i. When a wave is reflected from a denser medium, the change in phase is:
a. 0 b. π c. 2π d. 3π

ii. A stationary wave is represented by: $y = A\sin(100t)\cos(0.01x)$ where *A & y are in millimeters, t in sec and x in meter*. The velocity of wave is:
a. $10^2\ ms^{-1}$ b. $10^3\ ms^{-1}$ c. $10^4\ ms^{-1}$ d. $10^5\ ms^{-1}$

iii. The equation of a stationary wave is $y = 5\sin\frac{\pi x}{3}\cos 40\pi t$, where x and y in cm and t is second. Then the separation between two consecutive nodes is:
a. $12\ cm$ b. $6\ cm$ c. $3\ cm$ d. $1.5\ cm$

Wave Motion

Wave velocity: $v = \lambda f$ $v = \frac{\omega}{K}$ | $k = \frac{2\pi}{\lambda}$ | $\omega = 2\pi f = \frac{2\pi}{T}$

Maximum particle velocity: $(v_p)_{max} = a\omega$

Maximum particle acceleration: $(a_p)_{max} = a\omega^2$

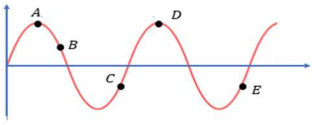
Distance between successive nodes $= \frac{\lambda}{2}$ = Distance between successive antinodes

Distance between successive node and antinode $= \frac{\lambda}{4}$

$Phase\ difference = \frac{2\pi}{\lambda} \times Path\ difference$

$phase\ difference = k \times path\ difference$

1. When the propagation of a longitudinal wave through a material medium takes place, the quantities transmitted in the direction of propagation are:
a. energy, momentum and mass b. energy c. energy and mass d. energy and linear momentum
2. A wave is propagating along a string and the displacement of particle along y-axis is given by $y(x,t) = A\cos(\omega t + kx)$. This represents:
a. A transverse wave along $+ve$ x-axis b. A transverse wave along $-ve$ x-axis
c. A longitudinal wave along $+ve$ x-axis d. A longitudinal wave along $-ve$ x-axis
3. The distance between two consecutive crests in a wave train produced in a string is 5 cm. If 2 complete waves pass through medium per second, then the velocity of wave is:
a. $2.5\ cms^{-1}$ b. $5\ cms^{-1}$ c. $10\ cms^{-1}$ d. $15\ cms^{-1}$
4. The equation of a wave is represented by: $y = 10\sin(100t - x/10)$. The velocity of the wave will be:
a. $100\ m/s$ b. $250\ m/s$ c. $750\ m/s$ d. $1000\ m/s$
5. The distance between two points differing in phase by 60° on a wave having a wave velocity 360 m/s & frequency 500 Hz is:
a. $0.72m$ b. $0.18m$ c. $0.36m$ d. 0.
6. The equation of a traveling wave is $y = 60\cos(1800t - 6x)$ where y is in microns t in secs and x in meter. The ratio of maximum particle velocity to wave velocity is
a. 3.6×10^{-11} b. 3.6×10^{-6} c. 3.6×10^{-4} d. 3.6×10^{-2}
7. Figure shows a sinusoidal wave at a given instant which points are in phase?
a. A, B b. B, D c. C, E d. B, C



1. a. Define progressive wave. Derive equation of progressive wave. [3]
b. A wave has the equation: $y = 0.02\sin(30t - 4x)$, y and x in meters and t in seconds.
Find (i) frequency (ii) wavelength (iii) speed. **[4.8Hz, 1.6m, 7.5m/s]** [2]
c. A radio station broadcasts at 700KHz. If the radio waves travel with a speed of $3 \times 10^8 m/s$, calculate the wavelength of radio waves. **[428.6m]** [2]