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(49) $\tau = RC$

$$R = \frac{\tau}{C} = \frac{3.0\,s}{3\times10^{-6}\,F} = 1\times10^{6}\,\Omega$$

(50) (a) $\tau = RC$

$$C = \frac{\tau}{R} = \frac{35\times10^{-6}\,s}{15\times10^{3}\,\Omega} = 2.33\times10^{-9}\,F$$

(b) $V = V_0 e^{-t/\tau}$

$$t = \tau \ln\left(\frac{V_0}{V}\right) = (35\times10^{-6}\,s)\ln\left(\frac{24V}{16V}\right)$$

$$t = 14.2\,\mu s$$

(51) $\tau = RC = (6.7\times10^{3}\,\Omega)(3.0\times10^{-6}\,F) = 2.01\times10^{-2}\,s$

$V = V_0 e^{-t/\tau}$

$$t = \tau \ln\left(\frac{V_0}{V}\right) = \tau \ln\left(\frac{V_0}{.01V_0}\right) = 2.01\times10^{-2}\,s \ln\left(\frac{1}{.01}\right) = 9.3\times10^{-2}\,s$$

(82) (a) $V_c = \mathcal{E}(1 - e^{-t/RC})$

$$t = -RC \ln\left(1 - \frac{V_c}{\mathcal{E}}\right) = -(2.35\times10^{6}\,\Omega)(0.15\times10^{-6}\,F)\left(1 - \frac{90V}{105V}\right)$$

$$= 0.686\,s$$

(b) Increase

(c) When it discharges, the resistance is very low and therefore it discharges quickly.

(d) After it flashes the first time the capacitor will recharge and the bulb will flash again. It will take less time to recharge because the capacitor will not completely discharge due to the threshold voltage of the lamp.