Sound part I paper I Group C
Date:- 24/1/2022

* Wave no:- The number of wavelengths in a unit distance is called wave number. It is denoted by $\bar{\nu}$

$$\bar{\nu} = \frac{1}{\lambda}$$

* Vibration :- It is the to and from motion of a particle from one extreme position to the other and back again

phase :- It is the ratio of displacement of the vibrating particle at any instant to the ~~other~~ amplitude of the vibrating particle.

* Relation between frequency and wavelength

$$\lambda = \frac{v}{n} \quad \text{or} \quad \boxed{v = n\lambda}$$

where:- λ = wavelength of the wave
v = velocity of the wave.
n = frequency of the wave

S.I. units of wavelength λ is metre
& S.I Unit of frequency is Hertz (H_z)
& Time period is in Sec.

Equation of progressive wave

$y = a \sin \omega t$ —

a = amplitude of the vibrating particle
y = displacement after a time t.
ω = angular velocity

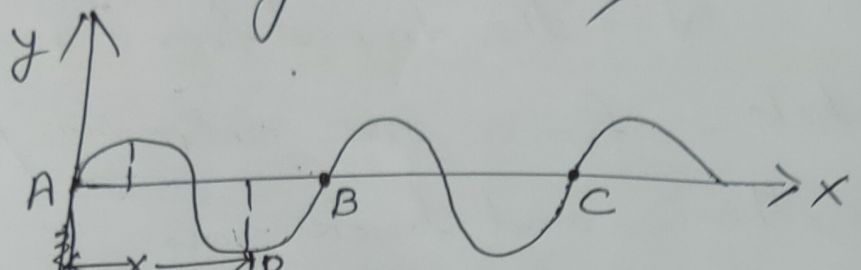

fig ①

$\because \omega = 2\pi n$

$\therefore y = a \sin \omega t$

$\therefore y = a \sin 2\pi n t$

When distance ↓ phase changes ↓
$\because \lambda \rightarrow 2\pi$
$\therefore 1 \rightarrow \frac{2\pi}{\lambda}$
$\therefore x \rightarrow \frac{2\pi}{\lambda} x$
$\therefore \phi = \frac{2\pi}{\lambda} x$

$\therefore$ Displacement of P is given by

$y = a(\sin \omega t - \phi)$

$= a \sin [2\pi n t - \phi]$

$= a \sin \left(2\pi n t - \frac{2\pi}{\lambda} x\right)$

$= a \sin \left[2\pi \frac{v}{\lambda} t - \frac{2\pi}{\lambda} x\right]$

$\therefore y = a \sin \frac{2\pi}{\lambda}(vt - x)$ — ①

$\because v = n\lambda$
$\therefore n = \frac{v}{\lambda}$