

Assertion Reasoning Type

(A) Both assertion and reason are true and reason is the correct explanation of Assertion.
 (B) Both assertion and reason are true and reason is not the correct explanation of assertion.
 (C) Assertion is true but reason is false.
 (D) Assertion is false but reason is true.

1) Assertion: For stable equilibrium force has to be zero and potential energy should be minimum.

Reason: For equilibrium, it is not necessary that the force is not zero.

2) Assertion: The work done in pushing a block is more than the work done in pulling the block is more than the work done in pulling the block on a rough surface.

Reason: In the pushing condition normal reaction is more.

3) Assertion: Potential energy is defined for only conservative forces

Reason : $\vec{F} = -\frac{dU}{dr} \hat{r}$

4) Assertion: An object of mass m is initially at rest. A constant force F acts on it. Then the velocity gained by the object in a fixed displacement is proportional to $\frac{1}{\sqrt{m}}$

Reason: For a given force and displacement velocity is always inversely proportional to root of mass.

Paragraph

Two identical beads are attached to free ends of two identical springs of spring constant $k = \frac{(2+\sqrt{3})}{\sqrt{3}R} mg$. Initially both springs make an angle of 60° at the fixed-point normal length of each spring is $2R$. Where R is the radius of smooth ring over which bead is sliding. Ring is placed on vertical plane and beads are at symmetry with respect to vertical line as diameter.

1) Normal reaction on one of the bead at initial moment due to ring is

a) $mg/2$ b) $\sqrt{3} mg/2$ c) mg d)) Insufficient data

2) Relative acceleration between two beads at the initial moment:

(A) $g/2$ vertically away from each other

(B) $g/2$ horizontally towards each other

(C) $2g/\sqrt{3}$ Vertically away from each other

(D) $2g/\sqrt{3}$ Horizontally towards each other

3) The speed of bead when spring is at normal length

a) $\sqrt{\frac{2gR}{5}}$ b) $\sqrt{\frac{3gR}{2}}$ c) $\sqrt{\frac{2gR}{3}}$ d) $\sqrt{\frac{3gR}{5}}$

4) Choose the correct statement

(A) Maximum angle made by spring after collision is same as that at initial moment.

(B) If the collision is perfectly inelastic, the total energy is conserved.

(C) If the collision is perfectly elastic, each bead undergoes SHM.

(D) Both linear momentum and angular momentum with respect to centre of smooth ring are conserved only at the instant of collision.