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CLASS 11 & 12th



Learning Inquiry
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CLASS 11th

Oscillations

misostudy



01. Periodic and Oscillatory Motions

Periodic Motion

Defined as that motion which repeats itself after equal intervals of time.

Oscillatory Motion

Oscillatory or vibratory motion is defined as a periodic and bounded motion of a body about a fixed point.

Difference between Periodic and Oscillatory Motion

Every oscillatory motion is periodic, but every periodic motion need not be oscillatory. e.g., circular motion (or the motion of planets around the sun) is a periodic motion, but it is not oscillatory because, the basic concept of to and fro motion about the mean position for oscillatory motion is not present here.

02. Periodic and Oscillatory Motions

Period is the smallest interval of time after which the motion is repeated.

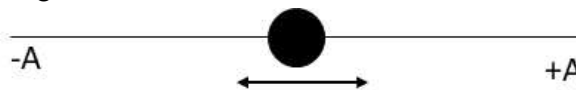
Frequency is defined as the number of oscillations per unit time. It is the reciprocal of time period T . It is represented by the symbol ν .

The relation between ν and T is

$$\nu = \frac{1}{T} \quad \dots(i)$$

03. Simple Harmonic Motion

Consider a particle oscillating to and fro, about the origin of an x-axis, between the limits $+A$ and $-A$ as shown in figure.



This is considered simple harmonic motion if displacement x , of the particle from the origin, varies with time as

$$x(t) = A \cos(\omega t + \phi) \quad (i)$$

Where A , ω and ϕ are constants.

SHM is not only periodic motion, but one in which displacement is a sinusoidal function of time.

04. Simple Harmonic Motion and Uniform Circular Motion

Given figure describes the same situation mathematically. Let a particle P move uniformly in a circle of radius A with angular speed ω in anti-clockwise direction.