Unit Exam II: Problem #1 (Spring '16)

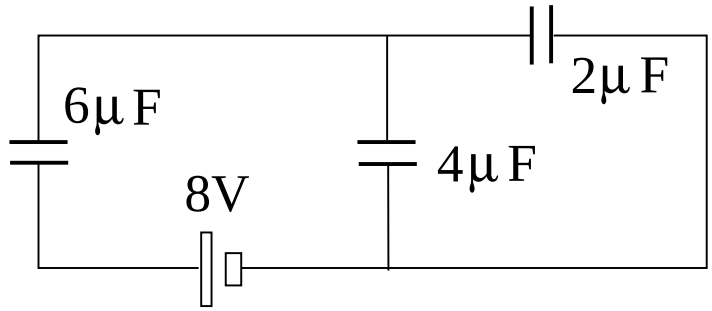
The circuit of capacitors connected to a battery is at equilibrium.

(a) Find the equivalent capacitance C_{eq}.

(b) Find the total energy U stored in the three capacitors.

(c) Find the charge Q_6 on the capacitor on the left.

(d) Find the the voltages V_2 and V_4 across the two capacitor on the right.



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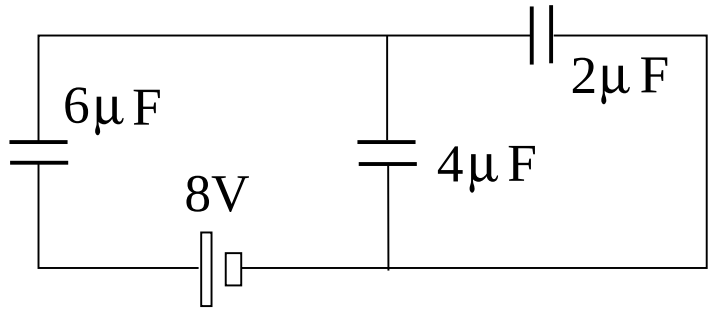

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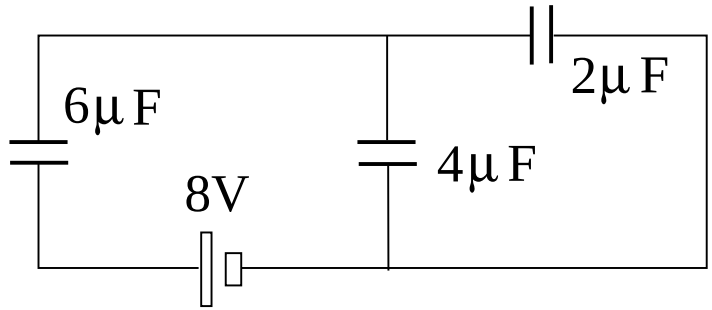

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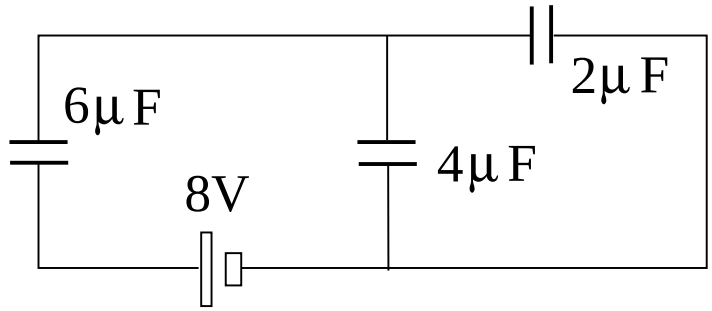

