

CAPACITORS AND CAPACITANCE

1. A parallel plate air capacitor has capacitance of 8 pF. What will be the capacitance if the distance between the plates be reduced by half and the space between them is filled with a substance of dielectric constant $K = 6$?
(a) 48 pF (b) 84 pF **(c) 96 pF** (d) 8 pF
2. A parallel plate air capacitor has circular plates of radius R . What should be the distance between the plates of this capacitor if it has the same capacitance as that of an isolated sphere of radius R ?
(a) $R/4$ (b) $R/2$ (c) R (d) $2R$
3. A sphere of 10 cm diameter is suspended within a hollow sphere of 12 cm diameter. If the inner sphere be charged to a potential of 15,000 V and the outer sphere be earthed, the charge on the inner sphere is:
(a) 500 nC (b) 600 nC (c) 700 nC (d) 800 nC
4. If N identical drops of mercury, each of capacitance C , are combined to form a bigger drop, then the capacity of bigger drop is:
(a) NC **(b) $N^{1/3}C$** (c) $N^{2/3}C$ (d) $N^{1/4}C$
5. A parallel plate capacitor of capacitance $5\mu\text{F}$ and plate separation 6 cm is connected to a 1 V battery and charged. A dielectric of dielectric constant 4 and thickness 4 cm is introduced between the plates of the capacitor. The additional charge that flows into the capacitor from the battery is:
(a) $1\mu\text{C}$ (b) $3\mu\text{C}$ **(c) $5\mu\text{C}$** (d) $8\mu\text{C}$
6. Two metal plate form a parallel plate capacitor. The distance between the plates is d . A metal sheet of thickness $d/2$ and of the same area is introduced between the plates. What is the ratio of the capacitances in the two cases?
(a) 1: 1 **(b) 2: 1** (c) 3 : 1 (d) 4: 1
7. A parallel plate capacitor has an electric field of 10^6 V/m between the plates. If the charge on the capacitor plate is $2\mu\text{C}$, the force on each capacitor plate is:
(a) 5 N (b) 4 N (c) 2 N **(d) 1 N**
8. A parallel plate capacitor is connected to a 5 V battery and charged. The battery is then disconnected and a glass slab is introduced between the plates. Then the quantities that decrease are:
(a) charge and potential difference (b) charge and capacitance **(c) energy stored and potential difference** (d) energy stored and capacitance
9. The capacitance a parallel plate air-capacitor increases from $2\mu\text{F}$ to $10\mu\text{F}$ when a dielectric plate is inserted between the plates. The dielectric constant of the plate is:
(a) 5 (b) 10 (c) 12 (d) 20
10. A slab of material of dielectric constant K has the same area as the plates of a parallel plate capacitor but has a thickness $3d/4$, where d is the separation of the plates. The ratio of the capacitance C (in the presence of the dielectric) to the capacitance C_0 (in the absence of the dielectric) is:
(a) $\frac{3K}{K+3}$ (b) $\frac{3K}{K+4}$ (c) $\frac{4K}{K+4}$ **(d) $\frac{4K}{K+3}$**
11. A parallel plate capacitor has two square plates with equal and opposite charges. The surface charge densities on the plates are $+\sigma$ and $-\sigma$ respectively. In the region between the plates the magnitude of the electric field is:

(a) $\frac{\sigma}{\epsilon_0}$ (b) $\frac{\sigma}{2\epsilon_0}$ (c) $\frac{2\sigma}{\epsilon_0}$ (d) Zero