Oscillations

- Relation between ν and T — ν = frequency — $\boxed{\nu = \frac{1}{T}}$
- Time period $\boxed{T = \frac{2\pi}{\omega}}$
- Displacement Equation of Simple Harmonic Motion (S.H.M.)

$$\boxed{x(t) = A\cos(\omega t + \phi)} \qquad \boxed{y(t) = A\sin(\omega t + \phi)}$$

- Velocity in S.H.M. $\boxed{v(t) = -\omega A\sin(\omega t + \phi)}$ $\boxed{v(t) = \frac{d}{dt}x(t)}$
- Acceleration in S.H.M. $\boxed{\alpha = -\omega^2 x(t)}$
- Time - Displacement curve of S.H.M. $\boxed{y = a\sin\left[2\pi \frac{t}{T}\right]}$
- Force law in Simple Harmonic motion (Spring)

$$\boxed{F = -kx} \qquad \boxed{\omega = \sqrt{\frac{K}{m}}} \qquad \boxed{T = 2\pi\sqrt{\frac{m}{2K}}}$$

ω = angular frequency
T = Time period

- Potential Energy in S.H.M. $\boxed{U = \frac{1}{2}m\omega^2 y^2}$ OR $\boxed{U = \frac{1}{2}KA^2\cos^2(\omega t + \phi)}$
- Kinetic Energy in S.H.M. $\boxed{K = \frac{1}{2}m\omega^2(a^2 - y^2)}$ OR $\boxed{K = \frac{1}{2}KA^2\sin^2(\omega t + \phi)}$
- Total Energy in S.H.M. $\boxed{E = \frac{1}{2}m\omega^2 a^2 = 2\pi^2 m n^2 a^2}$ OR $\boxed{E = \frac{1}{2}KA^2}$
- Time period of S.H.M. $\boxed{T = 2\pi\sqrt{\frac{m}{K}}}$ & $\boxed{\omega = \sqrt{\frac{mgL}{I}}}$
- Motion of body suspended by two springs $\boxed{T = 2\pi\sqrt{\frac{m}{K_1 + K_2}}}$ $\boxed{T = 2\pi\sqrt{m\left(\frac{1}{K_1} + \frac{1}{K_2}\right)}}$
- Time period of Simple Pendulam $\boxed{T = 2\pi\sqrt{\frac{l}{g}}}$
- Second's Pendulam $\boxed{l = \frac{g}{\pi^2} \simeq 1\,m}$

R_e = Radius of Earth (6.4×10^6 m)

- Time period of a simple pendulam of infinite length $\boxed{T = 2\pi\sqrt{\frac{R_e}{g}}}$
- Electromagnetic Resonance frequency $\boxed{f = \frac{1}{2\pi\sqrt{LC}}}$