THIRD MIDTERM

Average: 13.4

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Name (signed) ____________________________

Discussion Instructor (circle): Gramada  Hansen  Li  Zhukov

Discussion Section #: ______

SHOW ALL WORK!!!!!!
REPORT ALL NUMBERS TO THREE SIGNIFICANT FIGURES!
Use the conversion constants and data given on the front page.

For the network shown, S1 is closed for a long time with S2 open. S1 is then opened and S2 closed. S1 remains open.

(a) With S2 closed, find the potential on C1.
(b) With S2 closed, calculate the charge on C4.
(c) With S2 closed, what is the charge on C2?

\[ V_{\text{batt}} = 120 \text{ V} \]
\[ C_1 = 250 \text{ pF} \]
\[ C_2 = 150 \text{ pF} \]
\[ C_3 = 100 \text{ pF} \]
\[ C_4 = 225 \text{ pF} \]

\[ C_{234} = \left( \frac{1}{C_2} + \frac{1}{C_3} + \frac{1}{C_4} \right)^{-1} = 80.36 \text{ pF} \approx 80.4 \text{ pF} \]

\[ C_{eq} = C_3 + C_{234} = 330.4 \text{ pF} = 330 \text{ pF} \]
\[ V_4 = \frac{Q}{C_{eq}} = 90.8 \text{ V} \]

\[ Q_{23} = Q_2 + Q_3 = Q_4 \]
\[ Q = Q_4 + Q_{23} \]
\[ Q_4 = V_4 C_4 = 2.27 \times 10^{-8} \text{ C} \]

\[ Q_4 = Q - Q_4 = (30 - 22.7) \times 10^{-9} = 7.3 \times 10^{-9} \text{ C} \]

\[ Q_2 + Q_3 = 7.3 \times 10^{-9} \text{ C} \]

\[ Q_2 = \frac{Q_2}{C_2} \]

\[ Q_2 = 4.38 \times 10^{-9} \text{ C} \]

* Credit was given for meaningful work.