2017

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^2. 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

A particle moves from a point (–2i + 5j) to (4j + 3k) when a force of (4i + 3j) N is applied. How much work has been done by the force ?

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

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 8×10^{-4} J by the end of the second revolution after the beginning of the motion ? **[2016]**

(a) 0.1 m/s^2 (b) 0.15 m/s^2 (c) 0.18 m/s^2 (d) 0.2 m/s^2

A body of mass 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