Phys 102 – Sec # 40 **Quiz # 9 (Ch. 27)**

Name: Key **ID #**

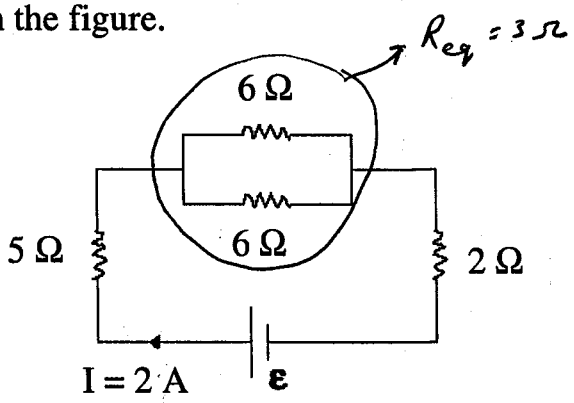
1- Calculate the emf ($\mathcal{E}$) of the battery shown in the figure.

3

$R_{eq} = 5 + 3 + 2 = 10\ \Omega$

$I = \frac{\mathcal{E}}{R_{eq}} = 2\ A$

$\Rightarrow \mathcal{E} = I R_{eq} = (2)(10) = 20\ V$



2- Four 10- Ohm resistors are connected in **Parallel** and the combination is connected to a 12-V battery.

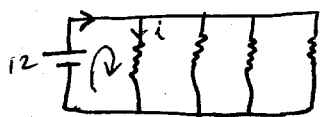
4

a) What is the current passing in any of the resistors?

total current $I = \frac{\mathcal{E}}{R_{eq}} = \frac{12}{2.5} = 4.8\ A$

each resistor will have $i = \frac{I}{4} = \boxed{1.2\ A}$

or use loop rule $12 - iR = 0 \Rightarrow i = \frac{12}{10} = 1.2\ A$



$\frac{1}{R_{eq}} = \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} = \frac{4}{10}$

$R_{eq} = \frac{10}{4} = \boxed{2.5\ \Omega}$

b) What is the potential difference across any of the resistors?

$V = iR = (1.2)(10) = 12\ V$

the same as that of the battery

(because they are connected in parallel)

3- A 5-μF capacitor is fully charged by connecting it to a 12-V battery. After disconnecting the battery, it was allowed for capacitor to discharge through a simple RC circuit, with a time constant of 4.0 s. What is the charge on the capacitor after one time constant has elapsed?

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$q = q_0 e^{-t/RC}$ $\qquad t = \tau = RC$

$q = C\mathcal{E} e^{-RC/RC}$

$q = C\mathcal{E}e^{-1} = (5 \times 10^{-6})(12)(e^{-1})$

$= 2.2 \times 10^{-5}\ C.$