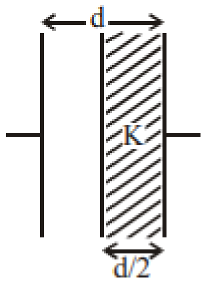
1.

A parallel plate capacitor having cross-sectional area A and separation d has air in between the plates. Now an insulating slab of the same area but thickness d/2 is inserted between the plates as shown in the figure having dielectric constant K(=4). The ratio of new capacitance to its original capacitance will be?



1. 2: 1
2. 8: 5
3. 6: 5
4. 4: 1

2.

The capacitance of a parallel plate capacitor with air as medium is 6μF. With the introduction of a dielectric medium, the capacitance becomes 30 μF. The permittivity of the medium is: $\varepsilon_o = 8.85 \times 10^{-12}\ \mathrm{C^2\ N^{-1}\ m^{-2}}$

1. $1.77 \times 10^{-12}\ \mathrm{C^2\ N^{-1}\ m^{-2}}$
2. $0.44 \times 10^{-10}\ \mathrm{C^2\ N^{-1}\ m^{-2}}$
3. $5.00\ \mathrm{C^2\ N^{-1}\ m^{-2}}$
4. $0.44 \times 10^{-13}\ \mathrm{C^2\ N^{-1}\ m^{-2}}$

3.

A parallel plate air capacitor is charged to a potential difference of *V* volts. After disconnecting the charging battery, the distance between the plates of the capacitor is increased using an insulating handle. As a result the potential difference between the plates:

1. decreases
2. does not change
3. becomes zero
4. increases

4.

A parallel plate air capacitor has capacity C, distance of separation between plates is d and potential difference V is applied between the plates. Force of attraction between the plates of the parallel plate air capacitor is?

1. $\frac{C^2V^2}{2d}$
2. $\frac{CV^2}{2d}$
3. $\frac{CV^2}{d}$
4. $\frac{C^2V^2}{2d^2}$

5.

The energy required to charge a parallel plate condenser of plate separation d and plate area of cross-section A such that the uniform electric field between the plates is E, is?

1. $\frac{1}{2}\ \varepsilon_0 \mathrm{E}^2 /\ \mathrm{Ad}$
2. $\varepsilon_0 \mathrm{E}^2 /\ \mathrm{Ad}$
3. $\varepsilon_0 \mathrm{E}^2\ \mathrm{Ad}$
4. $\frac{1}{2}\ \varepsilon_0 \mathrm{E}^2\ \mathrm{Ad}$

6.

The capacity of a parallel plate condenser is *C*. It's capacity when the separation between the plates is halved will be?

(1) 4 *C*

(2) 2 *C*

(3) $\frac{C}{2}$

(4) $\frac{C}{4}$

7.

The plates of a parallel plate condenser are pulled apart with a velocity *v*. If at any instant their mutual distance of separation is *d*, then the magnitude of the time rate of change of capacity depends on *d* as follows

(1) $1/d$

(2) $1/d^2$

(3) d^2

(4) d

8.

The capacity of a parallel plate condenser is 15 μF, when the distance between its plates is 6 cm. If the distance between the plates is reduced to 2 cm, then the capacity of this parallel plate condenser will be?

(1) 15 μF

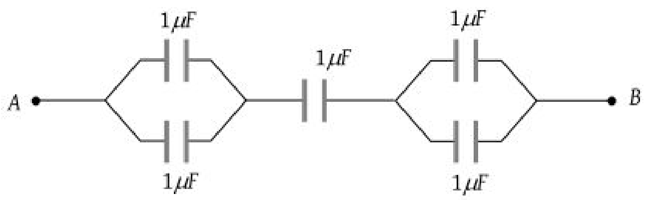
(2) 30 μF

(3) 45 μF

(4) 60 μF

9.

The equivalent capacitance between A and B is?



(1) 2 μF

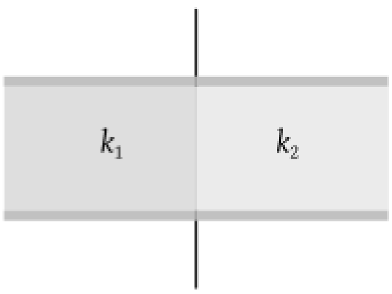
(2) 3 μF

(3) 5 μF

(4) 0.5 μF

10.

A parallel plate condenser is filled with two dielectrics as shown. Area of each plate is A metre^2 and the separation is t metre. The dielectric constants are k_1 and k_2 respectively. Its capacitance in farad will be?



(1) $\frac{\varepsilon_0 A}{t}\left(k_1 + k_2\right)$

(2) $\frac{\varepsilon_0 A}{t} . \frac{k_1+k_2}{2}$

(3) $\frac{2\varepsilon_0 A}{t}\left(k_1 + k_2\right)$

(4) $\frac{\varepsilon_0 A}{t} . \frac{k_1-k_2}{2}$

11.

Three capacitors of capacitances 3 μF, 9 μF and 18 μF are connected once in series and another time in parallel. The ratio of equivalent capacitance in the two cases $\left(\frac{C_s}{C_p}\right)$ will be?

(1) 1 : 15

(2) 15 : 1

(3) 1 : 1

(4) 1 : 3

12.

