

CET141 | Summer 2019

RC/RL circuits in time domain analysis

Agendas and Objects:

- » Introducing Inductors and capacitors in circuits
- » RL/RC circuits analysis in time domain

Student Details:

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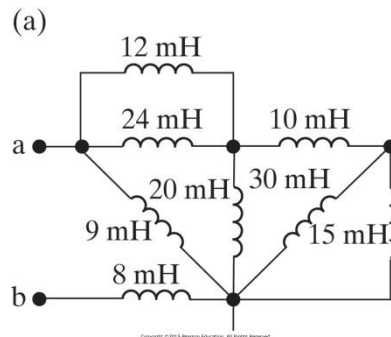
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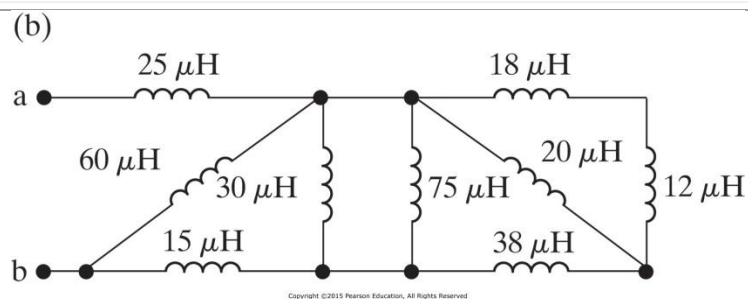
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Participation Test in this topic starts from here

1. (10pt = 5pt each) Assume that the initial energy stored in the inductors (a) and (b) is zero. Find the equivalent inductance with respect to the terminals a, b.

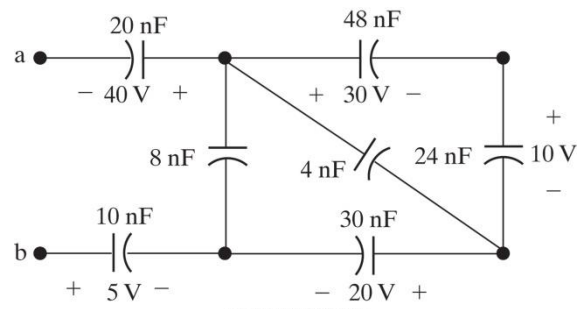


Answer:



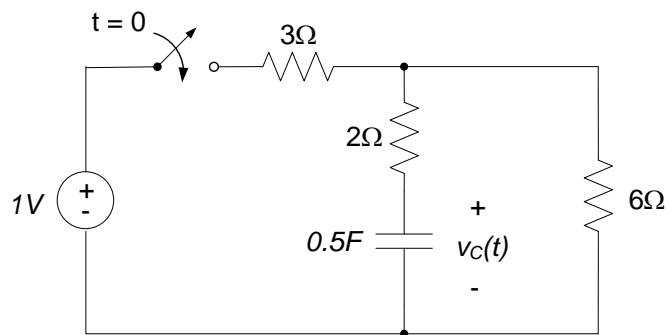
Answer:

2. (5 pt) Find the equivalent capacitance with respect to the terminals a, b.



Answer:

3. (20 pt) For the circuit below, determine



- a) (10 pt) $v_C(t)$, $t > 0$

Answer:

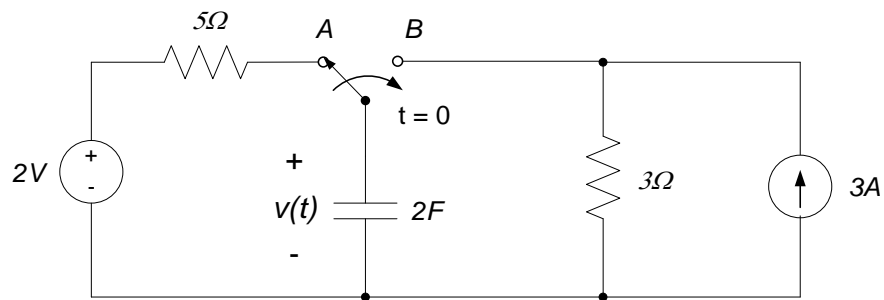
b) (5 pt) $v_C(t)$, $t > 0$ if the capacitance is $1F$

Answer:

c) (5 pt) $v_C(t)$, $t > 0$ if the capacitance is $0.25F$

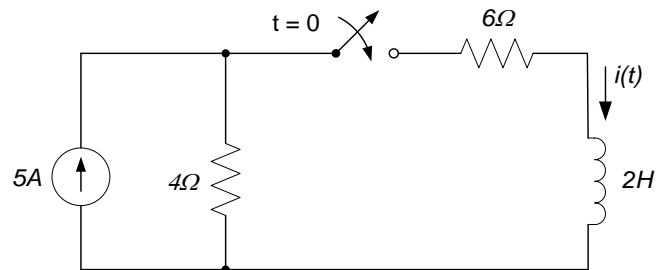
Answer:

4. (15 pt) For the circuit shown, the switch moves from position A to position B at time $t = 0$. Find $v(t)$, $t > 0$.



