A bob of mass m attached to an inextensible string of length l is suspended from a vertical support. The bob rotates in a horizontal circle with an angular speed ω rad/s about the vertical. About the point of suspension :

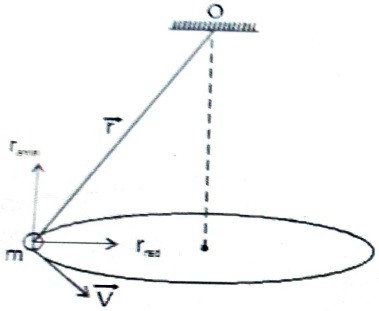
(A) angular momentum is conserved. **[JEE MAIN 2014]**

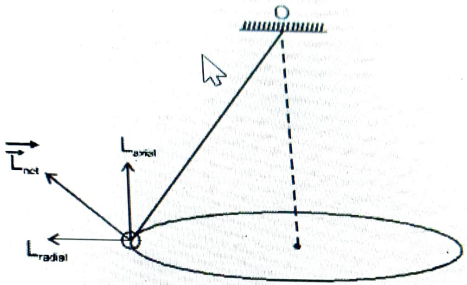
(B) angular momentum changes in magnitude but not in direction.

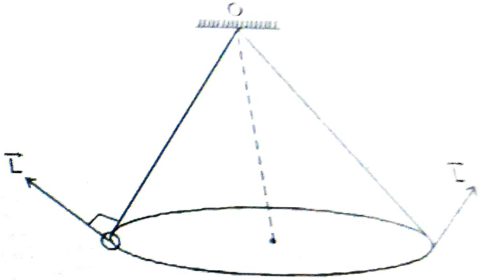
(C) angular momentum changes in direction but not in magnitude.

(D) angular momentum changes both in direction and magnitude.

Sol.







Angular momentum of the pendulum about the suspension point 'O' is

$$\vec{L} = m(\vec{r} \times \vec{v})$$

Then $\vec{r}$ can be resolved into two components, radial component r_{rad}, and axial component r_{axial}. Due to r_{rad}, L will be axial and due to r_{axial}, L will be radially outwards as shown.