

## PART 1 - PHYSICS

Topic : Moving charges and magnetism

## SECTION-A : (Maximum Marks : 4)

This section contains **ONE** question.

Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is the correct answer.

For each question, choose the option corresponding to the correct answer.

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

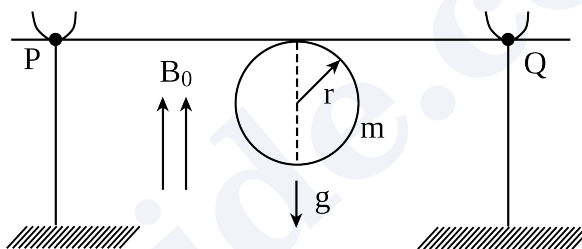
Full Marks : +4 If **ONLY** the correct option is chosen;

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

Negative Marks : -1 In all other cases.

1. A thin stiff insulated metal wire is bent into a circular loop with its two ends extending tangentially from the same point of the loop. The wire loop has mass  $m$  and radius  $r$  and it is in a uniform vertical magnetic field  $B_0$ , as shown in the figure. Initially, it hangs vertically downwards, because of acceleration due to gravity  $g$ , on two conducting supports at P and Q. When a current  $I$  is passed through the loop, the loop turns about the line PQ by an angle  $\theta$  given by

[JEE Advanced 2024 Paper 2]



- (A)  $\tan \theta = \pi r I B_0 / (mg)$  (B)  $\tan \theta = 2\pi r I B_0 / (mg)$  (C)  $\tan \theta = \pi r I B_0 / (2mg)$  (D)  $\tan \theta = mg / (\pi r I B_0)$

Scan or tap for the full solution



Space for Rough Work

**SECTION-B : (Maximum Marks : 8)**

This section contains **TWO** questions.

The answer to each question is a **NUMERICAL VALUE**.

For each question, enter the correct numerical value of the answer (in decimal notation, truncated / rounded-off to the **SECOND DECIMAL PLACE**; e.g. 6.25, 7.00, -0.33, -.30, 30.27, -127.30) in the place designated to enter the answer.

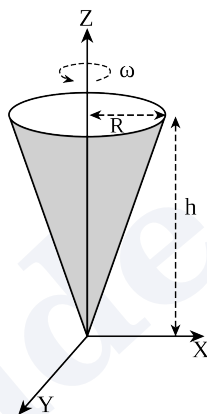
Answer to each question will be evaluated according to the following marking scheme :

Full Marks : +4 If **ONLY** the correct answer is entered;

Zero Marks : 0 In all other cases.

2. A hollow, right circular cone of base radius  $R$  and height  $h$ , with its tip at the origin is rotating about the  $Z$ -axis with an angular velocity  $\omega$ , as shown in the figure. The cone carries a total charge  $Q$  uniformly distributed on its curved surface. The magnitude of magnetic field at a point  $(0, 0, z)$ , where  $z \gg R$  and  $z \gg h$ , is  $\frac{n\mu_0 QR^2\omega}{4\pi z^3}$ . The value of  $n$  is:

[JEE Advanced 2026 Paper 1]



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3. A conducting solid sphere of radius  $R$  and mass  $M$  carries a charge  $Q$ . The sphere is rotating about an axis passing through its center with a uniform angular speed  $\omega$ . The ratio of the magnitudes of the magnetic dipole moment to the angular momentum about the same axis is given as  $\alpha \frac{Q}{2M}$ . The value of  $\alpha$  is \_\_\_\_

[JEE Advanced 2025 Paper 2]

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**Space for Rough Work**

# JEE ADVANCED MOVING CHARGES AND MAGNETISM — TORQUE ON A CURRENT LOOP, MAGNETIC DIPOLE MOMENT — PYQS

Test Pattern : **JEE (Advanced)**

## ANSWER KEY

## SECTION-A

[illegible]

## SECTION-B

|              |      |              |  |  |  |  |  |  |  |  |
|--------------|------|--------------|--|--|--|--|--|--|--|--|
| <b>Ques.</b> | 2    | 3            |  |  |  |  |  |  |  |  |
| <b>Ans.</b>  | 0.50 | 1.65 to 1.67 |  |  |  |  |  |  |  |  |