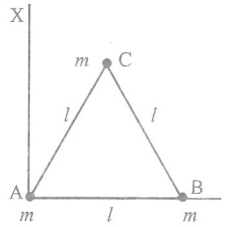
# PHYSICS

31. Three particles, each of mass m gram, are situated at the vertices of an equilateral triangle ABC of side $l$ cm (as shown in the figure). The moment of inertia of the system about a line AX perpendicular to AB and in the plane of ABC, in gram-cm$^2$ units will be




(1) $\frac{3}{2}ml^2$ (2) $\frac{3}{4}ml^2$

(3) $2ml^2$ (4) $\frac{5}{4}ml^2$

32. A fly wheel rotating about a fixed axis has a kinetic energy of 360 joule when its angular speed is 30 radian/sec. The moment of inertia of the wheel about the axis of rotation is

(1) 0.6 kg/m$^2$ (2) 0.15 kg/m$^2$

(3) 0.8 kg/m$^2$ (4) 0.75 kg/m$^2$

33. A rod of weight w is supported by two parallel knife edges A and B and is in equilibrium in a horizontal position. The knives are at a distance d from each other. The centre of mass of the rod is at distance x from A. The normal reaction on A is

(1) $\frac{wx}{d}$ (2) $\frac{wd}{x}$

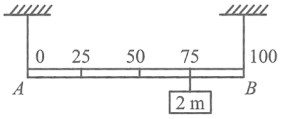
(3) $\frac{w(d-x)}{x}$ (4) $\frac{w(d-x)}{d}$

34. Two discs having mass ratio 1 : 2 and diameter ratio 2 : 1, then find the ratio of moment of inertia.

(1) 2 : 1 (2) 1 : 1

(3) 1 : 2 (4) 2 : 3

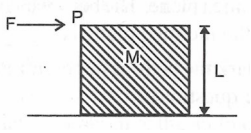
35. Shown in the figure is rigid and uniform one meter long rod AB held in horizontal position by two strings tied to its ends and attached to the ceiling. The rod is of mass m and has another weight of mass 2 m hung at a distance of 75 cm from A. The tension in the string at A is




(1) 0.5 mg (2) 2 mg

(3) 0.75 mg (4) 1 mg

36. A cubical block of side L rests on a rough horizontal surface with coefficient of friction μ. A horizontal force F is applied on the block as shown. If the coefficient of friction is sufficiently high so that the block does not slide before toppling, the minimum force required to topple the block is




(1) infinitesimal (2) $\frac{mg}{4}$

(3) $\frac{mg}{2}$ (4) mg (1 – μ)

37. The moment of inertia of a disc of mass M and radius R about an axis which is tangential to the circumference of the disc and parallel to its diameter, is

(1) $\frac{5}{4}MR^2$ (2) $\frac{3}{2}MR^2$

(3) $\frac{4}{5}MR^2$ (4) $\frac{2}{3}MR^2$

38. If the equation for the displacement of a particle moving on a circular path is given by $\theta = 2t^3 + 0.5$ where θ is in radians and t in seconds, then the angular velocity of the particle at t = 2 sec is

(1) 24 rad s$^{-1}$ (2) 12 rad s$^{-1}$

(3) 8 rad s$^{-1}$ (4) 36 rad s$^{-1}$

39. If the earth is treated as a sphere of radius R and mass M its angular momentum about the axis of its rotation with period T, is

(1) $\frac{MR^2T}{2\pi}$ (2) $\frac{4\pi MR^2}{5T}$

(3) $\frac{\pi MR^3}{T}$ (4) $\frac{2\pi MR^2}{T}$

40. What is the moment of inertia for a solid sphere w.r.t. a tangent touching to its surface?

(1) $\frac{2}{5}MR^2$ (2) $\frac{7}{5}MR^2$

(3) $\frac{2}{3}MR^2$ (4) $\frac{5}{3}MR^2$