A parallel plate capacitor of capacitance C is connected to a battery and is charged to a potential difference V. Another capacitor of capacitance 2C is connected to another battery and is charged to potential difference 2V. The charging batteries are now disconnected and the capacitors are connected in parallel to each other in such a way that the positive terminal of one is connected to the negative terminal of the other. The final energy of the configuration is?

(1) Zero

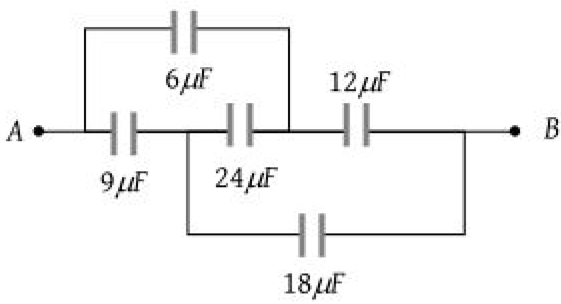
(2) $\frac{25CV^2}{6}$

(3) $\frac{3CV^2}{2}$

(4) $\frac{9CV^2}{2}$

13.

In the connections shown in the adjoining figure, the equivalent capacity between A and B will be?



(1) 10.8 μF

(2) 69 μF

(3) 15 μF

(4) 10 μF

14.

Two capacitances of capacity C_1 and C_2 are connected in series and potential difference V is applied across it. Then the potential difference across C_1 will be?

(1) $V\frac{C_2}{C_1}$

(2) $V\frac{C_1+C_2}{C_1}$

(3) $V\frac{C_2}{C_1+C_2}$

(4) $V\frac{C_1}{C_1+C_2}$

15.

A series combination of n_1 capacitors, each of value C_1, is charged by a source of potential difference 4V. When another parallel combination of n_2 capacitors, each of value C_2, is charged by a source of potential difference V, it has the same (total) energy stored in it, as the first combination has. The value of C_2, in terms of C_1, is then

(1) $\frac{2C_1}{n_1n_2}$

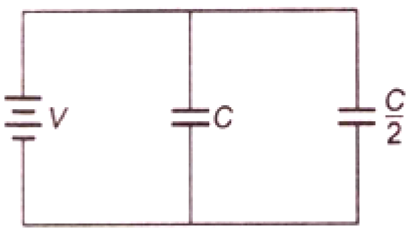
(2) $16\frac{n_2}{n_1}C_1$

(3) $2\frac{n_2}{n_1}C_1$

(4) $\frac{16C_1}{n_1n_2}$

16.

Two condensers, one of capacity C and the other of capacity C/2 are connected to a V volt battery, as shown.



The work done in charging fully both the condensers is?

1. $2\ CV^2$

2. $\frac{1}{4}\ CV^2$

3. $\frac{3}{4}\ CV^2$

4. $\frac{1}{2}\ CV^2$

17.

100 capacitors each having a capacity of 10 μF are connected in parallel and are charged by a potential difference of 100 kV. The energy stored in the capacitors and the cost of charging them, if electrical energy costs 108 paise per kWh, will be?

(1) 10^7 joule and 300 paise

(2) 5×10^6 joule and 300 paise

(3) 5×10^6 joule and 150 paise

(4) 10^7 joule and 150 paise

18.

The capacities of two conductors are C_1 and C_2 and their respective potentials are V_1 and V_2. If they are connected by a thin wire, then the loss of energy will be given by

(1) $\frac{C_1C_2(V_1+V_2)}{2(C_1+C_2)}$

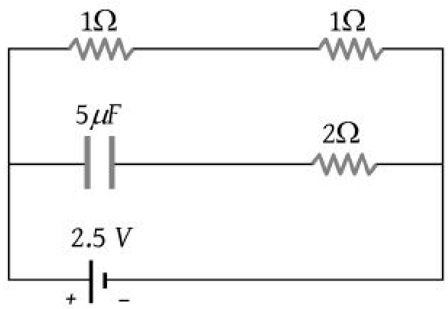
(2) $\frac{C_1C_2(V_1-V_2)}{2(C_1+C_2)}$

(3) $\frac{C_1C_2(V_1-V_2)^2}{2(C_1+C_2)}$

(4) $\frac{(C_1+C_2)(V_1-V_2)}{C_1C_2}$

19.

A capacitor of capacitance 5 μF is connected as shown in the figure. The internal resistance of the cell is 0.5 Ω. The amount of charge on the capacitor plate is?



(1) 0 μC

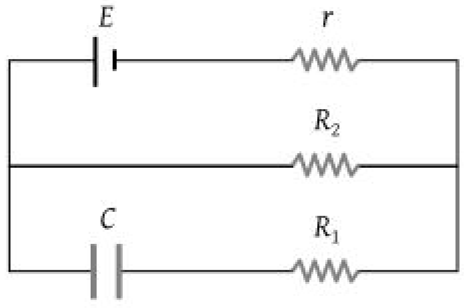
(2) 5 μC

(3) 10 μC

(4) 25 μC

20.

In the given figure each plate of capacitance C has partial value of charge?



(1) CE

(2) $\frac{CER_1}{R_2 - r}$

(3) $\frac{CER_2}{R_2 + r}$

(4) $\frac{CER_1}{R_1 - r}$

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