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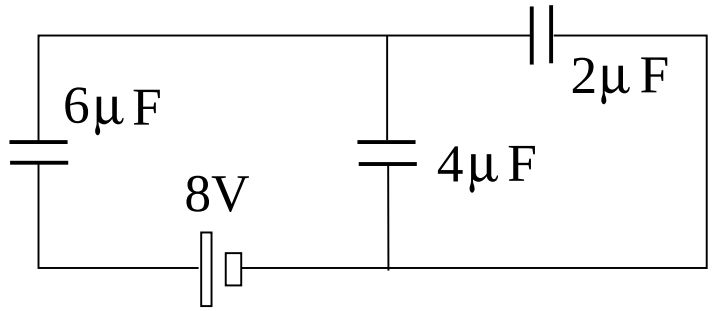
(d) $V_2 = V_4 = \dfrac{1}{2}(8\text{V}) = 4\text{V}.$

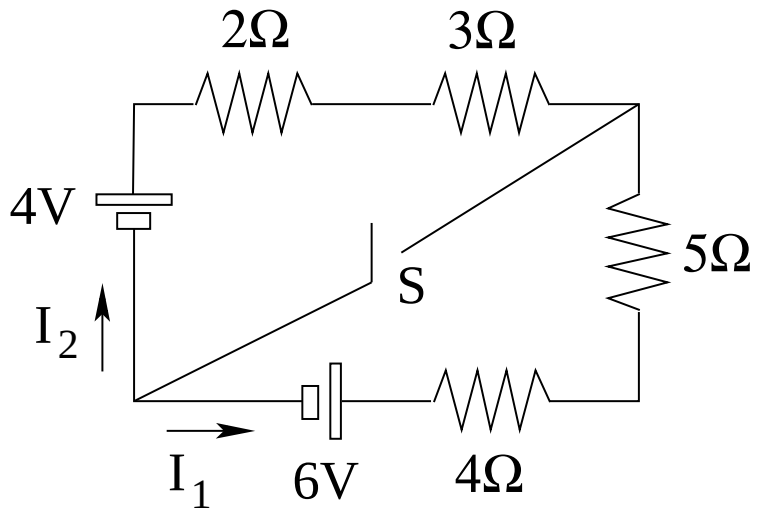


Unit Exam II: Problem #2 (Spring '16)

Consider the electrical circuit shown.

(a) Find the current I_1 when the switch S is open.

(b) Find the currents I_1 and I_2 when the switch S is closed.



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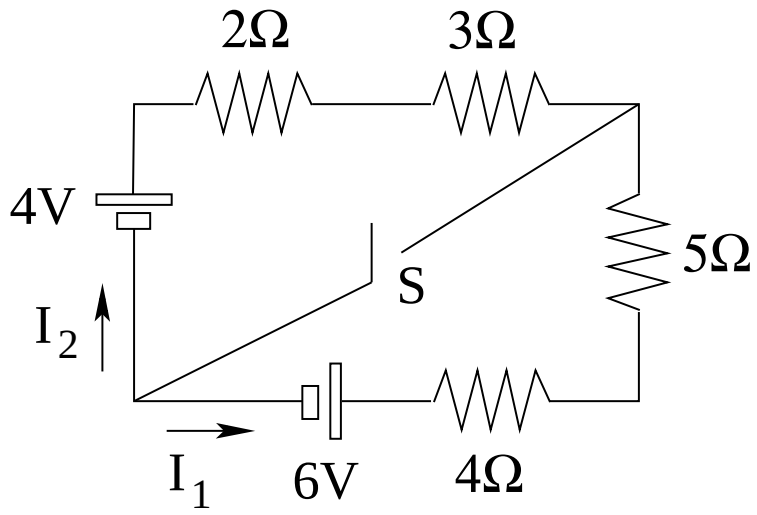

Solution:

(a) $I_1 = \dfrac{6\text{V} - 4\text{V}}{4\Omega + 5\Omega + 3\Omega + 2\Omega} = 0.143\text{A}.$

