26-6 Capacitor with a Dielectric

26-06

Question 678 0.56-60%

A certain air filled parallel-plate capacitor is connected across a 20 V battery. When the battery is disconnected and a dielectric slab is inserted into and fills the region between the plates, the voltage across the plates drops by 12 V. What is the dielectric constant of the slab?

(a) 2.5
(b) 1.7
(c) 0.4
(d) 2.1
(e) 0.6

26-06

Question 679 0.38-40%

A parallel-plate capacitor is to be constructed using paper as a dielectric. If the maximum voltage before breakdown is 3.2*10**3 V, what thickness of dielectric is needed? (The dielectric strength of paper is 16*10**6 V/m).

(a) 0.6 mm
(b) 0.8 mm
(c) 0.4 mm
(d) 0.2 mm
(e) 0.5 mm

26-06

Question 680

A 72-V battery is connected across a 0.50 micro-F, air filled, parallel-plate capacitor. With the battery still connected, the space between the plates is filled with a dielectric, whereupon the charge on the capacitor is increased by 90 micro-C. What is the dielectric constant of the dielectric?

(a) 2.5
(b) 1.5
(c) 5.0
(d) 4.5
(e) 3.5

26-06

Question 681 0.31-52%

A 6-micro-F air filled capacitor is connected across a 100 V battery. After the capacitors is fully charged, it is immersed in transformer oil (dielectric constant of 4.5). How much additional charge flows from the battery if it remains connected during the immersion process?

(a) 11 mC
(b) 0.37 mC
(c) 43 mC
(d) 2.1 mC
(e) 3.8 mC

26-06

Question 682
Find the WRONG statement: When a dielectric materials is inserted between the plates of an isolated capacitor, it will provide the following advantages:
(a) Increase the maximum operating voltage of the capacitor.
(b) Increase the capacitance of the capacitor.
(c) Mechanical support between the conducting plates.
(d) Increase the maximum energy that can be stored in the capacitor.
(e) Increase the original charge on the conducting plates.

26-06

Question 683
A parallel-plate capacitor, of capacitance 1.0*10**(-9) F, is charged by a battery to a potential difference of 12.0 volts. The charging battery is then disconnected and oil with dielectric constant = 4.0 fills the inside space between the plates. The resulting potential difference in volts, between the plates is:
(a) 3.0*10**(-9).
(b) 1.0*10**(-9).
(c) 48.
(d) 12.
(e) 3.

26-06

Question 684 0 51-44%
Consider an isolated capacitor of capacitance C0 and charge Q0. Which of the following statements is true when a dielectric slab is inserted between the plates of the capacitor?
(a) The energy stored in the capacitor does not change.
(b) The potential difference across the capacitor does not change.
(c) The capacitance goes to zero.
(d) The capacitance of the capacitor does not change.
(e) The charge on the capacitor does not change.

26-06

Question 685 0 51-35%
A parallel plate capacitor, with the space between the plates filled with polystyrene, has a capacitance of 10 nano-F. If the separation between the plates is 3.5 cm and the dielectric constant of the polystyrene is 2.6, what is the area of each plate?
(a) 2.50 m**2
(b) 0.11 m**2
(c) 0.04 m**2
(d) 15.2 m**2
(e) 1.20 m**2

26-06

Question 686 0 49-53%
The potential difference between the plates of an isolated, charged capacitor is Vo. A slab of dielectric material is inserted filling completely the space between the plates. The potential difference across the capacitor is now Vo/2. Find the dielectric constant of the material.
(a) 2
(b) 4
(c) 0.5
(d) 16
(e) 8

26-06
0.63-44%

Question 687

The space between the plates of a 2.0-nanoFarad parallel-plate capacitor is completely filled with a dielectric of dielectric constant k = 5. A battery is used to charge the capacitor to a potential difference of 100 V. Then the battery is disconnected and the dielectric is pulled completely out of the capacitor. What is the final energy stored in the capacitor ?

(a) 0.5*10**(-5) J
(b) 1.0*10**(-5) J
(c) 2.0*10**(-5) J
(d) 5.0*10**(-5) J
(e) 0.2*10**(-5) J

26-06
0.14-79%

Question 688

An air filled parallel-plate capacitor has a capacitance of 1.00*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 2.00*10**(-12) F. The dielectric constant of the wax is:

(a) 0.50.
(b) 8.00.
(c) 0.25.
(d) 4.00.
(e) 2.00.

26-06
0.00-0%

Question 689

A parallel-plate capacitor has an area A and a separation d. Find its capacitance if it is filled with two dielectrics as shown in figure 3. [Co is the capacitance of the air-filled parallel-plate capacitor. K1 = 3 and K2 = 1.5 are the dielectric constants]

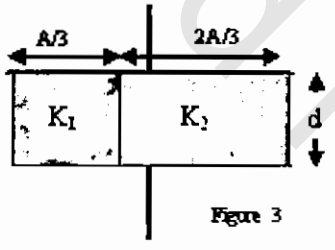

Figure 3

(a) 3*Co.
(b) 6*Co.
(c) Co.
(d) 4*Co.
(e) 2*Co.

26-06
0.25-66%

Question 690

A parallel plate capacitor is fully charged to potential V. A dielectric with dielectric constant k = 4 is inserted between the plates of the capacitor while the potential difference between the plates remains constant. Which one of the following statements is INCORRECT?

(a) The capacitance increases by a factor of four.
(b) The electric field between the plates increases by a factor of four.
(c) The energy density remains unchanged.
(d) The stored energy increases by a factor of four.
(e) The charge on the capacitor increases by a factor of four.

26-06
0.40-56%

Question 691

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) 6.25 micro-F.
(e) 12.5 micro-F.