Consider a drop of rain water having mass 1 g falling from a height of 1 km. It hits the ground with a speed of 50 m/s. Take g constant with a value 10 m/s<sup>2</sup>. The work done by the (i) gravitational force and the (ii) resistive force of air is

- (1) (i) 10 J (ii) 8.25 J
- (2) (i) 1.25 J (ii) -8.25 J
- (3) (i) 100 J (ii) 8.75 J
- (4) (i) 10 J (ii) -8.75 J

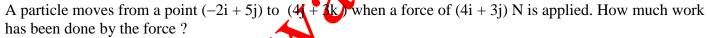
## 2016

A bullet of mass 10g moving horizontally with a velocity of 400 m/s strikes a wooden block of mass 2 kg which is suspended by a light inextensible string of length 5 m. As a result, the centre of gravity of the block is found to rise a vertical distance of 10 cm. The speed of the bullet after it emerges out horizontally from the block will be:-

(1) 120 m/s (2) 160 m/s (3) 100 m/s (4) 80 m/s

Two identical balls A and B having velocities of 0.5 m/s and -0.3 m/s respectively collide elastically in one dimension. The velocities of B and A after the collision respectively will be :-

(1) -0.3 m/s and 0.5 m/s (2) 0.3 m/s and 0.5 m/s (3) -0.5 m/s and 0.3 m/s (4) 0.5 m/s and -0.3 m/s



- (1) 5 J
- (2) 2 J
- (3) 8 J
- (4) 11 1

## 2016

A particle of mass 10 g moves along a circle of radius 6.4 cm with a constant tangential acceleration. What is the magnitude of this acceleration if the kinetic energy of the particle becomes equal to  $8 \times 10^{-4}$  J by the end of the second revolution after the beginning of the motion? [2016]

- (a)  $0.1 \text{ m/s}^2$
- (b)  $0.15 \text{ m/s}^2$
- (c)  $0.18 \text{ m/s}^2$
- (d)  $0.2 \text{ m/s}^2$

A body of mas, 1 kg begins to move under the action of a time dependent force  $F = (2ti+3t^2j) N$ , where i and j are unit vectors along x and y axis. What power will be developed by the force at the time t? [2016]

- (a)  $(2t^2 + 3t^3)$ W
- (b)  $(2t^2 + 4t^4)W$
- (c)  $(2t^3 + 3t^4)$  W
- (d)  $(2t^3 + 3t^5)W$