ROTATIONAL MOTION.

Equilibrium of rigid bodies.

A rigid body is said to be in equilibrium if both the linear momentum and angular momentum of the rigid body is a constant.

ie the conditions for equilibrium are,

1. the total force ie, the vector sum of the forces, on the rigid body is zero.

$$\vec{F}_1 + \vec{F}_2 + \cdots + \vec{F}_n = 0.$$

ie, the linear momentum of the body does not change.

2. the total torque ie, the vector sum of the torques on the rigid body is zero.

ie, $\vec{\tau}_1 + \vec{\tau}_2 + \cdots + \vec{\tau}_n = 0.$

ie, the angular momentum of the body remains as a constant. This is the condition for translational equilibrium.

Comparison of translational and Rotational Motion

Refer page No : 170 text book.

Questions

1. What will be the duration of the day if the earth suddenly shrinks to $\frac{1}{64}$ of its original volume, mass remaining the same?
2. If angular momentum 'L' of a system is conserved, whose M.I is decreased, will its rotational K.E also be conserved? Explain.
3. Obtain the relation between angular momentum, rotational K.E and M.I. of a rigid body.