

Electric Circuits

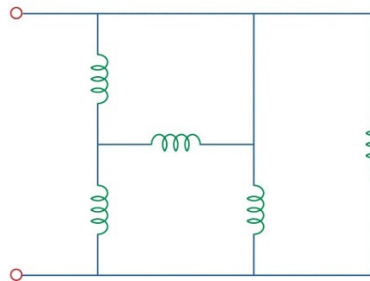
Homework Set 13

- The current through a 10 mH inductor is $10e^{-t/2}$ A, find the voltage and power at $t = 3$ s.
- An inductor has a linear change in current from 50 mA to 100 mA in 2 ms and induces a voltage of 160 mV. Calculate the inductance value of the inductor.
- The current through a 40 mH inductor is given by,

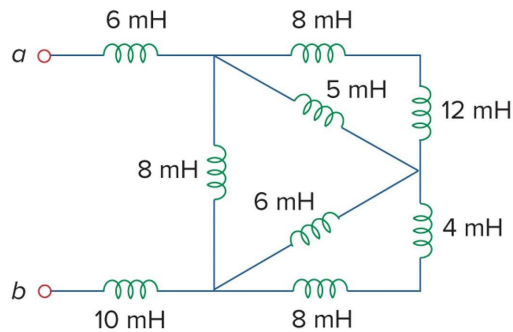
$$i(t) = \begin{cases} 0, & t < 0 \\ te^{-2t} \text{ mA}, & t \geq 0 \end{cases}$$

Find the voltage $v(t)$.

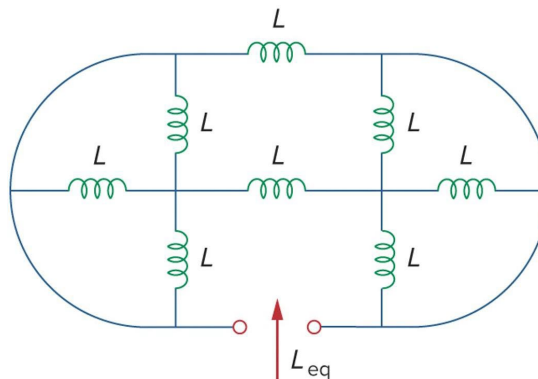
- Determine the equivalent inductance for the following circuit. Assume all inductors are 10 mH.



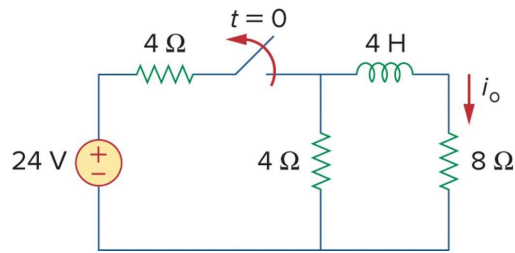
- Find the equivalent inductance between the terminals a and b in the circuit below.



- Find the equivalent inductance for the following circuit.



7. Find i_o in the circuit below.



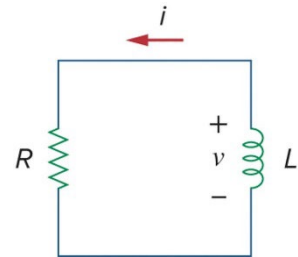
8. In the circuit at right,

$$v(t) = 80e^{-1000t} \text{ V}, \quad t \geq 0$$

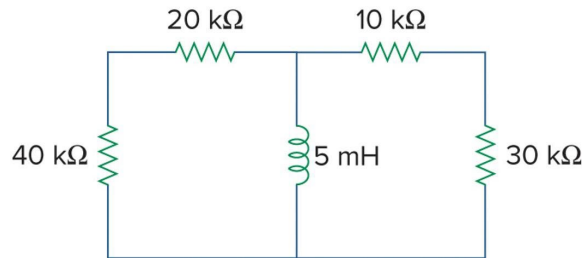
$$i(t) = 5e^{-1000t} \text{ mA}, \quad t \geq 0$$

a. Find R , L and τ

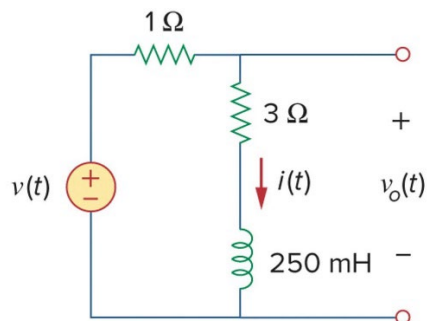
b. Calculate the energy dissipated in the resistor for $0 < t < 0.5 \text{ ms}$.



