21 Nov 2022

EE101 Tutorial 12

Topics: **RC, RL and RLC Circuits**

Q1. Assuming that the switch in Fig. 1 has been in position A for a long time and is moved to position B at t=0 find $v_o(t)$ for $t \geq 0$.

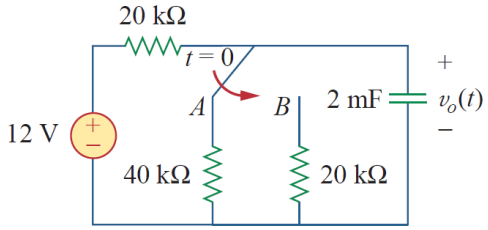

Fig. 1

Q2. For the circuit in Fig. 2, find $v_o(t)$ for $t>0$. Determine the time necessary for the capacitor Voltage to decay to one-third of its value at t =0.

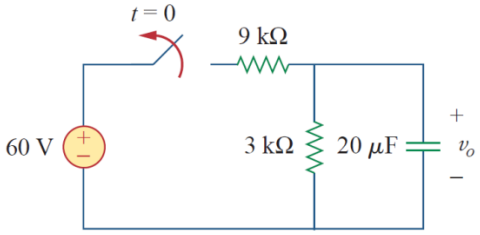

Fig. 2

Q3. For the circuit in Fig. 3, find i_o for $t > 0$.

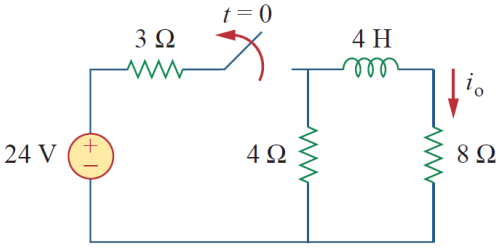

Fig. 3

Q4. In the circuit of Fig.4

$$v(t) = 20e^{(-10^3 t)}\text{V}, \; t > 0$$
$$i(t) \_ = 4\, e^{(-10^3 t)}\ \text{mA}, \; t > 0$$

(a) Find R, L, and τ.

(b) Calculate the energy dissipated in the resistance for 0 <t<0.5 ms.

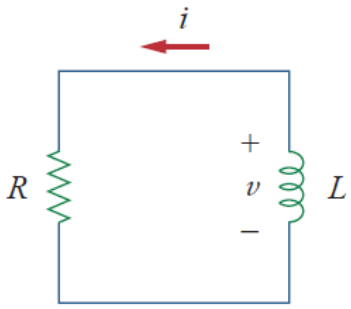

Fig. 4

Q5. Determine the time constant for each of the circuits in Fig. 5.

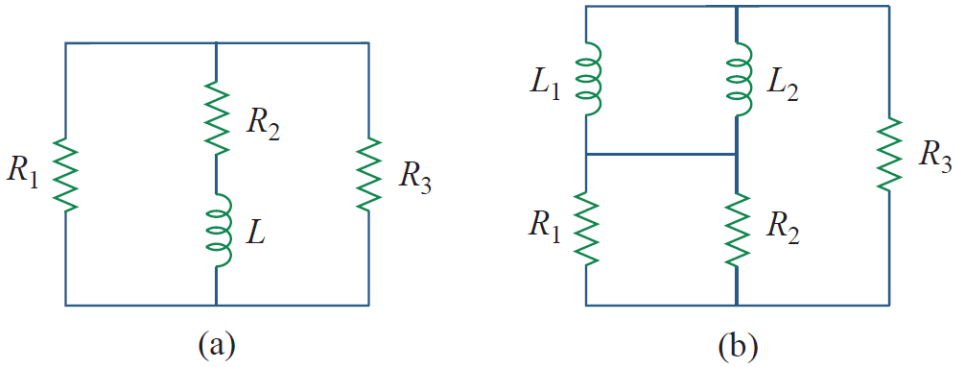

Fig. 5

Q6. In the circuit of Fig. 6, find $i(t)$ for $t > 0$ if $i(0) = 2\ A$.

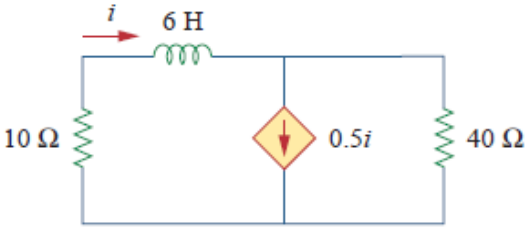

Fig. 6

Q7. Calculate the capacitor voltage for $t < 0$ and t > 0 for each of the circuits in Fig. 7.

