## **Self Practice Paper (SPP)**

A particle is observed from two frames S<sub>1</sub> and S<sub>2</sub>. The graph of relative velocity of S<sub>1</sub> with respect to S<sub>2</sub> is shown in figure . Let F<sub>1</sub> and F<sub>2</sub> be the pseudo forces on the particle when seen from S<sub>1</sub> and S<sub>2</sub> respectively . Which one of the following is not possible ?



2. Two particles of mass m each are tied at the ends of a light string of length 2a. The whole system is kept on a frictionless horizontal surface with the string held tight so that each mass is at a distance 'a' from the centre P (as shown in the figure). Now, the mid-point of the string is pulled vertically upwards with a small but constant force F. As a result, the particles move towards each other on the surface. The magnitude of acceleration, when the separation between them becomes 2x, is



3. A piece of wire is bent in the shape of a parabola y = kx2 (y-axis vertical) with a bead of mass m on it. The bead can slide on the wire without friction. It stays at the lowest point of the parabola when the wire is at rest. The wire is now accelerated parallel to the x-axis with a constant acceleration a. The distance of the new equilibrium position of the bead, where the bead can stay at rest with respect to the wire, from the y-axis is

$$\begin{array}{ccc} a \\ (1) \hline gk \\ (2) \hline 2gk \\ (3) \hline gk \\ (3) \hline gk \\ (4) \hline 4gk \\ (4) \hline 4g$$

**4.** A solid sphere of mass 2 kg is resting inside a cube as shown in the figure. The cube is moving with a velocity  $v = (5t\hat{i} + 2t\hat{j})m/s$ . Here t is the time in second. All surface are smooth. The sphere is at rest with respect to the cube. What is the total force exerted by the sphere on the cube. (Take g = 10 m/s<sup>2</sup>)



5. A particle of mass m, initially at rest, is acted upon by a variable force F for a brief interval of time T. It begins to move with a velocity u after the force stops acting. F is shown in the graph as a function of time. The curve is a semicircle.



6. Wedge of 10 kg is free to move on horizontal surface. At the given instant, acceleration of wedge is (string and pulleys are ideal)



(1) 2 m/s<sub>2</sub> towards right (2) 2 m/s<sub>2</sub> towards left (3) 1 m/s<sub>2</sub> toward left (4) 1 m/s<sub>2</sub> toward right

