

JEE MAIN ELECTRIC CHARGES AND FIELDS — DIPOLE IN A UNIFORM EXTERNAL FIELD (TORQUE) — PYQS

Max. Marks: 20
Questions: 5

Section A (MCQ) — 5 questions

- Q.1** A rigid dipole undergoes a simple harmonic motion about its centre in the presence of an electric field $\vec{E}_1 = E_0 \hat{x}$. If another electric field $\vec{E}_2 = 2E_0(\hat{y} + \hat{z})$ is introduced to the system, what will be the percentage change in the frequency of the oscillation (approximate)?

[JEE Main 2026 (Online) 4th April Evening Shift]

- (1) 73% (2) 63% (3) 83% (4) 53%

Scan or tap for the full solution



- Q.2** A dipole with two electric charges of $2 \mu\text{C}$ magnitude each, with separation distance $0.5 \mu\text{m}$, is placed between the plates of a capacitor such that its axis is parallel to an electric field established between the plates when a potential difference of 5 V is applied. Separation between the plates is 0.5 mm . If the dipole is rotated by 30° from the axis, it tends to realign in the direction due to a torque. The value of torque is:

[JEE Main 2025 (Online) 7th April Evening Shift]

- (1) $2.5 \times 10^{-9} \text{ Nm}$ (2) $2.5 \times 10^{-12} \text{ Nm}$
(3) $5 \times 10^{-3} \text{ Nm}$ (4) $5 \times 10^{-9} \text{ Nm}$

Scan or tap for the full solution



- Q.3** Two small spherical balls of mass 10 g each with charges $-2 \mu\text{C}$ and $2 \mu\text{C}$, are attached to two ends of very light rigid rod of length 20 cm . The arrangement is now placed near an infinite non-conducting charge sheet with uniform charge density of $100 \mu\text{C}/\text{m}^2$ such that length of rod makes an angle of 30° with electric field generated by charge sheet. Net torque acting on the rod is: (Take $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/\text{Nm}^2$)

[JEE Main 2025 (Online) 4th April Morning Shift]

- (1) 1.12 Nm (2) 2.24 Nm
(3) 11.2 Nm (4) 112 Nm

Scan or tap for the full solution



- Q.4** An electric dipole of mass m , charge q , and length l is placed in a uniform electric field $\vec{E} = E_0 \hat{i}$. When the dipole is rotated slightly from its equilibrium position and released, the time period of its oscillations will be :

[JEE Main 2025 (Online) 29th January Morning Shift]

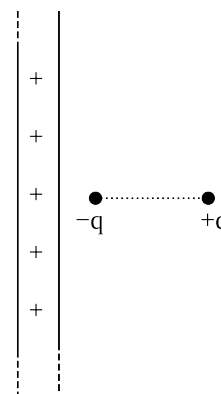
- (1) $\frac{1}{2\pi} \sqrt{\frac{ml}{2qE_0}}$ (2) $2\pi \sqrt{\frac{ml}{2qE_0}}$
(3) $2\pi \sqrt{\frac{ml}{qE_0}}$ (4) $\frac{1}{2\pi} \sqrt{\frac{2ml}{qE_0}}$

Scan or tap for the full solution



- Q.5** An electric dipole is placed at a distance of 2 cm from an infinite plane sheet having positive charge density σ_0 . Choose the correct option from the following.

[JEE Main 2025 (Online) 29th January Evening Shift]



- (1) Torque on dipole is zero and net force is directed away from the sheet.
(2) Potential energy of dipole is minimum and torque is zero.
(3) Potential energy and torque both are maximum.
(4) Torque on dipole is zero and net force acts towards the sheet.

Scan or tap for the full solution



ANSWER KEY

Ques.	1	2	3	4	5						
Ans.	1	4	1	2	2						