

$$L = I\omega$$

differentiating above Eq. w.r.t time $\left(\frac{d\omega}{dt} = \alpha\right)$

$$\frac{dL}{dt} = \frac{d}{dt}(I\omega)$$

$$= I \frac{d\omega}{dt} \quad (\because I = \text{const})$$

$$\frac{dL}{dt} = I\alpha$$

$$\boxed{\frac{dL}{dt} = \tau} \quad \checkmark \quad - (2)$$

Note: For translational Motion $L \rightarrow p, \tau \rightarrow F$

$$\frac{dp}{dt} = F$$