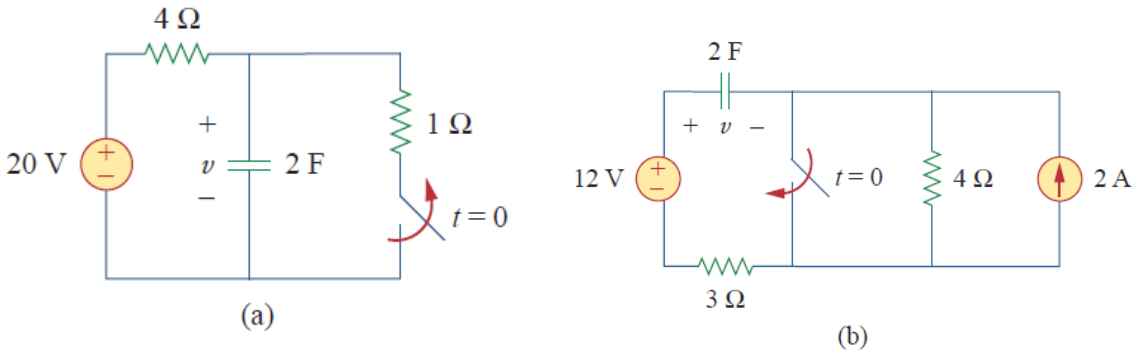

Fig. 7

Q8. Find *v (t) for t < 0* and *t > 0* in the circuit of Fig. 8.

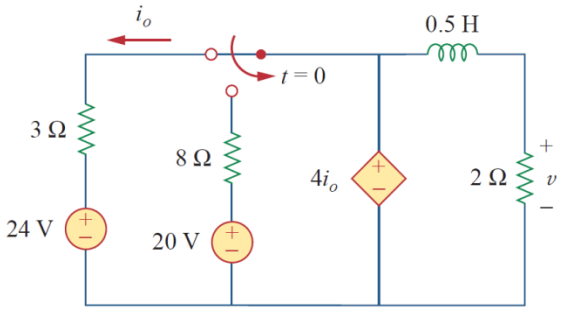

Fig. 8

Q9. For the network shown in Fig. 9, find *v(t)* for *t > 0.*

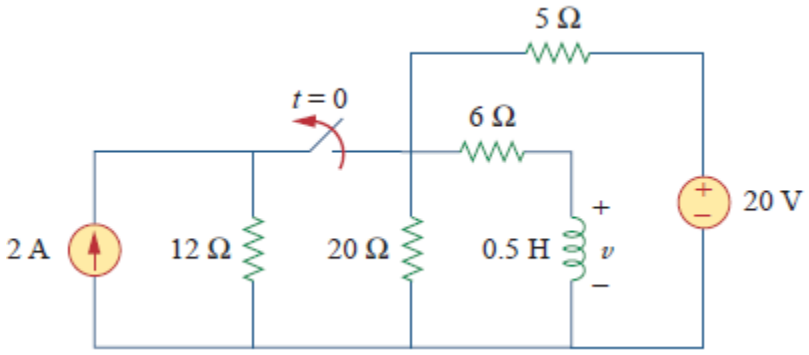

Fig. 9

Q10. For the circuit in Fig. 10, find:

(a) $i(0^+)$ and $v(0^+)$
(b) $di(0^+)/dt$ and $dv(0^+)/dt$,
(c) $i(\infty)$ and $v(\infty)$.

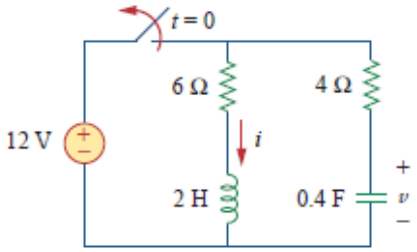

Fig. 10

Q11. The switch in Fig. 11 moves from position *A* to position *B* at t=0 (please note that the switch must connect to point *B* before it breaks the connection at *A*, a make-before-break switch). Find $v(t)$ for $t > 0$.

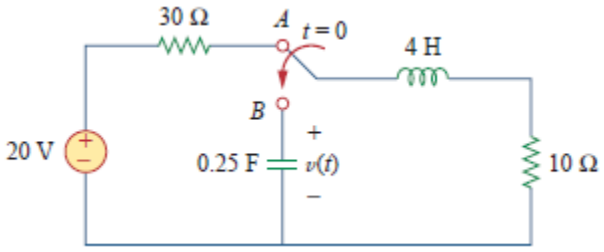

Fig. 11

Q12. The switch in Fig. 12 moves from position *A* to position *B* at (please note that the switch must connect to point *B* before it breaks the connection at *A*, a make-before-break switch). Determine $i(t)$ for $t > 0$.

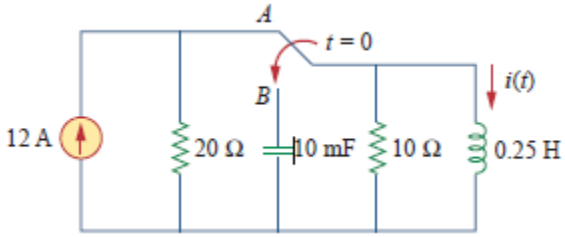

Fig. 12