DPP
DAILY PRACTICE PROBLEMS

CLASS : XITH
DATE :

SUBJECT : PHYSICS
DPP NO. :7

Topic :- WAVES

1. Two monoatomic ideal gases 1 and 2 of molecular masses m_1 and m_2 respectively are enclosed in separate containers kept at the same temperature. The ratio of the speed of sound in gas 1 to that in gas 2 is given by

    a) $\sqrt{\frac{m_1}{m_2}}$ b) $\sqrt{\frac{m_2}{m_1}}$ c) $\frac{m_1}{m_2}$ d) $\frac{m_2}{m_1}$

2. The equation of a progressive wave is $y = 8 \sin \left[\pi \left(\frac{t}{10} - \frac{x}{4} \right) + \frac{\pi}{3} \right]$. The wavelength of the wave is
    a) $8 \, m$ b) $4 \, m$ c) $2 \, m$ d) $10 \, m$

3. An observer standing at station observes frequency $219 \, Hz$ when a train approaches and $184 \, Hz$ when train goes away from him. If velocity of sound in air is $340 \, m/s$, then velocity of train and actual frequency of whistle will be
    a) $15.5 \, ms^{-1}, 200 Hz$ b) $19.5 \, ms^{-1}, 205 Hz$ c) $29.5 \, ms^{-1}, 200 Hz$ d) $32.5 \, ms^{-1}, 205 Hz$

4. The first overtone in a closed pipe has a frequency
    a) Same as the fundamental frequency of an open tube of same length
    b) Twice the fundamental frequency of an open tube of same length
    c) Same as that of the first overtone of an open tube of same length
    d) None of the above

5. Standing stationary waves can be obtained in an air column even if the interfering waves are
    a) Of different pitches   b) Of different amplitudes
    c) Of different qualities   d) Moving with different velocities

6. If fundamental frequency of closed pipe is $50 \, Hz$ then frequency of 2nd overtone is
    a) $100 \, Hz$ b) $50 \, Hz$ c) $250 \, Hz$ d) $150 \, Hz$

7. Two sound sources emitting sound each of wavelength λ are fixed at a given distance apart. A listener moves with a velocity u along the line joining the two sources. The number of beats heard by him per second is
    a) $2u/\lambda$ b) u/λ c) $\frac{u}{3\lambda}$ d) $\frac{2\lambda}{u}$

8. A source of sound placed at the open end of a resonance column sends an acoustic wave of pressure amplitude ρ_0 inside the tube. If the atmospheric pressure is ρ_A, then the ratio of maximum and minimum pressure at the closed end of the tube will be

   a) $\dfrac{(\rho_A+\rho_0)}{(\rho_A-\rho_0)}$
   b) $\dfrac{(\rho_A+2\rho_0)}{(\rho_A-2\rho_0)}$
   c) $\dfrac{\rho_A}{\rho_0}$
   d) $\dfrac{\left(\rho_A+\frac{1}{2}\rho_0\right)}{\left(\rho_A-\frac{1}{2}\rho_0\right)}$

9. Sound velocity is maximum in
   a) H_2
   b) N_2
   c) He
   d) O_2

10. Two loudspeakers L_1 and L_2 driven by a common oscillator and amplifier, are arranged as shown. The frequency of the oscillator is gradually increased from zero and the detector at D records a series of maxima and minima. If the speed of sound is $330\ ms^{-1}$ then the frequency at which the first maximum is observed is
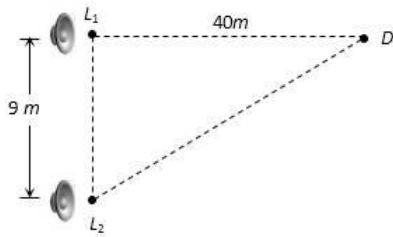
   a) $165\ Hz$
   b) $330\ Hz$
   c) $496\ Hz$
   d) $660\ Hz$

11. It takes 2.0 s for a sound wave to travel between two fixed points when the day temperature is 10°C. if the temperature rises to 30°C the sound wave travels between the same fixed parts in
   a) 1.9s
   b) 2.0s
   c) 2.1s
   d) 2.2s

12. An open pipe of length $33\ cm$ resonates with frequency of $100\ Hz$. If the speed of sound is $330\ m/s$, then this frequency is
   a) Fundamental frequency of the pipe
   b) Third harmonic of the pipe
   c) Second harmonic of the pipe
   d) Fourth harmonic of the pipe

13. A car sounding a horn of frequency 1000 Hz passes an observer. The ratio of frequencies of the horn noted by the observer before and after passing of the car is 11 : 9. If the speed of sound is v, the speed of the car is
   a) $\dfrac{1}{10}v$
   b) $\dfrac{1}{2}v$
   c) $\dfrac{1}{5}v$
   d) v

14. If the speed of a wave doubles as it passes from shallow water deeper water, its wavelength will be
   a) Unchanged
   b) Halved
   c) Doubled
   d) Quadrupled

15. When an aeroplane attains a speed higher than the velocity of sound in air, a loud bang is heard. This is because
    a) It explodes
    b) It produces a shock wave which is received as the bang
    c) Its wings vibrate so violently that the bang is heard
    d) The normal engine noises undergo a Doppler shift to generate the bang

16. A standing wave having 3 nodes and 2 antinodes is formed between two atoms having a distance 1.21 Å between them. The wavelength of the standing wave is
    a) 1.21Å   b) 1.42Å   c) 6.05Å   d) 3.63Å

17. Two identical plain wires have a fundamental frequency of 600 cycle per second when kept under the same tension. What fractional increase in the tension of one wires will lead to the occurrence of 6 beats per second when both wires vibrate simultaneously
    a) 0.01   b) 0.02   c) 0.03   d) 0.04

18. An unknown frequency x produces 8 beats per seconds with a frequency of 250 Hz and 12 beats with 270 Hz source, then x is
    a) 258 Hz b) 242 Hz c) 262 Hz d) 282 Hz

19. If the temperature increases, then what happens to the frequency of the sound produced by the organ pipe
    a) Increases   b) Decreases   c) Unchanged   d) Not definite

20. If the tension and diameter of a sonometer wire of fundamental frequency n are doubled and density is halved then its fundamental frequency will become
    a) $\frac{n}{4}$ b) $\sqrt{2}n$ c) n d) $\frac{n}{\sqrt{2}}$