BOARD-PATTERN PRACTICE PAPER · CBSE CLASS 12

Electric Charges and Fields

Physics · Chapter 1 · Matches current CBSE blueprint · Each question PYQ-sourced where indicated

DATE	TOTAL MARKS	DURATION	MARKING	TARGET
_____	30	70 min	As per board	⩾ 24/30

GENERAL INSTRUCTIONS

1. All questions are compulsory.
2. Section A: 4 one-mark questions. Section B: 3 two-mark questions. Section C: 3 three-mark questions. Section D: 2 long-answer questions (5 and 6 marks).
3. Use $g = 9.8\ m/s^2$, $k = 1/(4\pi\varepsilon_0) = 9 \times 10^9\ N\cdot m^2/C^2$, $\varepsilon_0 = 8.854 \times 10^{-12}\ C^2/(N\cdot m^2)$ where needed.
4. Diagrams are mandatory for derivation questions. State assumptions clearly.
5. Calculator NOT permitted unless otherwise specified.

Section A — Very Short Answer (1 mark each, 4 Qs) — 4 MARKS · 8 MIN

Q1. Define electric flux. Write its SI unit. [PYQ 2018 All India] **[1 mark]**

Q2. State Gauss's law in electrostatics. [PYQ 2019 Delhi] **[1 mark]**

Q3. What is the SI unit of the electric dipole moment? [PYQ 2022 All India] **[1 mark]**

Q4. Write the value of the electric field inside a uniformly charged thin spherical shell. [PYQ 2023 All India] **[1 mark]**

Section B — Short Answer I (2 marks each, 3 Qs) — 6 MARKS · 12 MIN

Q5. Two point charges +q and −q are placed at the corners of a square of side a. Find the electric field at the centre of the square. [PYQ 2020 Outside Delhi] **[2 marks]**

Q6. Define electric dipole moment. Write its direction by convention. [PYQ 2019 Delhi] **[2 marks]**

Q7. An electric dipole of moment p is placed in a uniform electric field $\vec{E}$ at angle θ. Derive the expression for the torque on the dipole. [PYQ 2022 Delhi] **[2 marks]**

Section C — Short Answer II (3 marks each, 3 Qs) — 9 MARKS · 20 MIN

Q8. Three point charges +q, +q, +q are placed at the vertices of an equilateral triangle of side a. Find the magnitude and direction of the resultant force on any one of them. [PYQ 2019 Outside Delhi] **[3 marks]**

Q9. Derive the expression for the electric field at a point on the axial line of an electric dipole. Express the result for a short dipole ($r \gg a$). [PYQ 2022 Delhi] **[3 marks]**

Q10. Two point charges 3 μC and −2 μC are placed 10 cm apart in vacuum. Find the position on the line joining them where the electric field is zero. [PYQ 2020 Delhi] **[3 marks]**

Section D — Long Answer (5 and 6 marks, 2 Qs) — 11 MARKS · 30 MIN

Q11. Using Gauss's law, derive an expression for the electric field due to an infinitely long uniformly charged straight wire at a perpendicular distance r from it. [PYQ 2023 Delhi] **[5 marks]**

Q12. (a) Using Gauss's law, derive the electric field due to an infinite plane sheet of charge of uniform surface charge density σ. (b) A charge of 17.7 μC is uniformly distributed over the surface of a sphere of radius 1.2 m. Calculate the electric flux through the sphere and the electric field at a point on its surface. [PYQ 2024 All India] **[6 marks]**

Marking scheme & model answers — see companion Answer Key PDF · all PYQs traceable to actual CBSE papers · readyforboards.com · +91 70330 05444