

JEE MAIN SYSTEM OF PARTICLES AND ROTATIONAL MOTION — TORQUE AND ANGULAR MOMENTUM — PYQS

Max. Marks: 20

Questions: 5

Section A (MCQ) — 4 questions

Q.1 The position of an object having mass 0.1 kg as a function of time t is given as $\vec{r} = (10t^2\hat{i} + 5t^3\hat{j})$ m. At $t = 1$ s, which of the following statements are **correct**?

- A. The linear momentum $\vec{p} = (2\hat{i} + 1.5\hat{j})$ kg·m/s.
 B. The force acting on the object $\vec{F} = (2\hat{i} + 3\hat{j})$ N.
 C. The angular momentum of the object about its origin $\vec{L} = 15\hat{k}$ J·s.
 D. The torque acting on the object about its origin $\vec{\tau} = 20\hat{k}$ N·m.

Choose the **correct** answer from the options given below: [JEE Main 2026 (Online) 2nd April Morning Shift]

- (1) A, B and C only (2) B, C and D only
 (3) A, C and D only (4) A, B and D only

Scan or tap for the
full solution



Q.2 When the position vector $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ changes sign as $-\vec{r}$, which one of the following vector will not flip under sign change?

[JEE Main 2026 (Online) 28th January Evening Shift]

- (1) Velocity (2) Linear momentum
 (3) Acceleration (4) Angular momentum

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Q.3 Two cars A and B each of mass 10^3 kg are moving on parallel tracks separated by a distance of 10 m, in same direction with speeds 72 km/h and 36 km/h. The magnitude of angular momentum of car A with respect to car B is _____ J·s.

[JEE Main 2026 (Online) 21st January Evening Shift]

- (1) 3.6×10^5 (2) 10^5
 (3) 3×10^5 (4) 2×10^5

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Q.4 Which of the following are correct expressions for torque acting on a body?
 ($\vec{r}$ = position vector; $\vec{p}$ = linear momentum; $\vec{L}$ = angular momentum; $\vec{\alpha}$ = angular acceleration; I = moment of inertia; $\vec{F}$ = force; t = time)

A. $\vec{\tau} = \vec{r} \times \vec{L}$

B. $\vec{\tau} = \frac{d}{dt}(\vec{r} \times \vec{p})$

C. $\vec{\tau} = \vec{r} \times \frac{d\vec{p}}{dt}$

D. $\vec{\tau} = I\vec{\alpha}$

E. $\vec{\tau} = \vec{r} \times \vec{F}$

Choose the correct answer from the options given below: [JEE Main 2025 (Online) 4th April Morning Shift]

- (1) A, B, D and E Only (2) C and D Only
 (3) B, C, D and E Only (4) B, D and E Only

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Section B (Numerical) — 1 question

Q.5 The coordinates of a particle with respect to origin in a given reference frame is (1, 1, 1) meters. If a force of $\vec{F} = \hat{i} - \hat{j} + \hat{k}$ acts on the particle, then the magnitude of torque (with respect to origin) in z-direction is _____.

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

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ANSWER KEY

Section A (MCQ) — 4 questions

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

Section B (Numerical) — 1 question

Ques.	5										
Ans.	2										