AVIRAL
JEE | NEET | FOUNDATIONS

WEEKLY TEST TYJ TEST - 33 B
SOLUTION Date 29-12-2019

[PHYSICS]

1. (a) $v = n\lambda = 2\times 5 = 10\ cm/sec$

2. (a) $v_{max} = a\omega = a\times 2\pi n = 0.1\times 2\pi\times 300 = 60\pi\ cm/sec$

3. (c) Phase difference $= \frac{2\pi}{\lambda}\times$ path difference

$\Rightarrow 1.6\pi = \frac{2\pi}{\lambda}\times 40 \Rightarrow \lambda = 50\ cm = 0.5m$

$\Rightarrow v = n\lambda \Rightarrow 330 = 0.5\times n \Rightarrow n = 660\ Hz$

4. (a)

5. (a) $\lambda = \frac{v}{n} = \frac{1.7\times 1000}{4.2\times 10^6} = 4\times 10^{-4}\ m$

6. (c) Velocity of sound in gas $v = \sqrt{\frac{\gamma RT}{M}} \Rightarrow v \propto \sqrt{\frac{\gamma T}{M}}$

$\Rightarrow \frac{v_{N_2}}{v_{He}} = \sqrt{\frac{\gamma_{N_2}}{\gamma_{He}}\times\frac{M_{He}}{M_{H_2}}} = \sqrt{\frac{\frac{7}{5}R\times 4}{\frac{5}{3}R\times 28}} = \frac{\sqrt{3}}{5}$

7. (a) Time required for a point to move from maximum displacement to zero displacement is $t = \frac{T}{4} = \frac{1}{4n}$

$\Rightarrow n = \frac{1}{4t} = \frac{1}{4\times 0.170} = 1.47\ Hz$

8. (c) $\lambda = \frac{v}{n} = \frac{340}{200} = 1.7\ m$

9. (a) The time taken by the stone to reach the lake

$t_1 = \sqrt{\left(\frac{2h}{g}\right)} = \sqrt{\left(\frac{2\times 500}{10}\right)} = 10 sec$ (Using $h = ut + \frac{1}{2}gt^2$)

Now time taken by sound from lake to the man

$t_2 = \frac{h}{v} = \frac{500}{340} \approx 1.5 sec$

$\Rightarrow$ Total time $= t_1 + t_2 = 10 + 1.5 = 11.5 sec.$

10. (b) Distance between a compression and the nearest rarefaction is $\frac{\lambda}{2} = 1m.$ Hence

$n = \frac{v}{\lambda} = \frac{360}{2} = 180\ Hz.$

11. (a) $v = \sqrt{\frac{\gamma P}{\rho}} \Rightarrow \frac{v_{O_2}}{v_{H_2}} = \sqrt{\frac{\rho_{H_2}}{\rho_{o_2}}} = \sqrt{\frac{1}{16}} = \frac{1}{4}$

12. (d) Speed of sound in gases is $v = \sqrt{\frac{\gamma RT}{M}} \Rightarrow T \propto M$

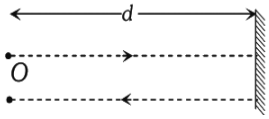
(Because v, γ-constant). Hence $\frac{T_{H_2}}{T_{O_2}} = \frac{M_{H_2}}{M_{O_2}}$

$\Rightarrow \frac{T_{H_2}}{(273+100)} = \frac{2}{32} \Rightarrow T_{H_2} = 23.2K = -249.7°C$

13. (c) Path difference $\Delta = \frac{\lambda}{2\pi}\times\phi \Rightarrow 1 = \frac{\lambda}{2\pi}\times\frac{\pi}{2} \Rightarrow \lambda = 4m$

Hence $v = n\lambda = 120\times 4 = 480\ m/s$

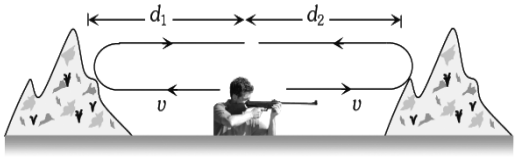
14. (a) Suppose the distance between shooter and reflecting surface is d. Hence time interval for hearing echo is



$t = \frac{2d}{v} \Rightarrow 8 = \frac{2d}{350} \Rightarrow d = 1400\ m.$

15. (d) $v = \sqrt{\frac{\gamma P}{\rho}}$; as P changes, ρ also changes. Hence $\frac{P}{\rho}$ remains constant so speed remains constant.

16. (b)



$2d_1 + 2d_2 = v\times t_1 + v\times t_2 \Rightarrow 2(d_1 + d_2) = v(t_1 + t_2)$

$d_1 + d_2 = \frac{v(t_1 + t_2)}{2} = \frac{340\times(1.5+3.5)}{2} = 850\ m.$

17. (b) By using $v = \sqrt{\frac{\gamma RT}{M}} \Rightarrow v \propto \sqrt{T}$

$\frac{v_2}{v_1} = \sqrt{\frac{T_2}{T_1}} = \sqrt{\frac{T+600}{T}} = \sqrt{3} \Rightarrow T = 300K = 27°C$

18. (c) $v = \sqrt{\frac{\gamma RT}{M}} \Rightarrow v \propto \sqrt{T}$

i.e. if v is doubled then T becomes four times,