

PART 1 - PHYSICS

Topic : Electric charges and fields

SECTION-A : (Maximum Marks : 8)

This section contains **TWO** questions.

Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is(are) correct answer(s).

For each question, choose the option(s) corresponding to (all) the correct answer(s).

Answer to each question will be evaluated according to the following marking scheme :

Full Marks : +4 ONLY if (all) the correct option(s) is(are) chosen;

Partial Marks : +3 If all the four options are correct but ONLY three options are chosen;

Partial Marks : +2 If three or more options are correct but ONLY two options are chosen, both of which are correct;

Partial Marks : +1 If two or more options are correct but ONLY one option is chosen and it is a correct option;

Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered);

Negative Marks : -1 In all other cases.

For example, in a question, if (A), (B) and (D) are the ONLY three options corresponding to correct answers, then choosing ONLY (A), (B) and (D) will get +4 marks; choosing ONLY (A) and (B) will get +2 marks; choosing ONLY (A) and (D) will get +2 marks; choosing ONLY (B) and (D) will get +2 marks; choosing ONLY (A) will get +1 mark; choosing ONLY (B) will get +1 mark; choosing ONLY (D) will get +1 mark; choosing no option (i.e. the question is unanswered) will get 0 marks; and choosing any other combination of options will get -1 marks.

1. Consider an electric dipole comprising two charges $+q$ and $-q$ each with mass m , separated by a fixed distance d and initially at rest with its dipole moment pointing along $\hat{i}$. A uniform electric field $E\hat{j}$ is turned on at time $t = 0$ and it is turned off at $t = t_f$, when the dipole moment makes an angle θ_f with $\hat{i}$. Neglecting any sources of energy loss, correct option(s) is/are:

[JEE Advanced 2026 Paper 2]

(A) The center of mass of the dipole is deflected towards $\hat{j}$ in the presence of the field.

(B) If the magnitude of the final angular velocity $\omega_f = \sqrt{\frac{2qE}{md}}$, then $\theta_f = \frac{\pi}{6}$.

(C) If $\theta_f = \pi/3$, then the change in kinetic energy of the dipole is given by $2\sqrt{3} qEd$.

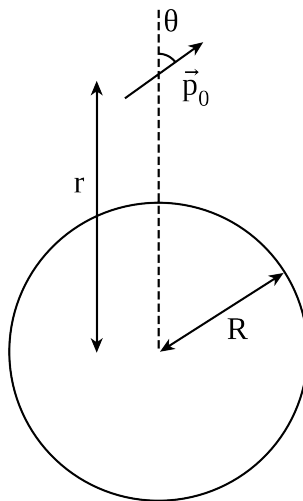
(D) For $\theta_f = \pi/4$, the dipole rotates around its center of mass with a constant angular velocity after $t > t_f$.

Scan or tap for the
full solution



Space for Rough Work

2. A small electric dipole $\vec{p}_0$, having a moment of inertia I about its center, is kept at a distance r from the center of a spherical shell of radius R . The surface charge density σ is uniformly distributed on the spherical shell. The dipole is initially oriented at a small angle θ as shown in the figure. While staying at a distance r , the dipole is free to rotate about its center.



If released from rest, then which of the following statement(s) is(are) correct?

$[\epsilon_0$ is the permittivity of free space.]

[JEE Advanced 2024 Paper 2]

- (A) The dipole will undergo small oscillations at any finite value of r .
 (B) The dipole will undergo small oscillations at any finite value of $r > R$.

(C) The dipole will undergo small oscillations with an angular frequency of $\sqrt{\frac{2\sigma p_0}{\epsilon_0 I}}$ at $r = 2R$.

(D) The dipole will undergo small oscillations with an angular frequency of $\sqrt{\frac{\sigma p_0}{100\epsilon_0 I}}$ at $r = 10R$.

Scan or tap for the full solution



Space for Rough Work

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

Test Pattern : JEE (Advanced)

ANSWER KEY

SECTION-A

[illegible]