PHYS102.10
Quiz # 10-Chapter 27

Name: Key Id#:

The capacitor in figure (1) is initially charged to 50 V and then the switch is closed. What charge flows out of the capacitor during the first minute after the switch was closed?

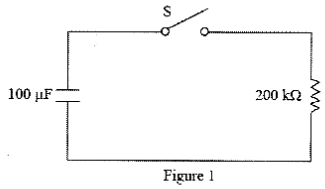

Figure 1

discharging

$$q = q_0 e^{-\frac{t}{RC}}$$

$$q_0 = C\mathcal{E} = 100\times10^{-6} \times 50$$

$$= 5\times10^{-3}\ C$$

at $t = 60s \Rightarrow q = 5\times10^{-3}\, e^{-\frac{60}{100\times10^{-6}\times200\times10^{3}}}$

$$q = 5\times10^{-3}\, e^{-3} = \boxed{2.5\times10^{-4}\ C}$$

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In figure (2), if Vc-Vd=6.0 Volts, what is the emf of the battery?

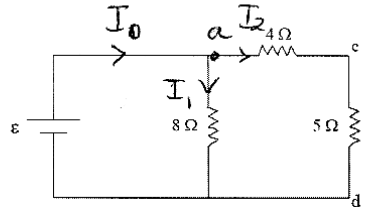

Figure 2

$V_c - V_d = 6V = I_2 R$

$= 5 I_2$

$\Rightarrow I_2 = \frac{6}{5} = 1.2A$ ← this is the current in 5Ω.

This is the same current that passer the 4Ω resistor

$V_a - V_d = 5 I_2 + 4 I_2 = 9 I_2 = 10.8V$

but $V_a - V_d = \boxed{\mathcal{E} = 10.8V}$

or use Kirchhoff's Start from point a and end at point a.

$-4 I_2 - 5 I_2 + \mathcal{E} = 0 \Rightarrow \mathcal{E} = 9 I_2$

$\boxed{\mathcal{E} = 10.8V}$

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If the current I in figure (5) is equal to 4.0 A, then the potential difference between point 1 and 2, i.e. (V2 -V1), is:

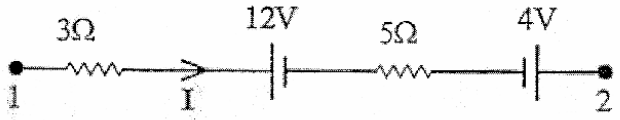

Figure (5)

$$V_2 - V_1 = -3I - 12 - 5I + 4$$

$$= -12 - 12 - 20 + 4$$

$$= -40\,V$$