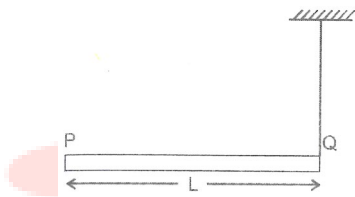


PHYSICS

21. Which of the following has centre of mass not situated in the material of the body?
- (1) A rod bent in the form of a circle
 - (2) Football
 - (3) Hand ring
 - (4) All of the above
22. A wheel has angular acceleration of 3.0 rad s^{-2} and an initial angular speed of 2.00 rad s^{-1} . In a time of 2 sec it has rotated through an angle (in radian) of
- (1) 10
 - (2) 12
 - (3) 4
 - (4) 6
23. A rod PQ of mass M and length L is hinged at end P. The rod is kept horizontal by a massless string tied to point Q as shown in figure. When string is cut, the initial angular acceleration of the rod is



- (1) $\frac{g}{L}$
 - (2) $\frac{2g}{L}$
 - (3) $\frac{2g}{3L}$
 - (4) $\frac{3g}{2L}$
24. A constant torque of 1000 N-m turns a wheel of moment of inertia 200 kg-m^2 about an axis through its centre. Its angular velocity after 3 seconds is
- (1) 1 rad s^{-1}
 - (2) 5 rad s^{-1}
 - (3) 10 rad s^{-1}
 - (4) 15 rad s^{-1}
25. A couple produces
- (1) no motion
 - (2) purely linear motion
 - (3) purely rotational motion
 - (4) linear and rotational
26. The angular momentum of a body with mass (m), moment of inertia (I) and angular velocity (ω) rad/sec is equal to
- (1) $I\omega$
 - (2) $I\omega^2$
 - (3) $\frac{I}{\omega}$
 - (4) $\frac{I}{\omega^2}$

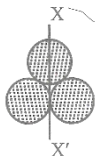
27. If \vec{F} is the force acting on a particle having position vector \vec{r} and $\vec{\tau}$ be the torque of this force about the origin, then
- (1) $\vec{r} \cdot \vec{\tau} > 0$ and $\vec{F} \cdot \vec{\tau} < 0$
 - (2) $\vec{r} \cdot \vec{\tau} = 0$ and $\vec{F} \cdot \vec{\tau} = 0$
 - (3) $\vec{r} \cdot \vec{\tau} = 0$ and $\vec{F} \cdot \vec{\tau} \neq 0$
 - (4) $\vec{r} \cdot \vec{\tau} \neq 0$ and $\vec{F} \cdot \vec{\tau} = 0$

28. Consider a system of two particles having masses m_1 and m_2 . If the particle of mass m_1 is pushed towards the centre of mass of particles through a distance d, by what distance would the particle of mass m_2 move so as to keep the centre of mass of particles at the original position?

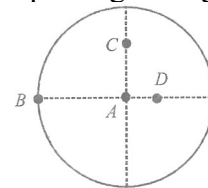
- (1) $\frac{m_2}{m_1} d$
- (2) $\frac{m_1}{m_1 + m_2} d$
- (3) $\frac{m_1}{m_2} d$
- (4) d

29. Three identical spherical shells, each of mass m and radius r are placed as shown in figure. Consider an axis XX' which is touching to two shells and passing through diameter of third shell. Moment of inertia of the system consisting of these three spherical shells about XX' axis is

- (1) $3mr^2$
- (2) $\frac{16}{5}mr^2$
- (3) $4mr^2$
- (4) $\frac{11}{5}mr^2$



30. The moment of inertia of a uniform circular disc is maximum about an axis perpendicular to the disc and passing through



- (1) B
- (2) C
- (3) D
- (4) A