Topic :- WAVES

1. An organ pipe open at one end is vibrating in first overtone and is in resonance with another pipe open at both ends and vibrating in third harmonic. The ratio of length of two pipe is
   a) 3:8   b) 8:3   c) 1:2   d) 4:1

2. Two pulses travel in mutually opposite directions in a string with a speed of 2.5 cm/s as shown in the figure. Initially the pulses are $10cm$ apart. What will be the state of the string after two seconds

   a)

   b)

   c)

   d)
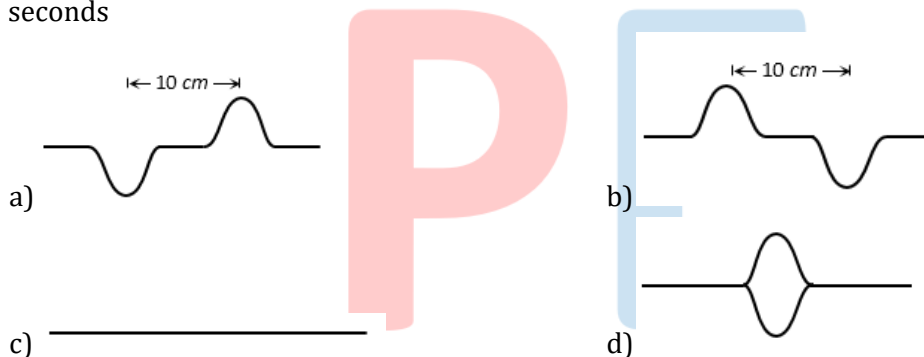
3. Two waves represented by the following equations are travelling in the same medium
   $y_1 = 5 \sin 2\pi(75t - 0.25x), y_2 = 10 \sin 2\pi(150t - 0.50x)$
   `The intensity ratio I_1/I_2 of the two waves is
   a) $1 : 2$ b) $1 : 4$ c) $1 : 8$ d) $1 : 16$

4. Two instruments having stretched strings are being played in union. When the tension of one of the instruments is increased by 1%, 3 beats are produced in 2s. the initial frequency of vibration of each wire is
   a) 300 Hz   b) 500 Hz   c) 1000 Hz   d) 400 Hz

5. The time of reverberation of a room A is one second. What will be the time (in seconds) of reverberation of a room, having all the dimensions double of those of room A
   a) $\frac{1}{2}$ b) 1   c) 2   d) 4

6. An organ pipe P_1 closed at one end vibrating in its first harmonic and another pipe P_2 open at both ends vibrating in its third harmonic are in resonance with a given tuning fork. The ratio of the length of P_1 to that P_2 is
   a) 1/3 b) 1/6 c) 3/8 d) 8/3

7. A railway engine whistling at a constant frequency moves with a constant speed. It goes past a stationary observer standing beside the railway track. The frequency (n') of the sound heard by the observer is plotted against time (t), which of the following best represents the resulting curve

   a) b) c) d)
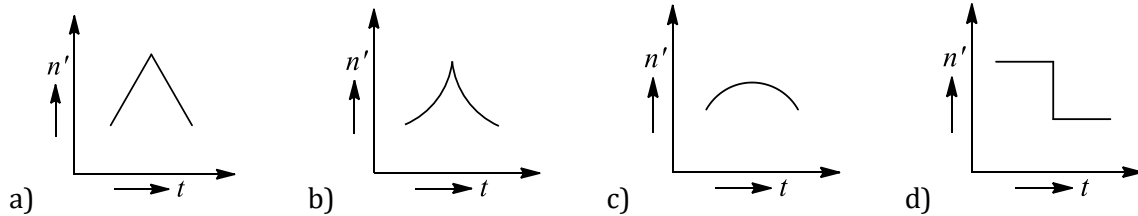
8. An observer is standing 500 m away from a vertically hill. Starting between the observer and the hill a police van having a siren of frequency 1000 Hz moves towards the hill with a uniform speed. If the frequency of the sound heard directly from the siren is 970 Hz, the frequency of the sound heard after reflection from the hill (in Hz) is about, (velocity of sound $=330\ ms^{-1}$)
   a) 1042 b) 1032 c) 1022 d) 1012

9. A pulse of a wave train travels along a stretched string and reaches the fixed end of the string. It will be reflected with
   a) A phase change of 180° with velocity reversed
   b) The same phase as the incident pulse with no reversal of velocity
   c) A phase change of 180° with no reversal of velocity
   d) The same phase as the incident pulse but with velocity reversed

10. A wave travelling along the x-axis is described by the equation y(x, t) =0.005 cos (αx-βt). If the wavelength and the time period of the wave are 0.08m and 2.0s, respectively, than α and β in appropriate unit are
    a) a=25.00π, β π b) $\alpha = \frac{0.08}{\pi}, \beta = \frac{2.0}{\pi}$ c) $\alpha = \frac{0.04}{\pi}, \beta = \frac{1.0}{\pi}$ d) $\alpha = 12.5\pi, \beta = \frac{\pi}{2.0}$

11. In the experiment to determine the speed of sound using a resonance column
    a) Prongs of the tuning fork are kept in a vertical plane
    b) Prongs of the tuning fork are kept in a horizontal plane
    c) In one of the two resonance observed, the length of the resonating air column is close to the wavelength of sound in air
    d) In one of the two resonance observed, the length of the resonating air column is close to half of the wavelength of sound in air

12. In Melde's experiment, the string vibrates in 4 loops when a 50 g weight is placed in the pan of weight 15 g. To made the string vibrate in 6 loops, the weight that has to be removed from the pan in approximately

    a) 7 g   b) 36 g   c) 21 g   d) 29 g

13. The equation of a cylindrical progressive wave is

    a) $y = a \sin \omega t$ b) $y = a \sin(\omega t - kr)$

    c) $y = \frac{a}{\sqrt{r}} \sin(\omega t - kr)$ d) $y = \frac{a}{r} \sin(\omega t - kr)$

14. A point source emits sound equally in all direction in a non-absorbing medium. Two points P and Q are at distance of 2 and 3 m respectively from the source. The ratio of the intensities of the wave at P and Q is.

    a) 9:4   b) 2:3   c) 3:2   d) 4:9

15. The harmonics which are present in a pipe, open at one end are

    a) Odd harmonics   b) Even harmonics

    c) Even as well as odd harmonics   d) None of the above

16. A wave frequency us y=0.1 sin [100 $\pi t - kx$] and wave velocity is 100^{-1}, its wave number is equal to

    a) $1m^{-1}$ b) $2m^{-1}$ c) πm^{-1} d) $2\pi \, m^{-1}$

17. A wave is represented by the equation
    $y = 0.5 \sin(10t - x)m$. It is a travelling wave propagating along the $+x$ direction with velocity

    a) $10 \, m/s$ b) $20 \, m/s$ c) $5 \, m/s$ d) None of these

18. The speed of a wave on string $150 \, ms^{-1}$ when the tension is 120 N. the percentage increase in the tension in order to raise the wave speed by 20% is

    a) 44%   b) 40%   c) 20%   d) 10%

19. "Stationary waves" are so called because in them

    a) The particles of the medium are not disturbed at all

    b) The particles of the medium do not execute SHM

    c) There occurs no flow of energy along the wave

    d) The interference effect can't be observed

20. Two wires are in unison. If the tension in one of the wires is increased by 2%, 5 beats are produced per second. The initial frequency of each wire is

    a) $200 \, Hz$ b) $400 \, Hz$ c) $500 \, Hz$ d) $1000 \, Hz$