

### Selected Problems on chapter 26 (4)

1: (a) How much charge is on each plate of a  $4.00\text{-}\mu\text{F}$  capacitor when it is connected to a  $12.0\text{-V}$  battery? (b) If this same capacitor is connected to a  $1.50\text{-V}$  battery, what charge is stored?

7. An air-filled capacitor consists of two parallel plates, each with an area of  $7.60\text{ cm}^2$ , separated by a distance of  $1.80\text{ mm}$ . A  $20.0\text{-V}$  potential difference is applied to these plates. Calculate (a) the electric field between the plates, (b) the surface charge density, (c) the capacitance, and (d) the charge on each plate.

9. When a potential difference of  $150\text{ V}$  is applied to the plates of a parallel-plate capacitor, the plates carry a surface charge density of  $30.0\text{ nC/cm}^2$ . What is the spacing between the plates?

18. Evaluate the equivalent capacitance of the configuration shown in Figure P26.18. All the capacitors are identical, and each has capacitance  $C$ .

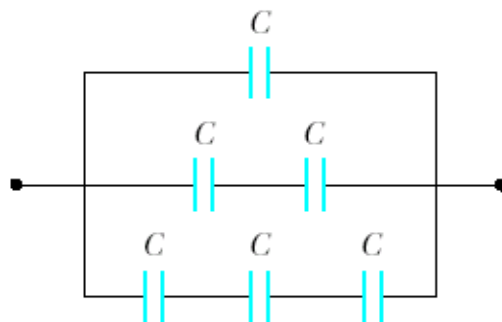


Figure P26.18

21. Four capacitors are connected as shown in Figure P26.21. (a) Find the equivalent capacitance between points  $a$  and  $b$ . (b) Calculate the charge on each capacitor if  $\Delta V_{ab} = 15.0\text{ V}$ .

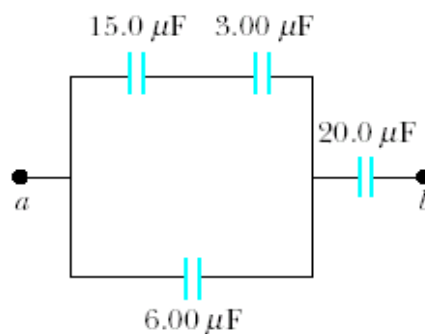


Figure P26.21

29. Find the equivalent capacitance between points  $a$  and  $b$  in the combination of capacitors shown in Figure P26.29.

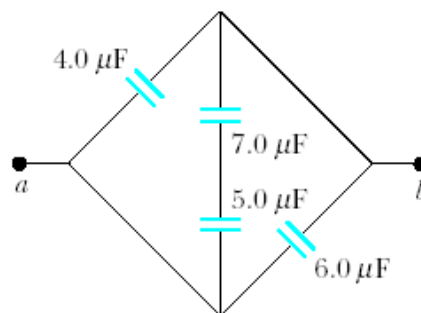


Figure P26.29

31. (a) A  $3.00\text{-}\mu\text{F}$  capacitor is connected to a  $12.0\text{-V}$  battery. How much energy is stored in the capacitor? (b) If the capacitor had been connected to a  $6.00\text{-V}$  battery, how much energy would have been stored?
36. A uniform electric field  $E = 3\,000\text{ V/m}$  exists within a certain region. What volume of space contains an energy equal to  $1.00 \times 10^{-7}\text{ J}$ ? Express your answer in cubic meters and in liters.
47. A parallel-plate capacitor in air has a plate separation of  $1.50\text{ cm}$  and a plate area of  $25.0\text{ cm}^2$ . The plates are charged to a potential difference of  $250\text{ V}$  and disconnected from the source. The capacitor is then immersed in distilled water. Determine (a) the charge on the plates before and after immersion, (b) the capacitance and potential difference after immersion, and (c) the change in energy of the capacitor. Assume the liquid is an insulator.
54. For the system of capacitors shown in Figure P26.54, find (a) the equivalent capacitance of the system, (b) the potential across each capacitor, (c) the charge on each capacitor, and (d) the total energy stored by the group.

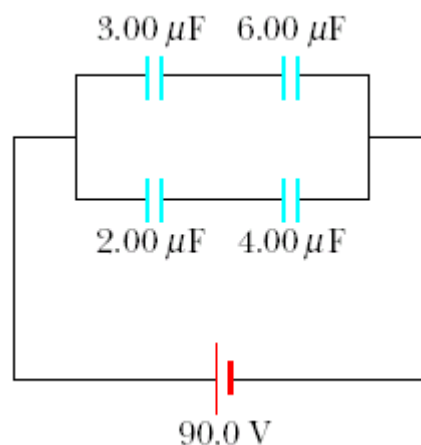


Figure P26.54