
Concise
English

# CHAPTER- IMPULSE AND MOMENTUM

176. The momentum of a particle is given by $\vec{P} = (4\sin t\,\hat{i} - 4\cos t\,\hat{j})$ kg m/s. Select the correct alternative

(a) Momentum $P$ of the particle is always parallel to $F$.

(b) Momentum $P$ of the particle is always perpendicular to $F$.

(c) Magnitude of momentum $P$ is variable.

(d) None of the above.

177. A uniform sphere is placed on a smooth horizontal surface and a horizontal force $F$ is applied on it at a distance $h$ above the surface. The acceleration of the centre

(a) is maximum at $h = 0$ (b) is maximum when $h = R$

(c) is maximum when $h = 2R$ (d) is independent of $h$.

178. A body at rest breaks into two pieces of equal masses. The parts will move

(a) in same direction (b) along different lines

(c) in opposite directions with equal speeds (d) in opposite directions with unequal speeds

179. Two blocks of masses 10 kg and 4 kg are connected by a spring of negligible mass and placed on a frictionless horizontal surface. An impulse gives a velocity of 14 m/s to the heavier block in the direction of the lighter block. The velocity of the center of mass is

(a) 30 m/s (b) 20 m/s (c) 10 m/s (d) 5 m/s

180. A ball strikes a frictonless horizontal floor at an angle $\theta = 45^0$. The coefficient of restitution between the ball and the floor is $e = \frac{1}{2}$. The fraction of its kinetic energy lost in collision is

(a) 5/8 (b) 3/8 (c) 3/4 (d) 1/4

181. A particle of mass $M$ is moving in a horizontal circle of radius $R$ with uniform speed $V$. When it moves from one point to a diametrically opposite point its:

(a) momentum does not change (b) Momentum changes by $2MV$

(c) KE changes by $MV^2$ (d) KE changes by $\frac{1}{4}MV^2$

182. A lead ball strikes a wall and falls down. A tennis ball having the same mass and velocity strikes the same wall and bounces back. Which is the correct statement

(a) The tennis ball suffers a greater change in momentum

(b) The lead ball suffers a greater change in momentum

(c) Both the balls suffers equal change in momentum

(d) The momentum of lead ball is greater than that of tennis ball

183. KE of a body of mass $m$ and momentum $p$, is given by

(a) $mp$ (b) $\frac{p^2}{2m}$ (c) $p^2m$ (d) $m^2/2p$

184. A light and a heavy body have equal KE which one has a greater momentum

(a) The light body

(b) The heavy body

(c) Both have equal momenta

(d) It is not possible to say anything without additional information

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After collision big ball obtains velocity $v$. Then what is the value of $v$ ($e = 1$)

(a) $\frac{M-m}{M+m}u$ (b) $\frac{m}{M+m}u$ (c) $\frac{2m}{M+m}u$ (d) $\frac{M}{M+m}u$

187. A metal ball of mass 2 kg moving with a velocity of 36 km/h has an head on collision with a stationary ball of mass 3 kg. If after the collision, the two balls move together, the loss in kinetic energy due to collision is

(a) 40 $J$ (b) 60 $J$ (c) 100 $J$ (d) 140 $J$

188. A body of mass $m_1$ is moving with a velocity $V$. It collides with another stationary body of mass $m_2$. They get combined. At the point of collision, the velocity of the system

(a) Increases (b) Decreases but does not become zero
(c) Remains same (d) Become zero

189. If a ball is thrown upwards from the surface of earth

(a) The earth remains stationary while the ball moves upwards
(b) The ball remains stationary while the earth moves downwards
(c) The ball and earth both moves towards each other
(d) The ball and earth both moves away from each other

190. A shell explodes and many pieces fly off in different directions. The following is conserved

(a) Kinetic energy (b) Momentum
(c) Neither momentum nor KE (d) Momentum and KE

191. A bullet in motion hits and gets embedded in a solid block resting on a frictionless table. What is conserved?

(a) Momentum and KE (b) Kinetic energy alone
(c) Neither KE nor momentum (d) Momentum alone

192. A particle of mass $m$ moving with velocity $v_o$ collides elastically with another stationary particle of same mass $m$. The velocity of the first particle as observed from the reference frame of center of mass of the two particle system

(a) remains constant
(b) changes by $v_o$ in the direction of motion of center of mass
(c) changes by $v_o$ in opposite direction to the motion of center of mass
(d) changes by $v_o/2$ in the direction of motion of center of mass.

193. A particle moving horizontally with a velocity $u$ strikes a fixed frictionless sphere at a height

(c) Move in irregular path

(d) Move in the parabolic path the unexploded bomb would have travelled

196. A man weighing 80 kg standing a trolley weighing 320 kg. The trolley is resting on frictionless horizontal rails. If the man starts walking on the trolley along the rails at speed 1 m/s then after 4s his displacement relative to the ground will be

(a) 5 m (b) 4.8 m (c) 3.2 m (d) 3.0 m

**197.** A ball is dropped $h$ m above the floor if $e$ is the coefficient of restitution, then after collision it rebounds to a height of

(a) $eh$ (b) $e^2h$ (c) $e^3h$ (d) $(1 + e)h$

198. If two balls collide in the air in the presence of gravity, the conservation of momentum is valid, because

(a) there is no force acting on the two ball system

(b) force of gravity is very lesser than the impulsive force

(c) impulsive force is very lesser than the gravity

(d) gravity is not acting during collision

199. A surface is hit elastically and normally by $n$ balls per unit time, all the balls having the same mass $m$ and moving with the same velocity $u$. The force on the surface is:

(a) $mnu^2$ (b) $2mnu$ (c) $\frac{1}{2}mnu^2$ (d) $2mnu^2$

200. A canon ball is fired with a velocity of 200 m/s at an angle of 60° with the horizontal. At the highest point of its flight it explodes into 3 equal fragments, one going vertically upwards with a velocity 100 m/s, the second one falling vertically downwards with a velocity 100 m/s. The third fragment will be moving with a velocity

(a) 100 m/s in the horizontal direction

(b) 300 m/s in the horizontal direction

(c) 300 m/s in a direction making an angle of 60° with the horizontal

(d) 200 m/s in a direction making an angle of 60° with the horizontal