IIT PHYSICS CENTRE

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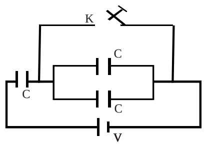
1. Three capacitor each of capacitance C are connected to a battery of voltage V. When key K is closed, the charge which will flow through the battery is



(A) 2 CV (B) CV (C) CV/2 (D) CV/3

2. A capacitor of capacitance 5 μF is fully charged by a 120 v battery. The battery is disconnected. If an addtional charge of +200 μC is given to the positive plate, the potential difference between the capacitor plates will be
(A) 100 V (B) 120 V (C) 140 V (D) 160 V

3. A solid metallic sphere of radius r is enclosed by a thin metallic shell of radius 2r. A charge q is given to the inner sphere. When the inner sphere is connected to the shell by a metal wire, the heat energy generated in it is given by

(A) $\frac{q^2}{\pi\varepsilon_0 r}$ (B) $\frac{q^2}{4\pi\varepsilon_0 r}$ (C) $\frac{q^2}{8\pi\varepsilon_0 r}$ (D) $\frac{q^2}{16\pi\varepsilon_0 r}$

4. A solid metallic sphere of radius r is charged to a voltage V. It is enclosed by a thin spherical shell of voltage 2 V. If q is the charge on the sphere and the shell, the potential difference between them will be
(A) 3V/2 (B) V (C) V/2 (D) 2V/3

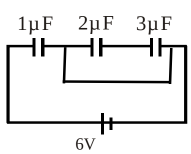
5. A parallel plate capacitor of plate area A has a charge Q. The force on each plate of the capacitor is

(A) $\frac{2Q^2}{\varepsilon_0 A}$ (B) $\frac{Q^2}{\varepsilon_0 A}$ (C) $\frac{Q^2}{2\varepsilon_0 A}$ (D) zero

6. If n drops, each of capacitance C, coalesce to form a single big drop will be
(A) n^3C (B) nC (C) $n^{1/2}C$ (D) $n^{1/3}C$

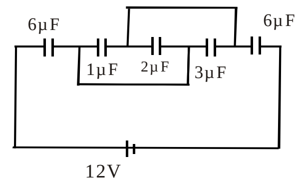
7. If n drops, each capacitance C and charged to a potential V, coalesce to form a big drop the ratio of the energy stored in the big drop to that in each small drop will be
(A) n:1 (B) $n^{4/3}:1$ (C) $n^{5/3}:1$ (D) $n^2:1$

8. Figure shows three capacitors connected to a 6 V power supply. What is the charge on the 2 μF capacitor ?



(A) 1 μC (B) 2 μC (C) 3 μC (D) Zero

9. Figure shows five capacitors connected across a 12 V power supply. What is the charge the 2 μF capacitor ?
(A) 6 μC (B) 8 μC (C) 10 μC (D) 12 μC



10. A capacitor is charged by using a battery which is then disconnected. A dielectric slab is then introduced between the plates which resultes is the
(A) reduction of charge on the plates and increase of potential difference across the plates
(B) increase is the potential difference across the plates and reduction in stored energy but no change in the charge on the plates
(C) decrease in the potential difference across the plates and reduction in the stored energy but no change in the charge on the plates (D) None.

11. The capacitance of a parallel plate capacitor is 5 μF. When a glass slab of thickness equal to the sepration between the plates is introduced between the plates, the potential difference reduces to 1/8 of the original value. The dielectric constant of glass is
(A) 1.6 (B) 5 (C) 8 (D) 40

12. The plates of a parallel plate capacitor are charged to 100 V. A 2 mm thick plate is inserted between the plates. Then to maintain the same potential difference, the distance between the capacitor plates is increased by 1.6 mm. The dielectric constant of the plate is
(A) 5 (B) 1.25 (C) 4 (D) 2.5

13. Four capacitors are connected as shown in Fig. The effective capacitance between point A and B will be
(A) 28/9 μF (B) 4 μF (C) 5 μF (D) 18 μF