

PhysicsByAaryan

CSIR NET . GATE . JEST . BARC - Physics

Poisson brackets - CSIR NET Physics PYQs

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

5 questions . Answer key included

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Q1. [Dec 2016] . 3.5 marks

Classical Mechanics > Poisson brackets

CSIR NET	2016 Dec	3.5M
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A particle in two dimensions is in a potential $V(x, y) = x + 2y$. Which of the following (apart from the total energy of the particle) is also a constant of motion?

1. $p_y - 2p_x$
2. $p_x - 2p_y$
3. $p_x + 2p_y$
4. $p_y + 2p_x$

Q2. [Dec 2019] . 5.0 marks

Classical Mechanics > Poisson brackets

CSIR NET	2019 Dec	5M
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The Hamiltonian of a system with two degrees of freedom is $H = q_1 p_1 - q_2 p_2 + a q_1^2$, where $a > 0$ is a constant. The function $q_1 q_2 + \lambda p_1 p_2$ is a constant of motion only if λ is

1. 0
2. 1
3. $-a$
4. a

Q3. [Dec 2024] . 5.0 marks

Classical Mechanics > Poisson brackets

CSIR NET	2024 Dec	5M
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A non-relativistic particle of mass m and charge q is moving in a magnetic field $\vec{B}(x, y, z)$. If \vec{v} denotes its velocity and $\{\dots\}_{P.B.}$ denotes the Poisson Bracket, then $\epsilon_{ijk}\{v_i, v_j\}_{P.B.}$ is equal to

1. $-\frac{q}{m^2}B_k$
2. 0
3. $\frac{2q}{m^2}B_k$
4. $\frac{q}{m^2}B_k$

Q4. [June 2024] . 5.0 marks

Classical Mechanics > Poisson brackets

CSIR NET	2024 June	5M
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For a simple harmonic oscillator, the Lagrangian is given by

$$L = \frac{1}{2} \dot{q}^2 - \frac{1}{2} q^2$$

If $H(q, p)$ is the Hamiltonian of the system and $A(p, q) = \frac{1}{\sqrt{2}}(p + iq)$, the Poisson bracket $\{A, H\}$ is

1. iA
2. A^*
3. $-iA^*$
4. $-iA$

Q5. [June 2025] . 5.0 marks

Classical Mechanics > Poisson brackets

CSIR NET	2025 June	5M	CM
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For a free particle of mass m , consider the following time dependent quantity in phase space

$$Q = \frac{qp}{m} - \frac{p^2 t}{m^2},$$

where q and p are the canonically conjugate position and momentum coordinates respectively.

Then $\frac{dQ}{dt}$ is given by

1. 0

2. $\frac{p^2}{m^2}$

3. $-\frac{p^2}{m^2}$

4. $\frac{qp}{mt}$

Answer Key

5 questions . Subject and topic for quick revision

Q. No	Subject	Topic	Answer
Q1	Classical Mechanics	Poisson brackets	1
Q2	Classical Mechanics	Poisson brackets	1
Q3	Classical Mechanics	Poisson brackets	3
Q4	Classical Mechanics	Poisson brackets	1
Q5	Classical Mechanics	Poisson brackets	1

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