EngineeringRise

Torque, angular momentum and its conservation

Formulas and units, JEE Main. Status: Reviewed on 2026-11-20.

Result	Formula	Units or note
Torque	tau = r x F; magnitude r F sin(theta) = F d_perp Valid when: r from reference point to the point where F acts; theta is angle between r and F	N m
Couple	tau = F d Valid when: two equal, opposite, parallel forces; d is perpendicular distance between them	N m
Angular momentum of a particle	L = r x p; magnitude m v d_perp Valid when: point particle; r from reference point; d_perp is perpendicular distance to velocity line	kg m^2/s
Rigid body about a fixed axis	L = I w Valid when: rigid body rotating about a fixed axis; L along the axis	kg m^2/s
Torque and angular momentum	tau_ext = dL/dt = I alpha Valid when: torque and L about the same fixed point or axis; I constant for I alpha	N m
Conservation	tau_ext = 0 gives I1 w1 = I2 w2 Valid when: net external torque about the axis is zero	kg m^2/s
Kinetic energy in terms of L	KE = L^2/(2 I) Valid when: rigid body rotating about a fixed axis	J
Equilibrium	sum F = 0 and sum tau = 0 Valid when: rigid body at rest or in uniform motion; torques about any one point	N (N m)

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/physics/rotational-motion/torque-angular-momentum-and-its-conservation

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