Chapter 25

Q13. Each of the two 25-µF capacitors, as shown in Fig. 3, is initially uncharged. How many Coulombs of charge pass through ammeter A after the switch S is closed for long time?
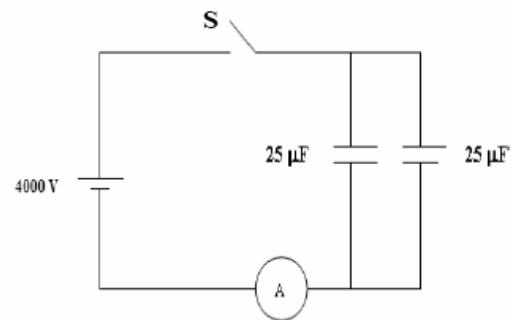A) 0.20 C

Figure 3

Q14. Each of the two 25-µF capacitors, as shown in Fig. 4 , is initially uncharged. How much energy is stored in the two capacitors after the switch S is closed for long time?
A) 100 J

Q15. The plates of a parallel plate capacitor are connected to a battery. If the distance between the
plates is halved, the energy stored in the capacitor:
A) Increases two-fold
B) Increases four-fold
C) Remains constant
D) Reduces to one-half
E) Reduces to one-fourth

Q16. A parallel-plate capacitor has a capacitance of 10 µF and is charged with a 20 V power supply. The power supply is then removed and a dielectric of dielectric constant 4 is filled in
the space between the plates. The voltage across the capacitor with dielectric is:
A) 5 V

Q14. A 2.0-µF capacitor and a 1.0-µF capacitor are connected in series and a potential difference of 12 V is applied across the combination. What is the potential difference across the 2.0-µF capacitor?
A) 4.0 V

Q15. Each capacitance of the four identical capacitors shown in figure 6 is 500 µF. They are connected to a 1000 V battery as shown in the figure. What is the magnitude of the charge on each capacitor plate?
A) 0.50 C
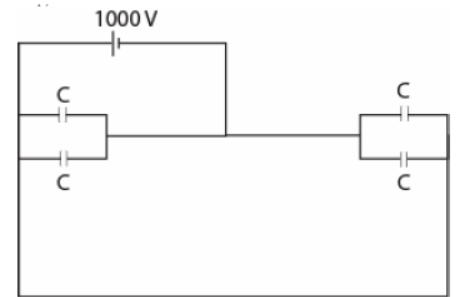
Q16. Capacitors A and B are identical. Capacitors A is charged so that it stores 4.0 J of energy and capacitor B is uncharged. The capacitors are then connected in parallel. The total energy stored in the capacitors is now:
A) 2.0 J
B) 4.0 J
C) 1.0 J
D) 8.0 J
E) 16 J

Q17. One of the materials listed below is to be placed between two identical metals sheets, of area A, with no air gap, to form a parallel-plate capacitor. Which of the following materials will produce the greatest capacitance?
A) a material of thickness 0.5 mm and dielectric constant 11.
B) a material of thickness 0.2 mm and dielectric constant 3.
C) a material of thickness 0.3 mm and dielectric constant 2.
D) a material of thickness 0.5 mm and dielectric constant 8.
E) a material of thickness 0.2 mm and dielectric constant 2.

Term 081

Q15. You are to connect capacitors $C1 = C$ and $C2 = 2C$ to the same battery, first individually, then in series and then in parallel. In which of the following cases, the charge stored is the smallest?
A) C1 and C2 in series
B) C1 and C2 in parallel
C) C1 individually
D) C2 individually
E) In all cases the same amount of charge is stored

Q16. Given a 9.4 pF air-filled capacitor, you are asked to convert it to a capacitor that can store 9.4 µJ, with a potential of 877 V. What is the dielectric constant of the material that you must insert between the plates of the capacitor?
A) 2.6

Q17. A capacitor $C1 = 1.00$ µF and another capacitor $C2 = 2.00$ µF are connected in series across a 900 V supply line. The charged capacitors are disconnected from the supply line then reconnected to each other with terminals of like sign together. Find the final charges on C1 and C2, respectively.
A) 400 C, 800 C

Q18. Two capacitors each of capacitance 250 F are connected in parallel across a battery of 120V. How much energy is produced after both capacitors are completely discharged?
A) 3.6 J

Term 073

Q13. Suppose you have two capacitors $C1 = 1.0$ µF and $C2 = 2.0$ µF. C2 is uncharged and C1 is charged to a voltage of 5.0 V by a battery. The battery is disconnected from C1 and then C1 is connected directly to C2. What will be the potential across each capacitor?
A) 1.7 V.