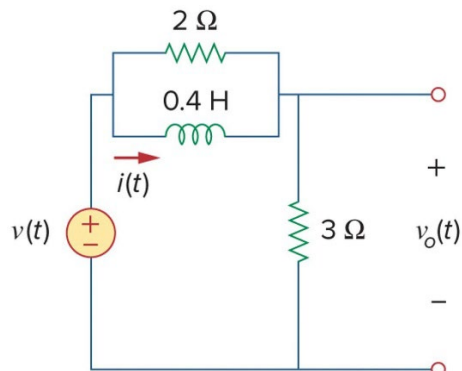
9. Calculate the time constant (τ) in the following circuit.



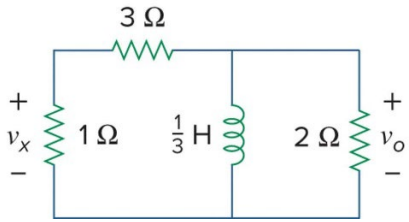
10. Consider the circuit below. Find $v_o(t)$ if $i(0) = 6 \text{ A}$ and $v(t) = 0$.



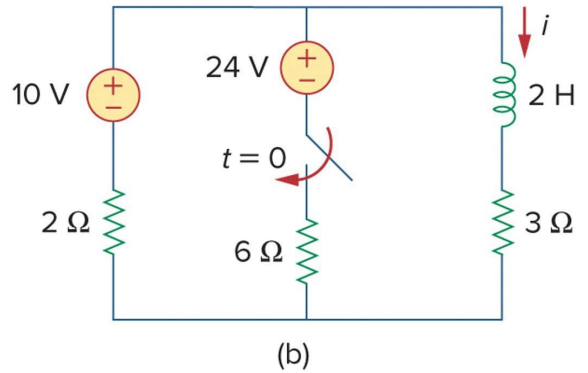
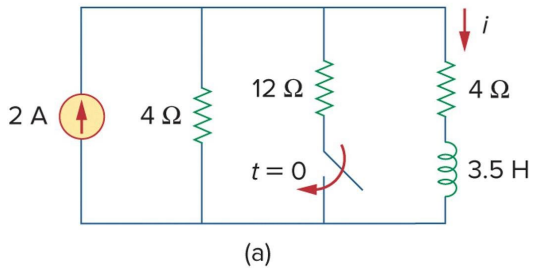
11. For the circuit below, determine $v_o(t)$ when $i(0) = 5 \text{ A}$ and $v(t) = 0$.



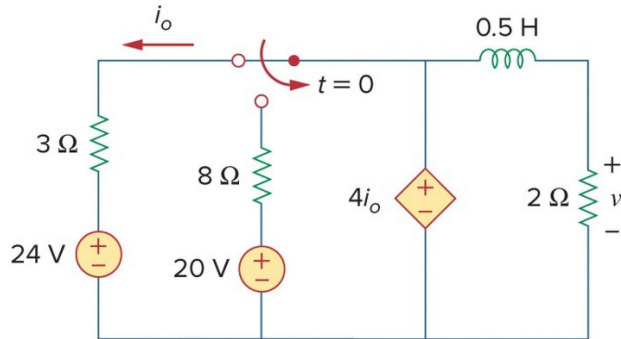
12. For the circuit below, given that $v_o(0) = 10$ V, find v_o and v_x for $t > 0$.



13. Obtain the inductor current for both $t < 0$ and $t > 0$ in each of the following circuits.



14. Find $v(t)$ for $t < 0$ and $t > 0$ in the circuit below.



15. For the network shown, find $v(t)$ for $t > 0$.

