Questions

Chapter 25
Capacitance

25-3 Calculating the Capacitance
m2-061

A parallel plate capacitor has square shaped plates with an area = 4.1×10^{-3} m^2 and 1.6×10^{-3} m separation. What charge will appear on the plates of such capacitor if a potential difference of 80 V is applied?

A) 2.8×10^{-9} C
B) 1.8×10^{-9} C
C) 3.6×10^{-9} C
D) 5.6×10^{-9} C
E) 0.9×10^{-9} C

Answer B

25-3 Calculating the Capacitance
m2-041

A parallel-plate capacitor (with plates A and B) has circular shape of radius 6.0 cm separated by 2.0 mm. Find the total charges on both plates (A and B) when a 12 V battery is connected.

A)zero
B)400 pico-C
C)10 pico-C
D)600 pico-C
E)700 pico-C

Answer A

25-4 Capacitors in Parallel and in Series
m2-062

Consider three identical capacitors. Their equivalent capacitance when connected in parallel is C_p, and their equivalent capacitance when connected in series is C_s. Which of the following statements is **CORRECT?**

A) $C_p = 3\ C_s$
B) $C_p = 9\ C_s$
C) $C_p = C_s/9$
D) $C_p = C_s/3$
E) $C_p = C_s/2$

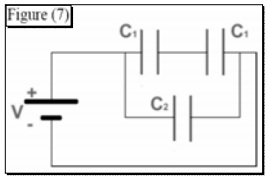
Answer B

25-4 Capacitors in Parallel and in Series
m2-062

Figure (7) shows three capacitors connected to a battery of voltage V = 6 Volts. The charges on the capacitors are known to be Q_1 = 24 μC for C_1 and Q_2 = 96 μC for C_2. What are the values of the capacitances C_1 and C_2?

A) C_1 = 10 μF, C_2 = 30 μF
B) C_1 = 8 μF, C_2 = 24 μF
C) C_1 = 8 μF, C_2 = 16 μF
D) C_1 = 21 μF, C_2 = 3 μF
E) C_1 = 4 μF, C_2 = 16 μF

Figure (7)

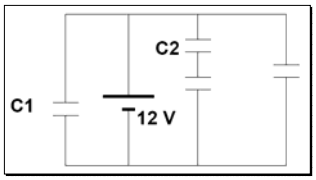


Answer C

25-4 Capacitors in Parallel and in Series
m2-061

A battery having potential difference V = 12 V and four capacitors, each having a capacitance of 12 μF, are connected as shown in the figure. What is the charge on C2?

A) 88 μC
B) 36 μC
C) 12 μC
D) 27 μC
E) 72 μC



Answer E

25-4 Capacitors in Parallel and in Series
m2-042

Consider two separate capacitors: c1= 30 micro-F carries a charge of q1=6.0 x10^2 micro-C and c2= 50 micro-F, carries a charge of q2=1.0x10^3 micro-C. If the opposite polarity terminals of the two capacitors are connected together as shown in figure 10, find the new voltage across c1.

A) 3.8 Volts.
B)10 Volts.
C)15 Volts.
D) 5.0 Volts.
E) 2.2 Volts.

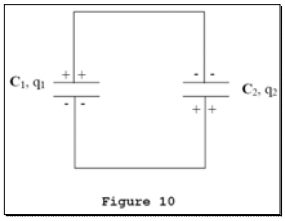


Figure 10

Answer D

25-4 Capacitors in Parallel and in Series
m2-041

The three capacitors in figure 5 have an equivalent capacitance of 12.4 micro-F, find the capacitance of C1.

A)7.0 micro-F
B)4.0 micro-F
C)10 micro-F
D)5.0 micro-F
E)6.0 micro-F

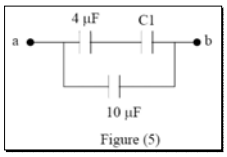


Figure (5)

Answer E

25-4 Capacitors in Parallel and in Series
m2-041

In figure 6, a capacitor of capacitance C = 9.0 micro-F is charged to a potential difference Vo = 10.0 volts. The charging battery is disconnected and the capacitor is connected to uncharged capacitor of unknown capacitance Cx. The potential difference across the combination is reduced to V = 3 volts. Find the value of Cx.

