11. Gravel is dropped on a conveyor belt at the rate of 2 kg/s. The extra force required to keep the belt moving at $3ms^{-1}$ is
(1) 1 N (2) 3 N (3) 4 N (4) 6 N

12. A body of mass m1 exerts a force on another body of mass m_2. If the magnitude of acceleration of m_2 is a_2, then the magnitude of the acceleration of m_1 is (considering only two bodies in space)
(1) Zero (2) $\frac{m_2 a_2}{m_1}$ (3) $\frac{m_1 a_1}{m_2}$ (4) a_2

13. The linear momentum p of a body of mass 5 kg varies with time t as, $p = 5t^2 + t + 5$ It follows that the body is moving with
(1) constant acceleration (2) constant speed
(3)variable acceleration which is increasing with time
(4)variable retardation which is decreasing with time

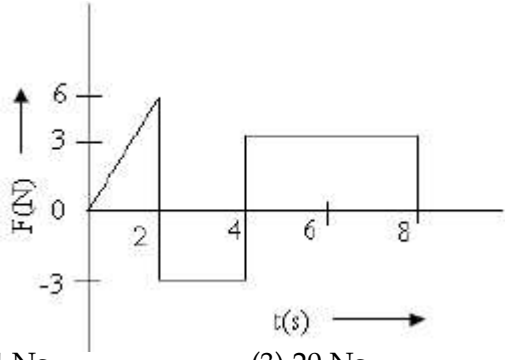
14. A ball of mass 2 kg moving with a velocity of 4 m/sec strikes a wall normally and bounces back with the same speed. If the time of contact between the ball and the wall is one millisecond, the average force exerted by the wall on the ball is
(1) 2000 N (2) 16000 N (3) 4000 N (4) 8000 N

15. A bullet of mass 10 g is fired from a gun of mass 1 kg with recoil velocity of gun 5 m/s. The muzzle velocity will be
(1) 30 km/min (2) 60 km/min (3) 30 m/s (4) 500 m/s

16. Three forces are acting on a particle of mass 'm' initially in equilibrium. If the first 2 forces $\left(\vec{F}_1 \& \vec{F}_2\right)$ are perpendicular to each other and suddenly the third force $\left(\vec{F}_3\right)$ is removed, then the magnitude of acceleration of the particle is
(1) $\frac{F_3}{m}$ (2) $\frac{F_1 + F_2}{m}$ (3) $\frac{F_1 - F_2}{m}$ (4) $\frac{F_1}{m}$

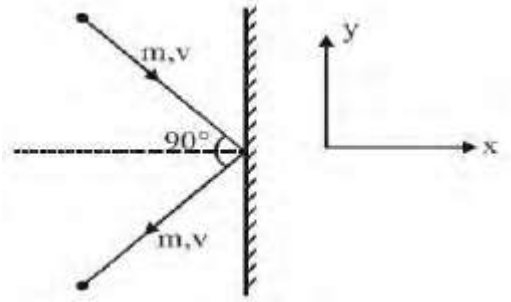
17. A constant forces (F) is applied on a stationary particle of mass M. The velocity attained by particle in certain displacement will be proportional to
(1) m (2) $\frac{1}{m}$ (3) $\sqrt{m}$ (4) $\frac{1}{\sqrt{m}}$

18. The force 'F' acting on a particle of mass 'm' is indicated by the force – time graph shown below. The change in momentum of the particle over the time interval from zero to 8s is:



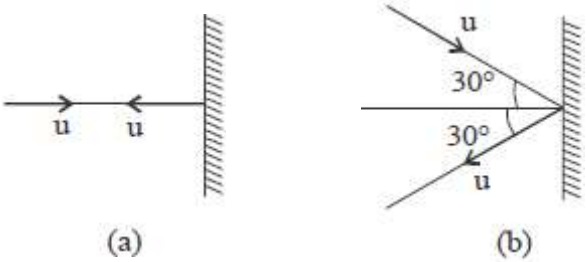
(1) 6Ns (2) 24 Ns (3) 20 Ns (4) 12Ns

19. If a ball collides with a wall at an angle of 45° and rebounds perpendicularly with to its initial direction then find the impulse acting on the ball



(1) $-2mv\cos 45^{o}\hat{i}$ (2) $2mv\cos 45^{o}\hat{i}$ (3) $mv\cos 45^{o}\hat{i}$ (4) $-mv\cos 45^{o}\hat{i}$

20. What is the direction of force on the wall due to the ball in two cases shown in the figures?



(a) (b)

(1) In (a) force is normal to the wall and in (b) force is inclined at 30° to the normal.
(2) In (a) force is normal to the wall and in (b) force is inclined at 60° to the normal.
(3) In (a) the force is along the wall and in (b) force is normal to the wall.
(4) In (a) and (b) both the force is normal to the wall.