

PhysicsByAaryan

CSIR NET . GATE . JEST . BARC - Physics

Rotation Motion - CSIR NET Physics PYQs

Classical Mechanics . All PYQs (2015-2025) with answer key

8 questions . Answer key included

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Q1. [Dec 2015] . 3.5 marks

Classical Mechanics > Rotation Motion

CSIR NET	2015 Dec	3.5 M
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Two masses m each, are placed at the points $(x, y) = (a, a)$ and $(-a, -a)$ and two masses, $2m$ each, are placed at the points $(a, -a)$ and $(-a, a)$. The principal moments of inertia of the system are

1. $2m^2, 4ma^2$
2. $4ma^2, 8ma^2$
3. $4ma^2, 4ma^2$
4. $8ma^2, 8ma^2$

Q2. [June 2020] . 3.5 marks

Classical Mechanics > Rotation Motion

CSIR NET	2020 June	3.5M
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A frictionless horizontal circular table is spinning with a uniform angular velocity ω about the vertical axis through its centre. If a ball of radius a is placed on it at a distance r from the centre of the table, its linear velocity will be

1. $-r\omega\hat{r} + a\omega\hat{\theta}$
2. $r\omega\hat{r} + a\omega\hat{\theta}$
3. $a\omega\hat{r} + r\omega\hat{\theta}$
4. 0 (zero)

Q3. [June 2022] . 5.0 marks

Classical Mechanics > Rotation Motion

CSIR NET	2022 June	5M
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Earth may be assumed to be an axially symmetric freely rotating rigid body. The ratio of the principal moments of inertia about the axis of symmetry and an axis perpendicular to it is 33:32. If T_0 is the time taken by earth to make one rotation around its axis of symmetry, then the time period of precession is closest to

1. $33T_0$
2. $33T_0/2$
3. $32T_0$
4. $16T_0$

Q4. [June 2023] . 3.5 marks

Classical Mechanics > Rotation Motion

CSIR NET	2023 June	3.5M
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A uniform circular disc on the xy -plane with its centre at the origin has a moment of inertia I_0 about the x axis. If the disc is set in rotation about the origin with an angular velocity $\omega = \omega_0(\hat{j} + \hat{k})$, the direction of its angular momentum is along

1. $-\hat{i} + \hat{j} + \hat{k}$
2. $-\hat{i} + \hat{j} + 2\hat{k}$
3. $\hat{j} + 2\hat{k}$
4. $\hat{j} + \hat{k}$

Q5. [June 2024] . 3.5 marks

Classical Mechanics > Rotation Motion

CSIR NET	2024 June	3.5M
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A uniform plane square sheet of mass m is centered at the origin of an inertial frame. The sheet is rotating about an axis passing through the origin. At an instant when all its vertices lie on x and y axes, the angular momentum is $\vec{L} = I_0\omega_0(2\hat{i} + \hat{j} + 2\hat{k})$, where I_0 is the moment of inertia about the x axis. At this instant, the angular velocity of the sheet is

1. $(2\hat{i} + \hat{j} + 2\hat{k})\omega_0$
2. $(2\hat{i} + \hat{j} + \hat{k})\omega_0$
3. $(2\hat{i} + \hat{j})\omega_0$
4. $(\hat{i} + \hat{j})\omega_0$

Q6. [Dec 2025] . 3.5 marks

Classical Mechanics > Rotation Motion

CSIR NET	2025 Dec	3.5M	CM
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A fly of mass m rests on the edge of a uniform horizontal disc of radius R and mass M . The disc is free to rotate about the vertical axis through its center. Initially the disc is stationary. The fly starts to walk around the circumference of the disc with speed v relative to the disc. The speed of the fly for a stationary observer is

1. $\frac{mv}{M+2m}$
2. $\frac{Mv}{M-2m}$
3. $\frac{Mv}{M+2m}$
4. $\frac{mv}{M-2m}$

Q7. [Dec 2025] . 3.5 marks

Classical Mechanics > Rotation Motion

CSIR NET	2025 Dec	3.5M	CM
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The position and velocity vector of a particle changes from \vec{R}_1 to \vec{R}_2 and \vec{V}_1 to \vec{V}_2 as time changes from t_1 to t_2 . If $\vec{r}(t), \vec{a}(t)$ are instantaneous position and acceleration vectors of the particle then the integral

$$I = \int_{t_1}^{t_2} dt(\vec{r}(t) \times \vec{a}(t)) \text{ is}$$

1. $\vec{R}_2 \times \vec{V}_1 - \vec{R}_1 \times \vec{V}_2$
2. $\vec{R}_2 \times \vec{V}_2 - \vec{R}_1 \times \vec{V}_1$
3. $\vec{R}_1 \times \vec{V}_1 - \vec{R}_2 \times \vec{V}_2$
4. $\vec{R}_1 \times \vec{V}_2 - \vec{R}_2 \times \vec{V}_1$

Q8. [June 2025] . 3.5 marks

Classical Mechanics > Rotation Motion

CSIR NET	2025 June	3.5M	CM
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Consider the earth to be a free rigid body symmetric about its north-south (z) axis. If the principal moments of inertia satisfy $I_z = 1.003I_x$, then its angular velocity (in the body fixed frame) would precess about the z -axis with a period of nearly

1. 167 days
2. 333 days
3. 556 days
4. 667 days

Answer Key

8 questions . Subject and topic for quick revision

Q. No	Subject	Topic	Answer
Q1	Classical Mechanics	Rotation Motion	2
Q2	Classical Mechanics	Rotation Motion	4
Q3	Classical Mechanics	Rotation Motion	3
Q4	Classical Mechanics	Rotation Motion	3
Q5	Classical Mechanics	Rotation Motion	2
Q6	Classical Mechanics	Rotation Motion	3
Q7	Classical Mechanics	Rotation Motion	2
Q8	Classical Mechanics	Rotation Motion	2

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