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SOUND AND WAVES

1.A pipe closed at one end and open at the other end resonates with sound waves of frequency 135 Hz and also 165 Hz but not with any wave of frequency intermediate between these two. Then the frequency of the fundamental note is

(a)30 Hz (b)15 Hz
(c)60 Hz (d)7.5 Hz

2.A vehicle with a horn of frequency n is moving with a velocity of 30m/s in a direction perpendicular to the straight line joining the observe and the vehicle .The observer perceives the sound to have a frequency n+n_1 .If velocity of sound in air is 300 m/s, n_1 would be

(a)n_1=10n (b)n_1=0
(c)$n_1 = 0.1\ n$ (d)n_1=-0.1n

3.In case of a moving source of sound approaching the observer

(a)wavelength of sound appears to be less
(b)wavelength of sound appears to be more
(c)the frequency appears to be less
(d)none of these

4.A standing wave having 3 nodes and 2 antinode is formed between two atoms having a distance of 1.21 A° between them .The wavelength of standing wave is

(a)1.21 A° (b)2.42 A°
(c)6.05 A° (d)3.63 A°

5.In a sinusoidal wave ,the time required for a particular point to move from maximum displacement to zero displacement is 0.170 s. The frequency of the wave is

(a)1.47 Hz (b)0.36 Hz
(c)0.73Hz (d)2.94Hz

6.The displacement x (in meter)of a particle performing SHM is related to time t(in sec) as x=0.05 cos($4\pi t + \pi/4$).The frequency of motions

(a)0.5 Hz (b)1.0 Hz (c)1.5Hz (d)2.0Hz

7.Y=25 cos(2 πt-πx)is the wave equation. Then the amplitude and frequency are respectively

(a)100,25 (b)200,25
(c)25,100 (d)25,1.00

8.Two waves produce displacement at a point given by y_1=a sin ωt and y_2=a sin ($\omega\ t + \ \pi/2$).The resultant amplitude is

(a)0 (b)2a (c)a$\sqrt{2}$ (d)a/$\sqrt{2}$

9.In a stationary wave, node is a point having

(a)maximum density (b)maximum displacement
(c)minimum density (d)maximum stress

10.A policeman sounding a whistle of 450Hz approaches stationary observe at a speed of 33m/s. If velocity of sound in air is 330m/s, the frequency heard by the observer is

(a)409 Hz (b)429Hz
(c)517Hz (d)500Hz

11.When a source is going away from a stationary observer with a velocity of sound in air, then the frequency heard by the observer will be

(a)same (b)double
(c)half (d)one third

12.Ultrasonic waves are produced by

(a)Piezoelectric effect (b)Peltier's effect
(c)Doppler's effect (d)Coulomb's law

13. Ultrasonic are used is SONAR with greater advantage because ultrasonic

(a)have low frequency
(b)have short wavelength
(c)are electromagnetic waves
(d)can be easily produced

14. The relation between phase difference and path differences is

(a)$\Delta\phi = \frac{2\pi}{\lambda}\Delta x$ (b)$\Delta\phi = 2\pi\lambda\Delta x$

(c)$\Delta\phi = \frac{2\pi\lambda}{\Delta x}$ (d)$\Delta\phi = \frac{\pi}{\lambda}\Delta x$

15. If the equation of progressive wave is given by v=4 sin $\pi\left[\frac{t}{5} - \frac{x}{9} + \frac{\pi}{6}\right]$then, which of the following is correct?

(a)v=5cm/s (b)r=0.04cm

(c)λ=18m (d)v=50Hz

16.A transverse wave is described by the equation y=$y_0$sin2π[ft-x/λ].The maximum particle velocity is equal to four times the wave velocity if

(a)λ=$\pi y_0/4$ (b) λ=$\pi y_0/2$

(c) λ=πy_0 (d) λ= $2\pi y_0$

17. The velocity of sound in any gas depends upon

(a)Intensity

(b)Amplitude

(c)Density and elasticity

(d)Volume and temperature

18. If at a place, the speed of a sound wave of frequency 300Hz is V, the speed of another wave of frequency 150Hz at the same place will be

(a)V (b)V/2 (c)2V (d)4V

19. If the intensity ratio of 2 waves is 4:1,the ratio of their amplitudes is

(a)2:1 (b)1:2 (c)4:1 (d)1:4

20. The speed of sound in air is :

(a) ∝Pressure of air

(b)∝ square of pressure

(c)$\propto\sqrt{pressure}$

(d)Independent of pressure

21. Th amplitude of sounds is doubled and the frequency is reduced to one fourth. The intensity of sound at the same point will be

(a)Increased by a factor of 2

(b)Increased by a factor of 4

(c)Decreased by a factor of 2

(d)Decreased by a factor of 4

22. If I a gramophone ,a music record is made to turn faster ,the

(a)Intensity increases

(b)Pitch increase

(c)Timber changes

(d)Pitch decreases

23. In an orchestra, the musical sounds of different instruments are distinguished from one another by which of the following characteristic ?

(a)Pitch (b)Loudness

(c)Quality (d)Overtones

24. The intensity of a harmonic wave:

(a)Depends on its frequency and not on amplitude

(b)Depends on its amplitude and not on frequency

(c)Depends upon both its frequency and amplitude

(d)Depends neither on frequency nor on its amplitude

25.which of the following expressions is that of a simple harmonic progressive wave :

(a)A sin ωt (b)A sin ωt cos k x

(c)a sin $(\omega t - Kx)$ (d)A cos Kx

26. If the volume elasticity of fresh water and sea water are assumed to be the same .I is necessary that of the velocity of sound to be the same:

(a)Fresh water must be at a higher temp

(b)Sea water must be at a higher temp

(c)Both must be at same temperature

(d)Fresh water must have higher refractive index.

27. Transverse elastic waves can propagate

(a)Both in a gas and a metal

(b)In a gas, but not in a metal

(c)In a metal, but not in a gas

(d)Neither in a gas nor in a metal

28.The relation between frequency f, wavelength λ and velocity of propagation v of a wave is –

(a)v λ=f (b)λ, f/v=1

(c)v f/λ=1 (d)f/v +λ/v=1

29.Ultrasonic ,infrasonic and audible waves travel through a medium with speeds $v_u, v_v \; and \; v_a$ respectively ,then :

(a)$v_f = v_a = v_u$ (b)$v_u > v_a > v_f$

(c)$v_{u<}v_a < v_f$ (d)$v_a \leq v_u = v_f$

30.The temperature at which speed of sound in air becomes double of its value at 27° C is

(a)54° C (b)327° C (c)927° C (d)-123° C