Class11-Physics-JEE-Mains-Formulas

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Chapter	Concept	Formula / Key Point
Physical World & Measurement	SI Units	Length (m), Mass (kg), Time (s), Current (A), Temperature (K)
	—	—
	Dimensional Formula	E.g., Force: $[MLT^{-2}]$
	—	—
Kinematics	Equations of Motion (Constant Acceleration)	$v = u + at$, $s = ut + \frac{1}{2}at^2$, $v^2 = u^2 + 2as$
	—	—
	Projectile Motion	$R = \frac{u^2 \sin 2\theta}{g}$, $H = \frac{u^2 \sin^2 \theta}{2g}$
	—	—
Laws of Motion	Newton's Second Law	$\vec{F} = m\vec{a}$
	—	—
	Momentum	$\vec{p} = m\vec{v}$
	—	—
	Impulse	$\vec{J} = \Delta\vec{p} = \vec{F}\Delta t$
	—	—
Work, Energy & Power	Work Done	$W = \vec{F} \cdot \vec{s} = Fs\cos\theta$
	—	—
	Kinetic Energy	$KE = \frac{1}{2}mv^2$
	—	—
	Potential Energy (Gravitational)	$PE = mgh$
	—	—
	Power	$P = \frac{W}{t} = Fv\cos\theta$
	—	—
System of Particles & Rotational Motion	Centre of Mass	$x_{cm} = \frac{\sum m_i x_i}{\sum m_i}$, similarly for y, z
	—	—
	Moment of Inertia	$I = \sum m_i r_i^2$
	—	—
	Torque	$\vec{\tau} = \vec{r} \times \vec{F}$
	—	—

Chapter	Concept	Formula / Key Point
	Angular Momentum	$\vec{L} = I\vec{\omega}$
	—	—
Gravitation	Universal Law of Gravitation	$F = G\frac{m_1 m_2}{r^2}$
	—	—
	Acceleration due to Gravity	$g = \frac{GM}{R^2}$
	—	—
	Orbital Velocity	$v = \sqrt{\frac{GM}{r}}$
	—	—
	Escape Velocity	$v_e = \sqrt{2gR}$
	—	—
Properties of Matter	Stress & Strain	Stress $= \frac{F}{A}$, Strain $= \frac{\Delta L}{L}$
	—	—
	Young's Modulus	$Y = \frac{\text{Stress}}{\text{Strain}} = \frac{FL}{A\Delta L}$
	—	—
	Bulk Modulus	$B = -V\frac{\Delta P}{\Delta V}$
	—	—
	Surface Tension	$F = T \times \text{length}$, $P = \frac{2T}{r}$
	—	—
Thermodynamics	First Law of Thermodynamics	$\Delta U = Q - W$
	—	—
	Work Done in Isothermal Process	$W = nRT \ln \frac{V_f}{V_i}$
	—	—
	Work Done in Adiabatic Process	$PV^\gamma = \text{constant}$, $W = \frac{P_i V_i - P_f V_f}{\gamma - 1}$
	—	—
Kinetic Theory of Gases	Ideal Gas Equation	$PV = nRT$
	—	—
	RMS Speed	$v_{rms} = \sqrt{\frac{3RT}{M}}$
	—	—
Oscillations & Waves	Simple Harmonic Motion (SHM)	$x = A\sin(\omega t + \phi)$
	—	—
	Angular Frequency	$\omega = 2\pi f = \sqrt{\frac{k}{m}}$
	—	—
	Time Period	$T = \frac{2\pi}{\omega} = 2\pi\sqrt{\frac{m}{k}}$
	—	—
	Wave Speed	$v = f\lambda$