NCERT-Analog-11.15-6

EE22BTECH11004 - Allu lohith

Q: A bat emits ultrasonic sound of frequency $1000kHz$ in air. If the sound meets a water surface, what is the wavelength of
(a) the reflected sound
(b) the transmitted sound?
Speed of sound in air is $340ms^{-1}$ and in water is $1486ms^{-1}$.

Ans: Given that the frequency of the Ultra sonic sound = 1000KHz
As we know that the frequency of sound does not change with medium, So the frequency in water is equal to in air.
let the wavelength in air = λ_a and speed in air = v_a
let the wavelength in water = λ_w and speed in water = v_w
As,

$$wavelength(\lambda) \times frequency(\text{f}) = Speed(v) \tag{1}$$

So,

$$\lambda_w = v_w/\text{f} \tag{2}$$
$$\lambda_w = 1486/1000KHz \tag{3}$$
$$\lambda_w = 1.486mm \tag{4}$$

And similarly,

$$\lambda_a = v_a/\text{f} \tag{5}$$
$$\lambda_a = 340/1000KHz \tag{6}$$
$$\lambda_a = 0.34mm \tag{7}$$

hi hello So the wavelngth in air is $0.34mm$ and wavelength in water is $1.486mm$