18. The speed of sound is more in
(a) dry He (b) moist He (c) same in both (d) none

19. If 4 g of Helium under STP has a volume of 22.4 liter, the speed of sound waves in an atmosphere of Helium of 0 °C and 1 atm pressure is $[1atm = 1.01 \times 10^5 Pa]$
(a) 972 m/s (b) 967 m/s (c) 957 m/s (d) 942 m/s

[Try Q. No. 19, assuming $1atm = 1 \times 10^5 Pa$]

20. Sound waves are traveling in a medium whose isothermal elasticity is E_1 and adiabatic elasticity is E_2. The velocity of sound is proportional to
(a) E_1 (b) E_2 (c) $\sqrt{E_1}$ (d) $\sqrt{E_2}$

21. Velocity of sound in the air remains unaffected when the wind blows by making
(a) 0^o (b) 90^o (c) 180^o (d) never

22. The velocity of sound in air is independent of changes in
(a) density (b) temperature (c) pressure (d) humidity

23. The percentage change in velocity of sound through air due to change in temperature from 20^oC to 35^oC is
(a) 1% (b) 2.5% (c) 4% (d) 5.5%

24. The speed of sound in air at NTP is 130 m/s. If air pressure becomes four times, the speed of sound will be
(a) 130 m/s (b) 150 m/s (c) 330 m/s (d) 600 m/s

25. If the temperature is raised by 1 ºC from 300 K, then the percentage change in speed of sound in air is
(a) 0.167% (b) 1.67% (c) 2.67% (d) 16.7%

26. Young's modulus of steel is $2 \times 10^{11} N/m$ and the density is $78 \times 10^2\ kg/m^3$. The velocity of sound in the steel is
(a) 340 m/s (b) 900 m/s (c) 4050 m/s (d) 5060 m/s

27. The velocity of sound in an ideal gas at temperatures $T_1\ K$ and $T_2\ K$ is found to be v_1 and v_2 respectively. If v_1' and v_2' are the root mean square velocities of the same gas at the same temperatures $T_1\ K$ and $T_2\ K$ respectively, then
(a) $v_2' = v_1' \left[\frac{v_1}{v_2}\right]^{1/2}$ (b) $v_2' = v_1' \left[\frac{v_1}{v_2}\right]$ (c) $v_2' = v_1' \left[\frac{v_2}{v_1}\right]$ (d) $v_2' = v_1' \left[\frac{v_2}{v_1}\right]^{1/2}$

28. The velocity of sound in air at STP is 330 m/s. The distance covered by sound in 2 sec when the atmospheric temperature is $30\ °C$, will nearly be
(a) 0.5 km (b) 0.7 km (c) 1 km (d) 2 km

29. The ratio of velocity of sound in hydrogen and oxygen gases at a given temperature is:
(a) 1:4 (b) 4:1 (c) 1:1 (d) 32:1

30. The ratio of the velocity of sound in hydrogen gas ($\gamma = 7/5$) to that in helium gas ($\gamma = 5/3$) is:
(a) $\sqrt{21}:1$ (b) $\sqrt{2}:1$ (c) $\sqrt{42}:5$ (d) $1:1$

31. Oxygen is 16 times heavier than hydrogen. Equal volumes of hydrogen and oxygen are mixed and the ratio of the velocity of sound in a mixture of two gases to oxygen is
(a) $1:\sqrt{8}$ (b) $\sqrt{8}:1$ (c) $\sqrt{32}:\sqrt{17}$ (d) $\sqrt{17}:\sqrt{32}$

Hint: $\left[M_{mix} = \frac{n_1 M_1 + n_2 M_2}{n_1 + n_2}\right]$ Here, Here, $n_1 = \frac{1}{2}\ x; n_2 = \frac{1}{2}\ x$, ($x$ being total volume of mixture)

OR

$n_1 = n_2$, (being equal volume)

32. The speed of sound in hydrogen at NTP is 1270 m/s then the speed in a mixture of hydrogen and oxygen in the ratio of 4: 1 by volume will be.
(a) 317 m/s (b) 635 m/s (c) 830 m/s (d) 950 m/s

Hint: $\left[M_{mix} = \frac{n_1 M_1 + n_2 M_2}{n_1 + n_2}\right]$ Here, $n_1 = \frac{4}{5}\ x$; $n_2 = \frac{1}{5}\ x$, (x being total volume of mixture)

33. The velocity of sound in the water of density $1000 Kg/m^3$ is 1400 m/s. The bulk modulus of the elasticity of water is
(a) $5 \times 10^{11}\ N/m^2$ (b) $1.96 \times 10^9\ N/m^2$ (c) $1.96 \times 10^{10}\ N/m^2$ (d) $5 \times 10^{10}\ N/m^2$