = 0$. Calculate $v(t)$ at $t = 0.5$.

Answer: $-5 + 15e^{-2t}$ V, 0.5182 V.



8- Switch S1 in the following circuit is closed at t = 0, and switch S2 is closed at t = 2 s. Calculate i(t) for all t. Find i(1) and i(3).



Answer:

$$i(t) = \begin{cases} 0, & t < 0 \\ 2(1 - e^{-9t}), & 0 < t < 2 \\ 3.6 - 1.6e^{-5(t-2)}, & t > 2 \end{cases}$$

$i(1) = 1.9997$ A, $i(3) = 3.589$ A.

9- The switch in Fig. 7.52 has been closed for a long time. It opens at $t = 0$. Find $i(t)$ for $t > 0$.

Answer: $(2 + e^{-10t})$ A, $t > 0$.