

Suggested problems: Chapter 25- HRW-Principles of Physics- ISV 10th Edition.

6. In Fig. 25-19, a potential difference $V = 100 \text{ V}$ is applied across a capacitor arrangement with capacitances $C_1 = 10.0 \mu\text{F}$, $C_2 = 5.00 \mu\text{F}$, and $C_3 = 2.00 \mu\text{F}$. What are (a) charge q_3 , (b) potential difference V_3 , and (c) stored energy U_3 for capacitor 3, (d) q_1 , (e) V_1 , and (f) U_1 for capacitor 1, and (g) q_2 , (h) V_2 , and (i) U_2 for capacitor 2?

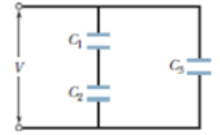


Fig. 25-19 Problem 6

Answer: (a) $200 \mu\text{C}$; (b) 100 V ; (c) 10.0 mJ ; (d) $333 \mu\text{C}$; (e) 33.3 V ; (f) 5.55 mJ ; (g) $333 \mu\text{C}$; (h) 66.7 V ; (i) 11.1 mJ

8. Figure 25-20 displays a 16.0 V battery and 3 uncharged capacitors of capacitances $C_1 = 4.00 \mu\text{F}$, $C_2 = 6.00 \mu\text{F}$, and $C_3 = 3.00 \mu\text{F}$. The switch is thrown to the left side until capacitor 1 is fully charged. Then the switch is thrown to the right. What is the final charge on (a) capacitor 1, (b) capacitor 2, and (c) capacitor 3?

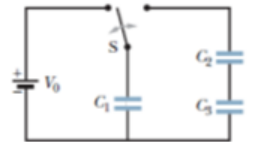


Fig. 25-20 Problem 8

Answer: (a) $42.7 \mu\text{C}$; (b) $21.3 \mu\text{C}$; (c) $21.3 \mu\text{C}$

22. Figure 25-26 shows a parallel-plate capacitor of plate area $A = 12.5 \text{ cm}^2$ and plate separation $2d = 7.12 \text{ mm}$. The left half of the gap is filled with material of dielectric constant $k_1 = 21.0$; the top of the right half is filled with material of dielectric constant $k_2 = 42.0$; the bottom of the right half is filled with material of dielectric constant $k_3 = 58.0$. What is the capacitance?



Fig. 25-26 Problem 22

Answer: $5.42 \times 10^{-11} \text{ F}$

24. In Fig. 25-27, the battery has a potential difference of $V = 12.0 \text{ V}$ and the five capacitors each have a capacitance of $10.0 \mu\text{F}$. What is the charge on (a) capacitor 1 and (b) capacitor 2?

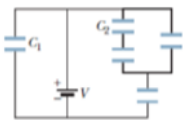


Fig. 25-27 Problem 24

Answer: (a) $1.20 \times 10^{-4} \text{ C}$; (b) $2.40 \times 10^{-5} \text{ C}$

32. The capacitor in Fig. 25-31 has a capacitance of $30 \mu\text{F}$ and is initially uncharged. The battery provides a potential difference of 120 V . After switch S is closed, how much charge will pass through it?



Fig. 25-31 Problem 32

Answer: $3.6 \times 10^{-3} \text{ C}$

48. How many $12.5 \mu\text{F}$ capacitors must be connected in parallel to store a charge of 33.0 mC with a potential of 110 V across the capacitors?

Answer: 24

54. The plates of a spherical capacitor have radii 37.0 mm and 40.0 mm . (a) Calculate the capacitance. (b) What must be the plate area of a parallel-plate capacitor with the same plate separation and capacitance?

Answer: (a) 54.9 pF ; (b) 186 cm^2