

PART 1 - PHYSICS

Topic : Oscillations

SECTION-1 : (Maximum Marks : 6)

- This section contains **TWO** questions.
- 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 : +3 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. Two beads, each with charge q and mass m , are on a horizontal, frictionless, non-conducting, circular hoop of radius R . One of the beads is glued to the hoop at some point, while the other one performs small oscillations about its equilibrium position along the hoop. The square of the angular frequency of the small oscillations is given by

[ϵ_0 is the permittivity of free space.]

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- (A) $q^2/(4\pi\epsilon_0 R^3 m)$ (B) $q^2/(32\pi\epsilon_0 R^3 m)$ (C) $q^2/(8\pi\epsilon_0 R^3 m)$ (D) $q^2/(16\pi\epsilon_0 R^3 m)$

Scan or tap for the
full solution



2. A block of mass 5 kg moves along the x -direction subject to the force $F = (-20x + 10)$ N, with the value of x in metre. At time $t = 0$ s, it is at rest at position $x = 1$ m. The position and momentum of the block at $t = (\pi/4)$ s are

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- (A) -0.5 m, 5 kg m/s (B) 0.5 m, 0 kg m/s (C) 0.5 m, -5 kg m/s (D) -1 m, 5 kg m/s

Scan or tap for the
full solution



Space for Rough Work

Test Pattern : **JEE (Advanced)**

SECTION-1

[illegible]