This print-out should have 14 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering. The due time is Central time.

PLEASE REMEMBER THAT YOU MUST CARRY OUT YOUR CALCULATIONS TO AT LEAST THREE SIGNIFICANT FIGURES. YOUR ANSWER MUST BE WITHIN ONE PERCENT OF THE CORRECT RESULT TO BE MARKED AS CORRECT BY THE SERVER.

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001 (part 1 of 1) 4 points

Two conductors insulated from each other are charged by transferring electrons from one conductor to the other. After 2.367×10^{14} have been transferred, the potential difference between the conductors is 11.8 V.

The charge on an electron is -1.60218×10^{-19} C.

What is the capacitance of the system? Answer in units of F.

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002 (part 1 of 4) 3 points

An air-filled capacitor consists of two parallel plates, each with an area of 9.8 cm^2, separated by a distance 3.2 mm. A 23 V potential difference is applied to these plates.

The permittivity of a vacuum is 8.85419×10^{-12} $C^2/N \cdot m^2$. 1 pF is equal to 10^{-12} F.

The magnitude of the electric field between the plates is

1. $E = \dfrac{1}{V\,d}$.

2. $E = \dfrac{1}{(V\,d)^2}$.

3. $E = \dfrac{d}{V}$.

4. $E = \left(\dfrac{d}{V}\right)^2$.

5. None of these

6. $E = V\,d$.

7. $E = \left(\dfrac{V}{d}\right)^2$.

8. $E = \dfrac{V}{d}$.

9. $E = (V\,d)^2$.

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003 (part 2 of 4) 3 points

The magnitude of the surface charge density on each plate is

1. $\sigma = \dfrac{\epsilon_0\,d}{V}$.

2. None of these

3. $\sigma = \dfrac{\epsilon_0}{V\,d}$.

4. $\sigma = \dfrac{\epsilon_0\,V}{d}$.

5. $\sigma = \epsilon_0\,(V\,d)^2$.

6. $\sigma = \dfrac{\epsilon_0}{(V\,d)^2}$.

7. $\sigma = \epsilon_0\,V\,d$

8. $\sigma = \epsilon_0 \left(\dfrac{d}{V}\right)^2$.

9. $\sigma = \epsilon_0 \left(\dfrac{V}{d}\right)^2$.

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004 (part 3 of 4) 3 points

Calculate the capacitance. Answer in units of

pF.

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005 (part 4 of 4) 3 points
Calculate plate charge; *i.e.*, the magnitude of the charge on each plate. Answer in units of pC.

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006 (part 1 of 2) 5 points
An air-filled spherical capacitor is constructed with inner and outer shell radii of 10 cm and 17.3 cm, respectively.

The Coulomb constant is $8.98755 \times 10^9\ \mathrm{N \cdot m^2/C^2}$.

Calculate the capacitance of the device. Answer in units of pF.

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007 (part 2 of 2) 4 points
What potential difference between the spheres results in a charge of 36.1 μC on the capacitor? Answer in units of kV.

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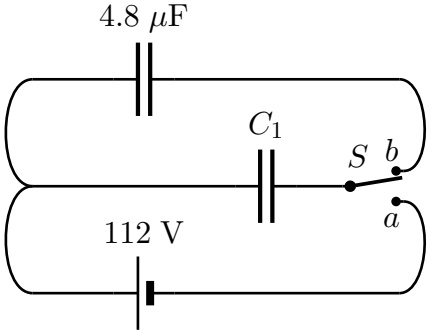
008 (part 1 of 1) 5 points
When the switch is in position a, an isolated capacitor of unknown capacitance has been charged to a potential difference of 112 V.

When the switch is moved to position b, this charged capacitor is then connected parallel to the uncharged 4.8 μF capacitor. The voltage across the combination becomes 17 V.



Calculate the unknown capacitance. Answer in units of μF.

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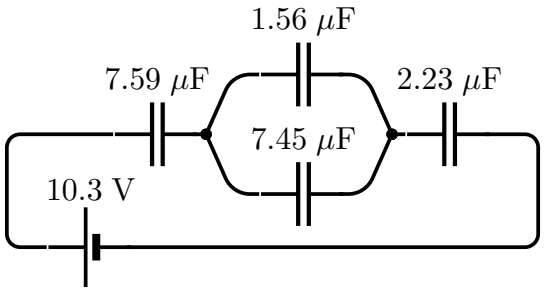
009 (part 1 of 5) 3 points
Consider the group of capacitors shown in the figure.



Find the equivalent capacitance of the circuit. Answer in units of μF.

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010 (part 2 of 5) 3 points
Determine the charge on 7.59 μF capacitor on the left. Answer in units of μC.

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011 (part 3 of 5) 3 points
Determine the charge on 1.56 μF capacitor on the top. Answer in units of μC.

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012 (part 4 of 5) 3 points
Determine the charge on 7.45 μF capacitor on the bottom. Answer in units of μC.

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013 (part 5 of 5) 3 points
Determine the charge on 2.23 μF capacitor on the left. Answer in units of μC.

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014 (part 1 of 1) 5 points
Calculate the energy stored in a(n) 17.6 μF capacitor when it is charged to a potential of 159 V. Answer in units of mJ.