Tier 1

1. Newton's Second Law (Force = Mass × Acceleration):

$F = m \cdot a$

2. Work Done by a Force:

$W = F \cdot d \cdot \cos(\theta)$

3. Kinetic Energy:

$KE = \frac{1}{2} \cdot m \cdot v^2$

4. Potential Energy (Gravitational):

$PE = m \cdot g \cdot h$

5. Hooke's Law (Spring Force):

$F = k \cdot x$

6. Pressure in a Fluid at Rest:

$P = \rho \cdot g \cdot h$

7. Bernoulli's Equation (Incompressible, Steady Flow):

$P + \frac{1}{2} \cdot \rho \cdot v^2 + \rho \cdot g \cdot h = \text{constant}$

8. Fluid Flow Rate (Continuity Equation):

$A_1 \cdot v_1 = A_2 \cdot v_2$

9. Ideal Gas Law:

$PV = nRT$

10. Efficiency (Thermal):

$\eta = \frac{W_{\text{out}}}{Q_{\text{in}}}$

11. First Law of Thermodynamics (Energy Conservation):

$\Delta U = Q - W$

12. Stress:

$\sigma = \frac{F}{A}$

13. Strain:

$\epsilon = \frac{\Delta L}{L}$

14. Young's Modulus:

$E = \frac{\sigma}{\epsilon}$

15. Shear Stress:

$\tau = \frac{F}{A}$

16. Shear Strain:

$\gamma = \frac{\Delta x}{h}$

17. Bending Stress (Simple Beam):

$\sigma = \frac{M \cdot c}{I}$

18. Torsional Shear Stress (Circular Shaft):

$\tau = \frac{T \cdot r}{J}$

19. Coulomb's Law (Electrostatic Force):

$F = \frac{k \cdot q_1 \cdot q_2}{r^2}$

20. Ohm's Law (Electrical Circuits):

$V = I \cdot R$

21. Magnetic Field Strength (Straight Wire):

$B = \frac{\mu_0 \cdot I}{2 \cdot \pi \cdot r}$

22. Frequency (Simple Harmonic Motion):

$f = \frac{1}{T}$

23. Centripetal Force:

$F_c = \frac{m \cdot v^2}{r}$

24. Angular Velocity:

$\omega = \frac{\theta}{t}$

25. Wave Speed (Propagation):

$v = f \cdot \lambda$

Tier 2

1. Moment of Inertia (Rectangle about centroid):

$I = \frac{b \cdot h^3}{12}$

2. Poisson's Ratio (Longitudinal to lateral strain):

$\nu = -\frac{\epsilon_{\text{lat}}}{\epsilon_{\text{long}}}$

3. Reynolds Number (Fluid Mechanics):

$Re = \frac{\rho \cdot v \cdot D}{\mu}$

4. Nusselt Number (Convection Heat Transfer):

$Nu = \frac{h \cdot L}{k}$

5. Fourier's Law (Heat Conduction):

$q = -k \cdot A \cdot \frac{dT}{dx}$

6. Diffusion Equation (Mass Transfer):

$\frac{\partial C}{\partial t} = D \cdot \nabla^2 C$

7. Euler's Formula (Buckling of Columns):

$F_{\text{critical}} = \frac{\pi^2 \cdot E \cdot I}{(K \cdot L)^2}$

8. Carnot Efficiency (Ideal Heat Engine):

$\eta_{\text{Carnot}} = 1 - \frac{T_{\text{low}}}{T_{\text{high}}}$

9. Law of Conservation of Linear Momentum:

$\Sigma F = m \cdot a$

10. Law of Conservation of Angular Momentum:

$\Sigma \tau = I \cdot \alpha$

11. Law of Conservation of Energy:

$\Sigma W = \Delta KE + \Delta PE + Q$

12. Pascal's Law (Hydrostatic Pressure):

$\Delta P = \rho \cdot g \cdot \Delta h$

13. Stokes' Law (Viscous Drag on a Sphere):

$F_d = 6 \cdot \pi \cdot \mu \cdot R \cdot v$

14. Strouhal Number (Flow past a Cylinder):

$St = \frac{f \cdot D}{v}$

15. Capacitance (Parallel Plate Capacitor):

$C = \frac{\varepsilon_0 \cdot A}{d}$

16. Inductance (Solenoid):

$L = \frac{\mu_0 \cdot N^2 \cdot A}{l}$

17. Biot-Savart Law (Magnetic Field around a Wire):

$dB = \frac{\mu_0 \cdot I \cdot dl \times r}{4 \cdot \pi \cdot r^3}$

18. Displacement Current (Maxwell's equations):

$\frac{\partial D}{\partial t} = \nabla \times H$

19. Resistivity (Electrical Resistance):

$\rho = R \cdot \frac{A}{L}$

20. Force on a Current-Carrying Wire in a Magnetic Field:

$F = I \cdot L \times B$

21. Speed of Sound in a Gas:

$v = \sqrt{\gamma \cdot R \cdot T}$

22. Specific Heat Capacity:

$Q = mc\Delta T$

23. Coefficient of Performance (Refrigeration Cycle):

$\text{COP} = \frac{Q_{\text{in}}}{W_{\text{in}}}$

24. Heat Transfer by Radiation (Stefan-Boltzmann Law):

$q = \sigma \cdot A \cdot (T_h^4 - T_c^4)$

25. Snell's Law (Refraction of Light):

$n_1 \cdot \sin(\theta_1) = n_2 \cdot \sin(\theta_2)$

Ambiguous Variables

F

Newton's Second Law: Force
Coulomb's Law: Electrostatic Force
Euler's Formula: Critical Load
Law of Conservation of Linear Momentum: Net Force

T

Ideal Gas Law: Temperature
Torsional Shear Stress: Torque

P

Work Done by a Force: Power
Pressure in a Fluid at Rest: Pressure

v

Kinetic Energy: Velocity
Fluid Flow Rate: Velocity
Reynolds Number: Velocity
Speed of Sound in a Gas: Velocity

Q

Efficiency (Thermal): Heat
Law of Conservation of Energy: Heat
Specific Heat Capacity: Heat
Heat Transfer by Radiation: Heat

A

Bernoulli's Equation: Area
Capacitance: Area

L

Law of Conservation of Linear Momentum: Length
Inductance: Length
Displacement Current: Length

R

Ohm's Law: Resistance
Resistivity: Resistance

I

Hooke's Law: Spring Constant
Bernoulli's Equation: Current
Capacitance: Current
Biot-Savart Law: Current

E

Young's Modulus: Elastic Modulus
Euler's Formula: Modulus of Elasticity

h

Potential Energy: Height
Moment of Inertia: Height