A)3.0 micro-F.
B)42 micro-F.
C)11 micro-F.
D)8.0 micro-F.
E)21 micro-F.

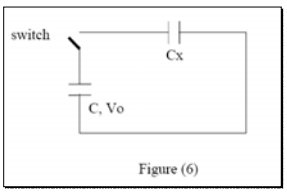


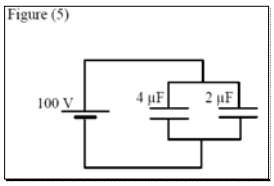
Figure (6)

Answer E

25-5 Energy Stored in an electric field
m2-062

How much energy is stored in the combination of capacitors shown figure (5)?

A) 0.04 J
B) 0.03 J
C) 0.02 J
D) 0.01 J
E) 0.06 J



Answer B

25-5 Energy Stored in an electric field
m2-061

Consider the combination of capacitors as shown in the Figure. The energy stored in the 8.0 μF capacitor is 0.40 J. The energy stored in the 5.0 μF capacitor is:

A) 0.42 J
B) 0.51 J
C) 0.84 J
D) 0.25 J
E) 0.13 J

Answer D

25-5 Energy Stored in an electric field
m2-042

Three capacitors C1=5 micro-F, C2=10 micro-F and C3= 3 micro-F are connected to a 20 V battery as shown in Figure 8. Find the stored electric energy in C2.

A) 2.2×10^{-4} J.
B) 0.3×10^{-4} J.
C) 4.0×10^{-6} J.
D) 1.3×10^{-4} J.
E) 1.0×10^{-5} J.

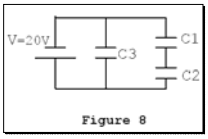


Figure 8

Answer A

25-5 Energy Stored in an electric field
m2-041

A parallel-plate capacitor has plates of area A and separation d and is charged by a battery of a potential difference V. If the charging battery is disconnected, then the work required, by external agent, to separate the plates of the capacitor to infinite distance is: [Take A = 2.0 m^2, V = 12 Volts, d = 3.0 cm]

A)12 nano-J.
B)42 nano-J.
C)22 nano-J.
D)65 nano-J.
E)-89 nano-J.

Answer B

25-6 Capacitor with dielectric
m2-062

Two parallel-plate capacitors are connected in series to a battery as shown in figure (6). A dielectric is inserted in capacitor C_1.

A) The charge on C_2 increases.

B) The charge on C_2 increases or decreases depending on the value of the voltage of the battery.

C) The charge on C_2 remains the same.

D) The charge on C_2 increases or decreases depending on the value of the dielectric constant of the dielectric.

E) The charge on C_2 decreases.

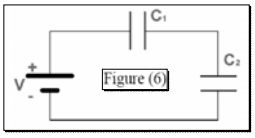


Figure (6)

Answer A

25-6 Capacitor with dielectric
m2-061

An air filled parallel-plate capacitor has a capacitance of 3.0×10^{-12} F. The plate separation is then doubled and a wax dielectric is inserted, completely filling the space between the plates. As a result the, capacitance becomes 7.5×10^{-12} F. The dielectric constant of the wax is:

A) 8
B) 2
C) 5
D) 4
E) 6.0×10^{-12}

Answer C

25-6 Capacitor with dielectric
m2-042

A 25 micro-F parallel plates capacitor is constructed using Pyrex glass as a dielectric. If the thickness of the Pyrex glass sheet is doubled, calculate the new capacitance of the capacitor. (Dielectric constant of Pyrex Glass = 5.6)

A)50.0 micro-F.
B) 30.2 micro-F.
C)100 micro-F.
D)12.5 micro-F.
E) 6.25 micro-F.

Answer D