TURBO
MECHANICAL PROPERTIES OF SOLIDS

Class 11 Physics • Complete Formula Sheet

Sr.	Concept	Formulas	Other Information
1	Stress	$\sigma = \frac{F}{A}$	Longitudinal, Volumetric, Shear.
2	Strain	$\epsilon = \frac{\Delta l}{l}$ or $\frac{\Delta V}{V}$ or ϕ	Dimensionless quantity.
3	Hooke's Law	Stress $\propto$ Strain $\Rightarrow \sigma = E\epsilon$	Valid within Elastic Limit.
4	Young's Modulus	$Y = \frac{F \cdot l}{A \cdot \Delta l}$	For solids (wires).
5	Bulk Modulus	$K = -\frac{P}{\Delta V/V}$	Compressibility $C = 1/K$.
6	Modulus of Rigidity	$\eta = \frac{F_{tan}/A}{\phi}$	Shape change without volume change.
7	Poisson's Ratio	$\sigma = \frac{\text{Lateral Strain}}{\text{Longitudinal Strain}} = \frac{\Delta D/D}{\Delta l/l}$	Theoretical range: -1 to 0.5.
8	Relations	$Y = 3K(1-2\sigma)$ $Y = 2\eta(1+\sigma)$	$\frac{9}{Y} = \frac{3}{\eta} + \frac{1}{K}$.
9	Strain Energy	$U = \frac{1}{2} \times$ Stress $\times$ Strain $\times$ Volume	Potential energy in stretched wire.