Q14. A 15 µF capacitor is connected to a 50 V battery and becomes fully charged. The battery is removed and a slab of dielectric that completely fills the space between the plates is inserted.
If the dielectric has a dielectric constant of 5.0, what is the voltage across the capacitor's plates after the slab is inserted?
A) 10 V.

Q15. A parallel plate capacitor is connected to a battery and becomes fully charged. The capacitor is then disconnected, and the separation between the plates is increased in such a way that no charge leaks off. What happens to the energy stored in this capacitor?
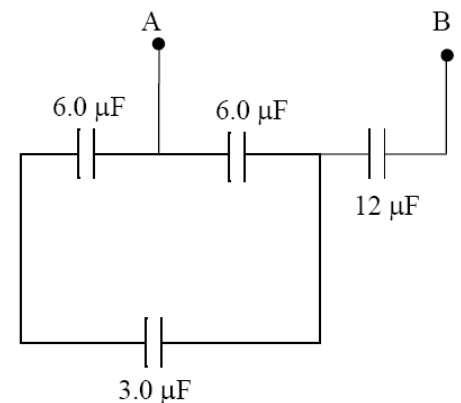A) increases.
B) decreases.
C) becomes zero.
D) does not change.
E) not enough data to choose the right answer.

Q16. Find the equivalent capacitance between the points A and B.
A) 4.8 µF.

Term 072
Q14. The magnitude of the charge on each plate of a parallel plate capacitor is 2.5 µC. If the capacitor has a plate area of 0.25 m2 and a plate separation of 0.1 mm, what is the electric field between its plates?
A) 1.1×106 V/m

Q15. The figure shows two capacitors C1=30 µF carrying a charge q1=200 µC and C2=20 µF carrying a charge q2=900 µC. If the switches S are closed, the voltage across C1 will be
A) 14 V

C_1, q_1

S S

C_2, q_2
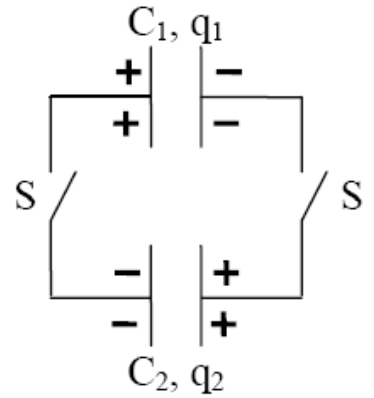
Q16. If C = 12 µF and the potential between points A and B is 10 V, what is the total energy stored by the group of capacitors shown in the figure?
A) 300 µJ
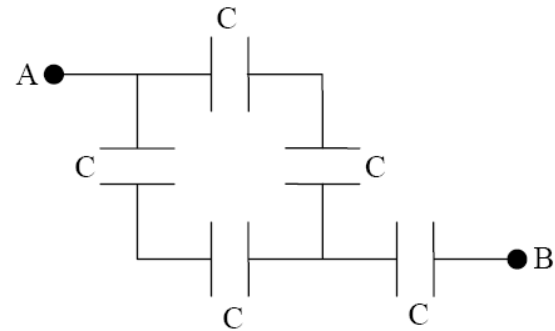
Q17. An air-filled parallel-plate capacitor is connected across a 24 V battery. When the battery is disconnected and then a dielectric slab is inserted into and fills the region between the plates, the voltage across the capacitor drops to 8 V. What is the dielectric constant of the slab?
A) 3.0