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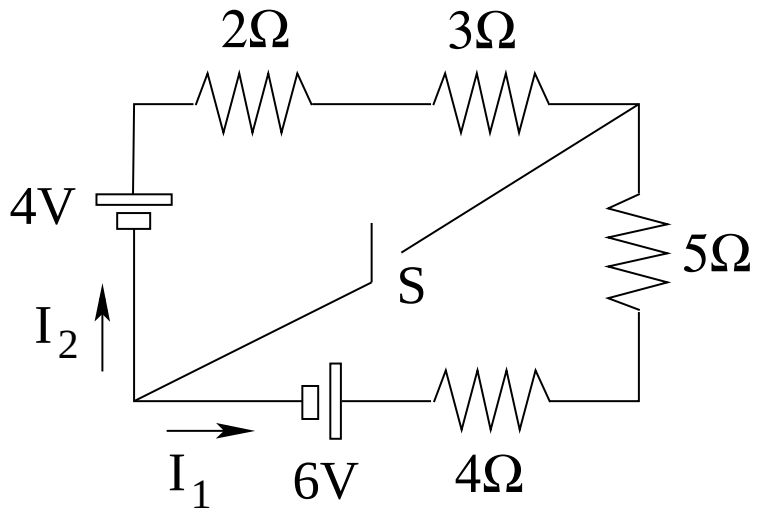


Solution:

(a) $I_1 = \dfrac{6\text{V} - 4\text{V}}{4\Omega + 5\Omega + 3\Omega + 2\Omega} = 0.143\text{A}.$

(b) $I_1 = \dfrac{6\text{V}}{4\Omega + 5\Omega} = 0.667\text{A}, \quad I_2 = \dfrac{4\text{V}}{3\Omega + 2\Omega} = 0.8\text{A}.$

Unit Exam II: Problem #3 (Spring '15)

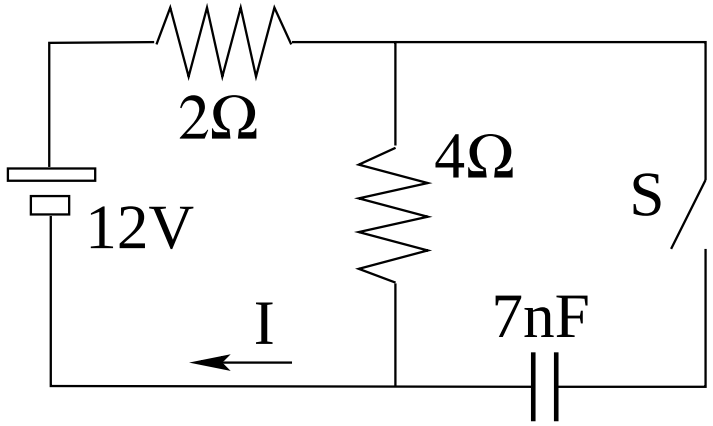
This RC circuit has been running for a long time with the switch open.

(a) Find the current I while the switch is still open.

(b) Find the current I right after the switch has been closed.

(c) Find the current I a long time later.

(d) Find the charge Q on the capacitor also a long time later.



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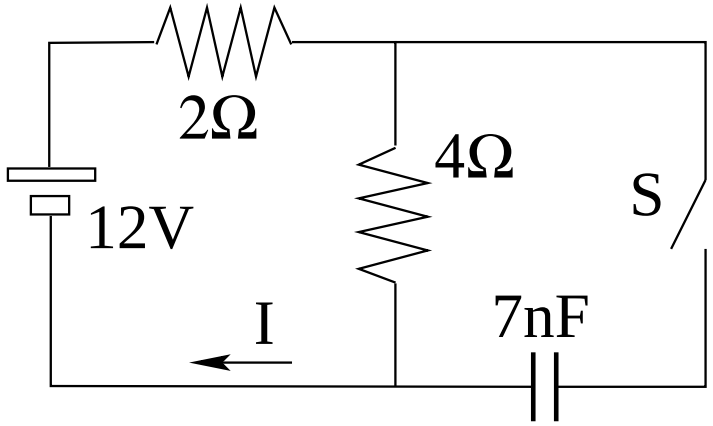

Solution:

