



CHAPTER TEST

STD: XII

PHYSICS – ELECTRIC CHARGES AND FIELDS

TIME: 1 HR 15 MIN

MARKS: 35

Answer all the questions. Section *A* carries 1 mark, Section *B* carries 2 marks, Section *C* carries 3 marks, Section *D* carries 5 marks, Section *E* carries 4 marks.

SECTION – A

- Force of attraction between two-point charges placed at a distance d is F . Then at what distance apart should they be kept in the same medium so that force between them is $\frac{F}{3}$
a) $3d$ b) $9d$ c) $\sqrt{3}d$ d) d
- Electric field due to an electric dipole is
a) Spherically symmetric b) Cylindrically symmetric
c) Asymmetric d) None of the above
- If there is only one type of charge in the universe, then
a) $\oint E \cdot ds \neq 0$ on any surface.
b) $\oint E \cdot ds = 0$ if the charge is outside the surface.
c) $\oint E \cdot ds$ cannot be defined.
d) $\oint E \cdot ds = \frac{q}{\epsilon_0}$ if charges of magnitude q is inside the surface.
- The number of electric lines of force radiating from a closed surface in vacuum is 1.13×10^{11} . The charge enclosed by the surface is
a) 1 C b) $1 \mu\text{C}$ c) 0.1 C d) $0.1 \mu\text{C}$
- Assertion (A): Electric field due to point is inversely proportional to cube of the distance.
Reason (R): When distance increases electric field also increases.
a) Both *A* and *R* are true and *R* is the correct explanation of *A*.
b) Both *A* and *R* are true and *R* is not the correct explanation of *A*.
c) *A* is true but *R* is false.
d) Both *A* and *R* are false.
- Assertion (A): Gauss law is not applicable for isolated point charge.
Reason (R): Gauss law is valid for continuous charge distribution irrespective of their size.
a) Both *A* and *R* are true and *R* is the correct explanation of *A*.
b) Both *A* and *R* are true and *R* is not the correct explanation of *A*.
c) *A* is true but *R* is false.
d) *A* is false but *R* is true.



SECTION – B

7. What is the total charge on 75.0 kg of electrons?
8. Give two properties of electric field lines.
9. Define coulomb's force.
10. Give reason:
 - i) The electric charge of any body is actually a surplus or deficit of electrons. Why not protons?
 - ii) Why an electrostatic field line cannot have sudden breaks?

SECTION – C

11. Two insulated charged spheres of charges $6.5 \times 10^{-7} C$ each are separated by a distance of 0.5 m. Calculate the electrostatic force between them. Also calculate the force (i) when the charges are doubled and the distance of separation is halved. (ii) When the charges are placed in a dielectric medium water. ($\epsilon_r=80$)
12. State Gauss's law. Give its significance.
13. Derive an expression for electric dipole placed in a uniform electric field.
14. Derive an expression for dipole of field intensity at any point on axial line of dipole.

SECTION – D

15. Using Gauss's theorem, derive an expression for electric field intensity at a point due to: (i) A line of charge. (ii) A uniformly charged thin spherical shell.

SECTION – E

16. Case Study based Question:

Faraday's cage is an enclosure made of conducting material. Any external disturbance outside the cage does not have any impact on its inner surface. Let the conducting material carries a charge Q .

 - i) Name the phenomenon that explains the working of Faraday's cage.
 - ii) What is the net charge on the cage when a charge $q C$ is placed inside the cage?
 - iii) What is the reason to arrive our answer in the (ii)? Explain in detail about the law or phenomenon that involves in your assumption. Also write the net electric field just outside the cage after the charge q placed inside the cage.