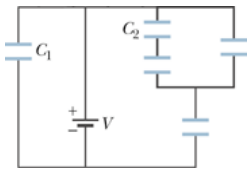
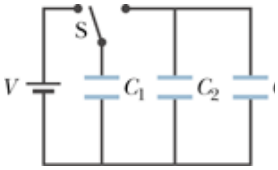
Chapter 26 – Problem Day

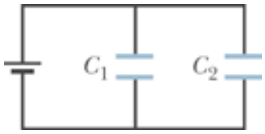
12. In the figure, the battery has a potential difference of $V = 10.0$ V and the five capacitors each have a capacitance of 10.0 μF. What is the charge on (a) capacitor 1 and (b) capacitor 2?



20. In the figure, $V = 10$ V, $C_1 = 10$ μF, and $C_2 = C_3 = 20$ μF. Switch S is first thrown to the left side until capacitor 1 reaches equilibrium. Then the switch is thrown to the right. When equilibrium is again reached, how much charge is on capacitor 1?



21. In the figure, two parallel-plate capacitors (with air between the plates) are connected to a battery. Capacitor 1 has a plate area of 1.5 cm² and an electric field of magnitude 2000 V/m. Capacitor 2 has a plate area of 0.70 cm² and an electric field of magnitude 1500 V/m. What is the total charge on the two capacitors?

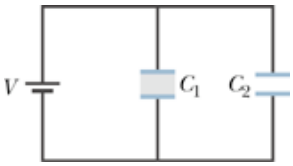


30. A parallel-plate air-filled capacitor having area 40 cm² and plate spacing 1.0 mm is charged to a potential difference of 600 V. Find (a) the capacitance, (b) the magnitude of the charge on each plate, (c) the stored energy, and (d) the electric field between the plates.

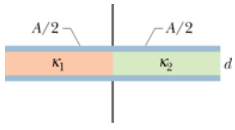
35. The parallel plates of a capacitor, with a plate area of 8.5 cm² and an air-filled separation of 3 mm, are charged by a 6 V battery. They are then disconnected from the battery and pulled apart (without discharge) to a separation of 8 mm. Find (a) the potential difference between the plates, (b) the initial stored energy, (c) the final stored energy, and (d) the work required to separate the plates.

42. An air-filled parallel-plate capacitor has a capacitance of 1.3 pF. The separation of the plates is doubled, and wax is inserted between. The new capacitance is 2.6 pF. Find the dielectric constant of the wax.

44. In the figure, how much charge is stored on the parallel-plate capacitors by the 12.0 V battery? One is filled with air, and the other is filled with a dielectric for which $\kappa = 3.00$; both capacitors have a plate area of 5.00×10^{-3} m² and a plate separation of 2.00 mm.



48. The figure shows a parallel-plate capacitor with a plate area $A = 5.56$ cm² and separation $d = 5.56$ mm. The left half of the gap is filled with material of dielectric constant $\kappa_1 = 7$; the right half is filled with material of dielectric constant $\kappa_2 = 12$. What is the capacitance?



Chapter 26 Answers

12a) 100 μC
12b) 20 μC

20) 20 μC

21) 3.6 pC

30a) 35 pF
30b) 21 nC
30c) 6.3 μJ
30d) 6.00×10^{5} V/m

35a) 16 V
35b) 4.51×10^{-11} J
35c) 1.20×10^{-10} J
35d) 7.52×10^{-11} J

42) 4

44) 1.06×10^{-9} C

48) 8.41×10^{-12} F