EECE 2210 - Electrical Engineering
Quiz 8

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Student Name: _____

The figure shows a circuit with resistors and capacitors. For this example, $C_1 = 10\,\mu\text{F}$, $C_2 = 4.7\,\mu\text{F}$, $C_3 = 2\,\mu\text{F}$, and $C_4 = 100\,\mu\text{F}$. The resistors are all $1\,\text{kOhms}$.

a. Capacitors C_1, C_2, and C_3 can be treated as a single capacitor. What is the value of that single capacitor?

_____ .

b. The voltage source, V_S was turned off for a long time. Now it is turned on to $10\,\text{V}$. Again we wait a long time so that the circuit reaches steady state. What is V_A?

_____ .

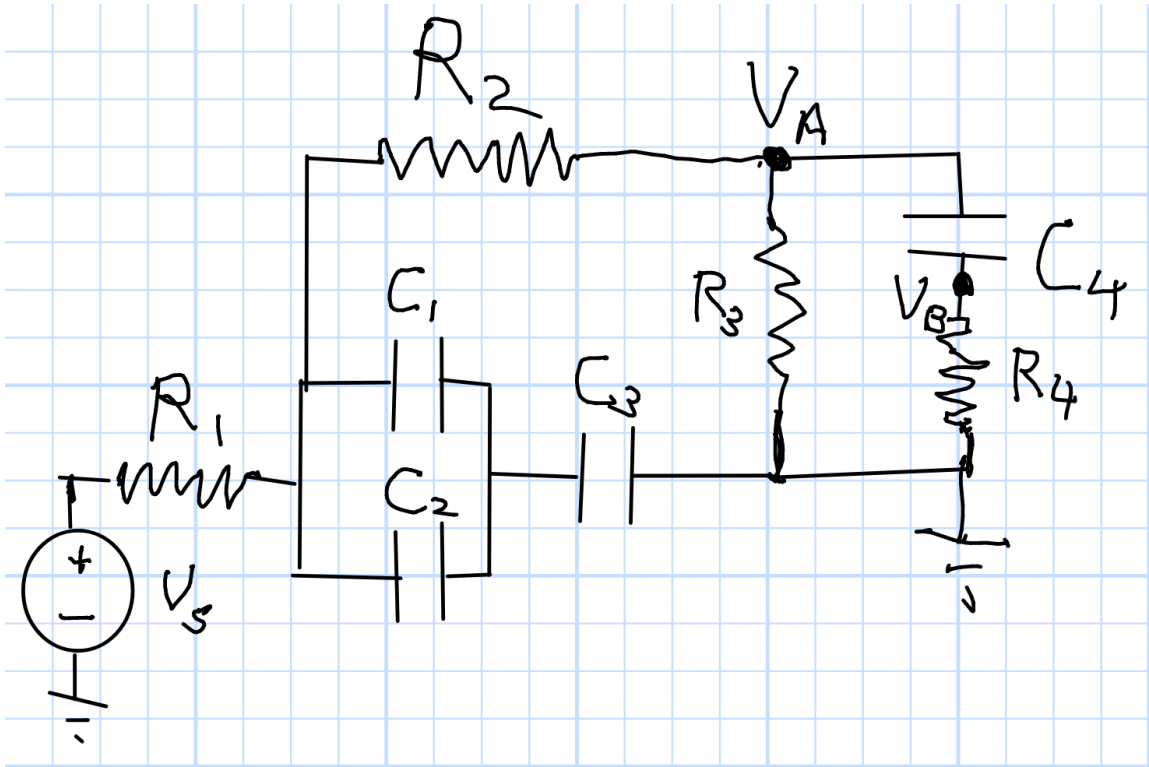c. In the conditions of part b, what is V_B?

_____ .

d. In the conditions of part b, what is the charge on C_4?

_____ .

e. In part d, how many electrons is that?

_____ .

a. Capacitors C_1, C_2, and C_3 can be treated as a single capacitor. What is the value of that single capacitor?

$C_{12} = C_1 + C_2$, $C_{123} = \frac{1}{\frac{1}{C_{12}} + \frac{1}{C_3}} = 1.76\,\mu\text{F}$.

b. The voltage source, V_S was turned off for a long time. Now it is turned on to $10\,\text{V}$. Again we wait a long time so that the circuit reaches steady state. What is V_A?

$V_A = V_S \frac{R_3}{R_1 + R_2 + R_3} = 3.33\,\text{V}$

c. In the conditions of part b, what is V_B?

No current in R_4 so $V_B = 0$.

d. In the conditions of part b, what is the charge on C_4?

$Q = C\,(V_A - V_B) = 333\,\mu\text{Coulombs}$

e. In part d, how many electrons is that?

$N = Q/e = 2.1 \times 10^{15}$