

PART 1 - PHYSICS

Topic : System of particles and rotational motion, Oscillations

SECTION-B : (Maximum Marks : 8)

This section contains **ONE** paragraph.

Based on each paragraph, there are **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.

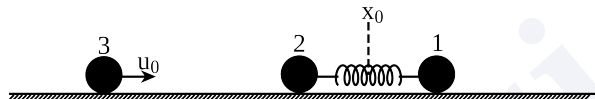
Answer to each question will be evaluated according to the following marking scheme :

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

Zero Marks : 0 In all other cases.

Paragraph for Questions 1 and 2

Two particles, 1 and 2, each of mass m , are connected by a massless spring, and are on a horizontal frictionless plane, as shown in the figure. Initially, the two particles, with their center of mass at x_0 , are oscillating with amplitude a and angular frequency ω . Thus, their positions at time t are given by $x_1(t) = (x_0 + d) + a \sin \omega t$ and $x_2(t) = (x_0 - d) - a \sin \omega t$, respectively, where $d > 2a$. Particle 3 of mass m moves towards this system with speed $u_0 = a\omega/2$, and undergoes instantaneous elastic collision with particle 2, at time t_0 . Finally, particles 1 and 2 acquire a center of mass speed v_{cm} and oscillate with amplitude b and the same angular frequency ω .



1. If the collision occurs at time $t_0 = 0$, the value of $v_{cm}/(a\omega)$ will be _____.

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Scan or tap for the full solution



2. If the collision occurs at time $t_0 = \pi/(2\omega)$, then the value of $4b^2/a^2$ will be _____.

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Scan or tap for the full solution



Space for Rough Work

**JEE ADVANCED SYSTEM OF PARTICLES AND
ROTATIONAL MOTION — MOTION OF CENTRE OF
MASS — PYQS**

Test Pattern : **JEE (Advanced)**

ANSWER KEY

SECTION-B

[illegible]