Answer:

5. (15pt = 5pt each) For the circuit shown, the switch closes at time $t = 0$.



- a) Write the differential equation governing $i(t)$, $t > 0$.

Answer:

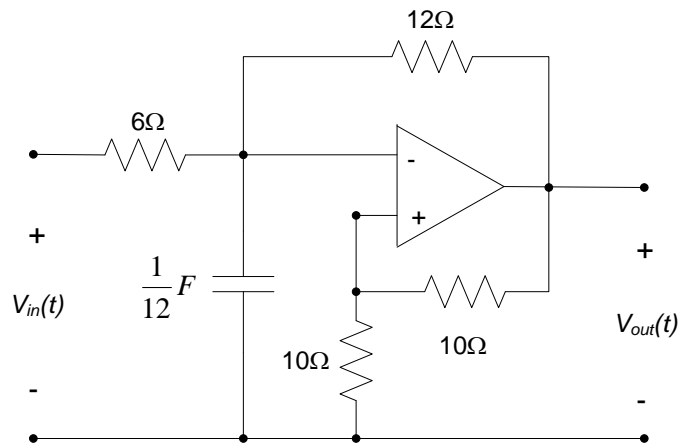
- b) Determine initial ($t = 0$) and final ($t \rightarrow \infty$) conditions on the current $i(t)$. You may assume that no energy is stored in the inductor before $t = 0$.

Answer:

- c) Find $i(t)$, $t > 0$.

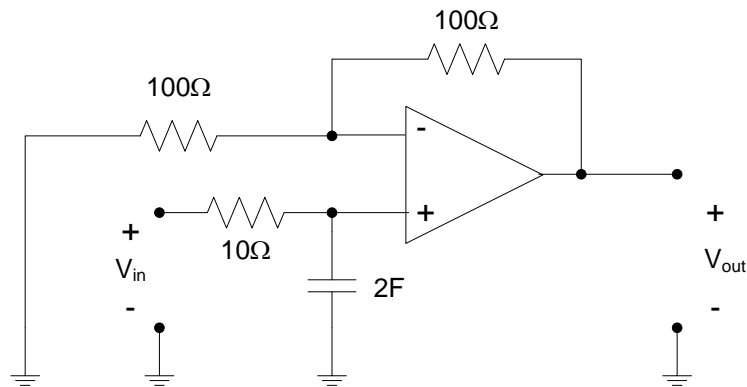
Answer:

6. (10 pt) For the circuit below, determine the differential equation relating $V_{out}(t)$ and $V_{in}(t)$.



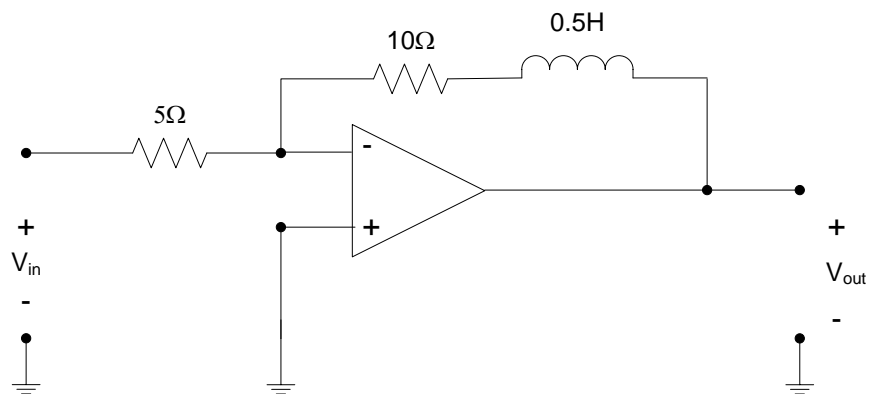
Answer:

7. (10 pt) Determine the differential equations relating V_{out} and V_{in} for the circuit below.



Answer:

8. (15 pt) Determine the differential equations relating V_{out} and V_{in} for the circuit below.



Answer:

Total Score

/100