(a) $I = \dfrac{12\text{V}}{2\Omega + 4\Omega} = 2\text{A}.$

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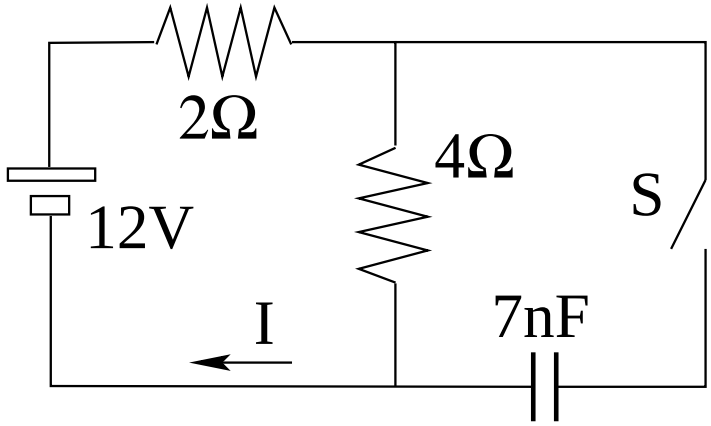

Solution:

(a) $I = \dfrac{12\text{V}}{2\Omega + 4\Omega} = 2\text{A}.$

(b) $I = \dfrac{12\text{V}}{2\Omega} = 6\text{A}.$

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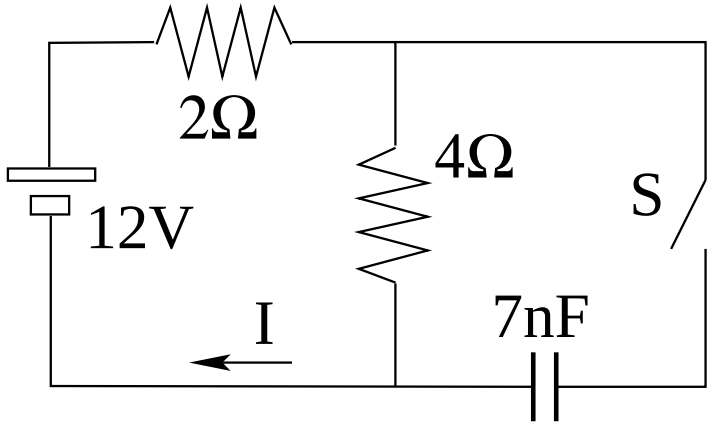

Solution:

(a) $I = \dfrac{12\text{V}}{2\Omega + 4\Omega} = 2\text{A}.$

(b) $I = \dfrac{12\text{V}}{2\Omega} = 6\text{A}.$

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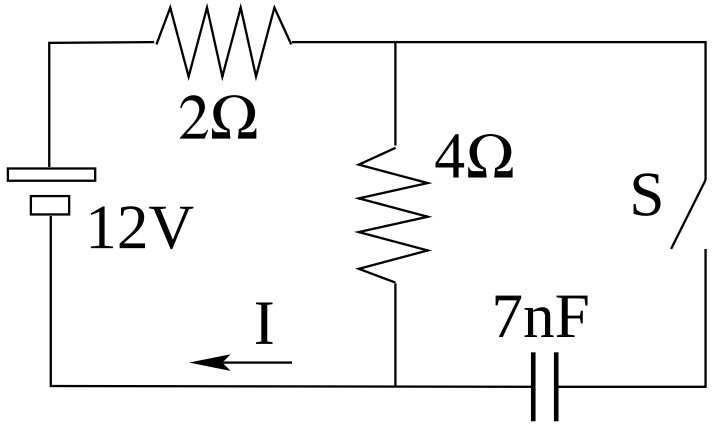

Solution:

(a) $I = \dfrac{12\text{V}}{2\Omega + 4\Omega} = 2\text{A}.$

(b) $I = \dfrac{12\text{V}}{2\Omega} = 6\text{A}.$

(c) $I = \dfrac{12\text{V}}{2\Omega + 4\Omega} = 2\text{A}.$

(d) $Q = (8\text{V})(7\text{nF}) = 56\text{nC}.$