

Practice Quiz 1

1.  $y = 0.25 \cos(0.52x - 2.3t) \Leftrightarrow y = A \cos(kx - \omega t)$

$\therefore A = 0.25 \text{ (m)} ; k = \frac{2\pi}{\lambda} = 0.52 \Rightarrow \lambda = 12.08 \text{ (m)} ; \omega = 2\pi f = 2.3 \Rightarrow f = 0.37 \text{ Hz}$

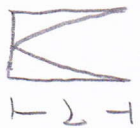
$\Rightarrow v = f \cdot \lambda = 12.8 \cdot 0.37 = 4.7 \text{ m/s} // \therefore \text{(B)}$

2.  $\lambda = 20 \text{ m} , v = 5 \text{ m/s} \Rightarrow f = \frac{v}{\lambda} = 0.25 \text{ Hz} \Rightarrow T = \frac{1}{f} = 4 \text{ (s)}$

It takes  $\frac{1}{2}T$  traveling from a crest to a trough  $\therefore \frac{1}{2}T = 2 \text{ (s)} // \text{(A)}$

3.  $\begin{cases} 100 \text{ kHz} \\ 102 \text{ kHz} \end{cases} \Rightarrow f_{\text{beat}} = 2 \text{ kHz}$  audible ;  $\begin{cases} 100 \text{ kHz} \\ 125 \text{ kHz} \end{cases} \Rightarrow f_{\text{beat}} = 25 \text{ kHz}$  inaudible  $\therefore \text{(D)} //$

4. Refer to the definition of a transverse wave  $\therefore \text{(C)} //$

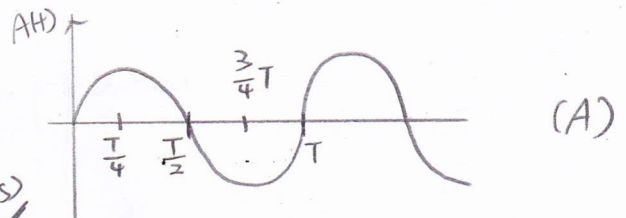
5.   $\lambda = \frac{1}{2} \text{ bubble} = \frac{1}{4} \lambda \therefore \lambda = 4L$   $\therefore f = 22 \text{ Hz} \Rightarrow \lambda = \frac{v}{f} \approx \frac{343}{22} = 15.6 \text{ m}$   
 $4L = 15.6 \Rightarrow L = 3.9 \text{ (cm)} // \text{(B)}$

6.  $\lambda = \frac{v}{f} = \frac{3 \times 10^8}{10 \times 10^9} = 0.03 \text{ m} = 3 \text{ cm} // \text{(B)}$

7.  $A(t) = 1.8 \sin(31.4t) \Leftrightarrow A(t) = A \sin(\omega t) \Rightarrow \omega = 31.4 \text{ rad/s} = 2\pi f$

$\Rightarrow f = 5 \text{ Hz} //$

The plot of  $A(t)$  is:



First trough arrives at  $t = \frac{3}{4}T = \frac{3}{4 \cdot 5} = 0.15 \text{ (s)} //$

8.  $k = 120 \text{ N/m} , f = 6 \text{ Hz} \Rightarrow T = \frac{1}{f} = 0.17 \text{ (s)}$

$\therefore T = 2\pi \sqrt{\frac{m}{k}} \quad 0.17 = 2\pi \sqrt{\frac{m}{120}} \quad \therefore m = 0.088 \text{ kg} = 88 \text{ g} // \text{(C)}$