

Physics 102-Rec
Quiz # 8 - Sect. 22
Chapter 27

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Name: Key Id: _____

Consider an RC circuit in which the emf is 12 V, $R = 10 \text{ M}\Omega$ and $C = 1.2 \text{ }\mu\text{F}$.

- (a) What is the time constant of the circuit?

$$RC = 12 \text{ s}$$

- (b) What is the potential difference across the capacitor 12 sec after the capacitor start charging?

$$V_c = V_{\text{max}} (1 - e^{-t/RC})$$

$$V_c = 12 (1 - e^{-12/12}) = 12 (1 - e^{-1})$$

$$\boxed{V_c = 7.6 \text{ V}}$$

- (c) What is the potential difference across the resistor at that time?

$$V_R = IR = \frac{V}{R} e^{-t/RC} * R$$

$$= 12 e^{-12/12} = 12 e^{-1} = 4.4 \text{ V}$$

$$\boxed{V_R = 4.4 \text{ V}}$$

- (d) What is the sum of the potential differences found in (a) and (b)?

$$V_R + V_c = 12 = \mathcal{E}$$