

Situation:- A non conducting solid sphere of inner radius a and outer radius b is uniformly charged with volume charge density ...

1. electric field at a point P at distance r ($r < a$) is

- (A) zero (B) > 0 (C) $\frac{4}{3} \frac{f \cdot a^3 \dots}{4fV \cdot r^2}$ (D) None.

2. The electric energy stored in the cavity is

- (A) 0 (B) > 0 (C) $\frac{4}{3} \frac{f \dots (b^3 - a^3)}{4fV \cdot a^2}$ (D) None.

3. Find the electric field at a point P at distance r ($a < r < b$) from the centre

- (A) $E = 0$ (B) $E = \frac{(r^3 - a^3) \dots}{3V \cdot r^2}$ (C) $E = \frac{(r^2 - a^2) \dots}{V \cdot r^2}$ (D) $E = \frac{(r^3 - a^3) \dots}{V \cdot r^2}$

4. Energy stored inside the sphere is

- (A) $U_{in} = 0$ (B) $U_{in} = \frac{\dots^2}{18V} \left[\frac{R^3 - a^3}{3} + 4a^6 \left(\frac{1}{a^5} - \frac{1}{R^5} \right) - 2a^3 \ell_n \frac{R}{a} \right]$
(C) $U_{in} = \frac{\dots^2}{18V} \left[\frac{a^3 - R^3}{3} + 4a^6 \left(\frac{1}{R^5} - \frac{1}{a^5} \right) - 2a^3 \ell_n \frac{a}{R} \right]$ (D) None.

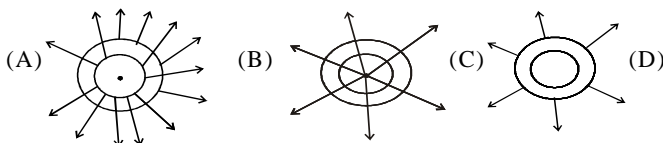
5. The energy stored outside the sphere is (put $Q = \frac{4}{3} f \dots (R^3 - a^3)$)

- (A) $U = 0$ (B) $U = \frac{Q^2}{8fV \cdot R}$ (C) $U = \frac{Q^2}{4fV \cdot R}$ (D) None

6. self potential energy of sphere is

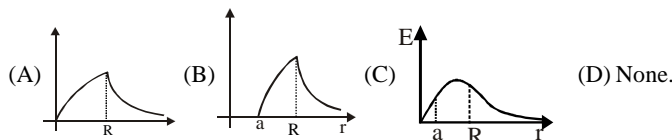
- (A) $U = 0$ (B) $\frac{Q^2}{8fV \cdot R}$
(C) $U = \frac{Q^2}{8fV \cdot R} + \frac{\dots^2}{18V} \left[\left(\frac{R^3 - a^3}{3} \right) + 4a^6 \left(\frac{1}{a^5} - \frac{1}{R^5} \right) - 2a^3 \ell_n \frac{R}{a} \right]$ (D) None.

7. Draw electric lines of force.



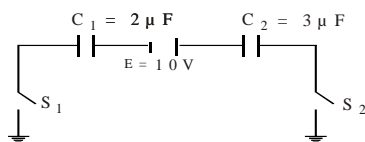
None.

8. Draw E-r graph for $0 \leq r < \infty$



(D) None.

Situation:-



9. Initially capacitors are uncharged. Find charge on C_1 and C_2 when S_1 is closed but S_2 is open.

- (A) 0, 0 (B) $20 \sim C, 0$
(C) $12 \sim C, 12 \sim C$ (D) None.

10. Find the change on C_1 and C_2 when S_1 and S_2 both are closed

- (A) $0, 12 \sim C$ (B) $20 \sim C, 20 \sim C$
(C) $12 \sim C, 12 \sim C$ (D) None.

11. In previous problem, charge flowing through earthing wire is

- (A) zero (B) $12 \sim C$
(C) $20 \sim C$ (D) None.

12. In previous problem, energy stored on capacitors C_1 and C_2 are

- (A) $36 \sim J, 24 \sim J$ (B) $24 \sim J, 36 \sim J$
(C) zero (D) None.

13. In previous problem, work done by cell is

- (A) zero (B) $120 \sim J$
(C) $60 \sim J$ (D) $200 \sim J$

14. In previous problem, heat loss is

- (A) zero (B) $120 \sim J$
(C) $60 \sim J$ (D) None.