CLASS 12 PHYSICS EXTRA QUESTIONS

Extra Questions: Class 12 Physics Chapter 1 Electric Charges and Fields

Genuinely harder, HOTS-level practice for Class 12 Physics Chapter 1 (Electric Charges and Fields), going beyond the standard exercise. These Class 12 Physics Chapter 1 important questions are handy for last-minute exam practice.

Contents

Genuinely harder, HOTS-level practice for Class 12 Physics Chapter 1 (Electric Charges and Fields), going beyond the standard exercise. These Class 12 Physics Chapter 1 important questions are handy for last-minute exam practice.

Q1 (Hollow conductor, HOTS). A hollow spherical conductor carries a charge Q. An insulated point charge q is placed inside the cavity, not at the centre. Where does charge appear on the inner and outer surfaces, and does the OFF-CENTRE position of q change the charge distribution on the outer surface?
Solution: The inner surface develops an induced charge of exactly −q (non-uniformly distributed, concentrated closer to where q sits), and the outer surface carries Q+q. Crucially, the outer surface's charge distribution is **uniform** regardless of where q sits inside the cavity — the conductor's bulk material completely shields the outside from the exact position of q inside, which is the basis of electrostatic shielding.

Q2 (Assertion-Reason). Assertion (A): The electric field inside a uniformly charged spherical shell is zero. Reason (R): By Gauss's law, a Gaussian surface inside the shell encloses zero net charge.
Solution: Both A and R are true, and R correctly explains A — since the entire charge resides on the shell's surface, any Gaussian sphere drawn strictly inside encloses no charge, forcing the enclosed flux (and hence the field, by symmetry) to be zero. **Answer: Both true, R is the correct explanation of A.**

Q3 (Combining dipole + flux). An electric dipole of moment p is placed at the centre of a sphere of radius R. What is the total electric flux through the sphere?
Solution: **Zero.** A dipole's net charge is zero (+q and −q are equal and opposite), and Gauss's law depends only on the net enclosed charge — so despite the dipole producing a strong, complex field pattern, the total outward flux through any closed surface around it is always exactly zero.

Q4 (Numerical synthesis). Two identical small conducting spheres, one with charge +12μC and the other with charge −4μC, are brought into contact and then separated to their original distance. If they originally repelled with force F_0 when both had their initial charges (calculate assuming initial force was attractive), what is the ratio of the new force to the magnitude of the old force?
Solution: Original force (attractive, opposite signs): $F_1 \propto |12\times(-4)| = 48$ (in μC^2 units). After contact, charge redistributes equally: each sphere gets $(12+(-4))/2 = 4\mu C$. New force (repulsive, same sign): $F_2 \propto 4\times4 = 16$. **Ratio $F_2/F_1 = 16/48 = 1/3$** — the new force is one-third the magnitude of the old, and has switched from attractive to repulsive.

Class 12 Physics Chapter 1 – Solutions and Notes

For complete step-by-step answers and a quick summary, check the Class 12 Physics Chapter 1 Solutions and Class 12 Physics Chapter 1 Revision Notes.