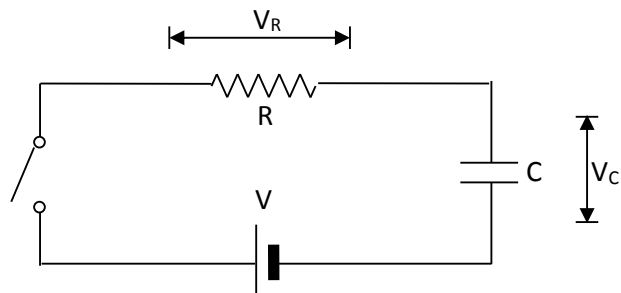


Name: _____

PHY 232 Summer 2016 Class Work

Class 22. RC Circuit

PART A.



If Q is the charge stored in the capacitor and I is the current from the battery. Switch is closed at $t=0$.

(a) What is the value of the following quantities at $t=0$ (in terms of V , R , and C):

$$Q = \underline{0} \quad I = \underline{V/R} \quad V_C = \underline{0} \quad V_R = \underline{V}$$

(b) What is the value of the following quantities at $t=\infty$ (in terms of V , R , and C):

$$Q = \underline{CV} \quad I = \underline{0} \quad V_C = \underline{V} \quad V_R = \underline{0}$$

(c) Write down the following quantities as a function of time (in terms of V , R , C , and t):

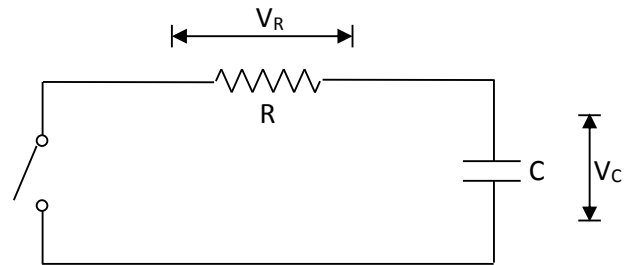
$$Q(t) = \underline{CV(1 - e^{-\frac{t}{RC}})}$$

$$I(t) = \underline{\frac{V}{R}e^{-\frac{t}{RC}}}$$

$$V_C(t) = \underline{V(1 - e^{-\frac{t}{RC}})}$$

$$V_R(t) = \underline{Ve^{-\frac{t}{RC}}}$$

PART B.



If Q is the charge stored in the capacitor and I is the current through R . The capacitor is originally charged with a charge of Q_0 . Switch is closed at $t=0$.

(a) What is the value of the following quantities at $t=0$ (in terms of C , R , and Q_0):

$$Q = \underline{Q_0} \quad I = \underline{Q_0/(RC)} \quad V_C = \underline{Q_0/C} \quad V_R = \underline{Q_0/C}$$

(b) What is the value of the following quantities at $t=\infty$ (in terms of V , R , and Q_0):

$$Q = \underline{0} \quad I = \underline{0} \quad V_C = \underline{0} \quad V_R = \underline{0}$$

(c) Write down the following quantities as a function of time (in terms of V , R , Q_0 and t):

$$Q(t) = \underline{Q_0 e^{-\frac{t}{RC}}}$$

$$I(t) = \underline{\frac{Q_0}{RC} e^{-\frac{t}{RC}}}$$

$$V_C(t) = \underline{\frac{Q_0}{C} e^{-\frac{t}{RC}}}$$

$$V_R(t) = \underline{\frac{Q_0}{C} e^{-\frac{t}{RC}}}$$