WEEKLY TEST TYJ -1 TEST - 33 R
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 $v = \sqrt{\frac{\gamma RT}{M}} \Rightarrow T \propto M$

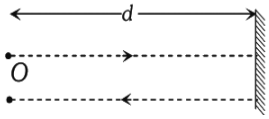
(Because v, γ-constant). Hence $\frac{T_{H_2}}{T_{O_2}} = \frac{M_{H_2}}{M_{O_2}}$

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

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

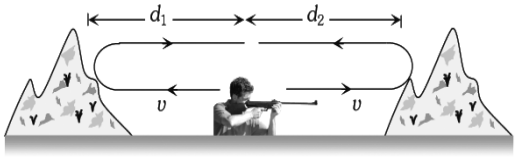
14. (a) Suppose the distance between shooter and reflecting surface is d. Hence time interval for hearing echo is



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

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,

hence $T_2 = 4T_1 = 4(273+27) = 1200K = 927°C$

19. (c) Since solid has both the properties (rigidity and elasticity)

20. (b) Frequency of wave is $n = \frac{3600}{2\times 60} Hz \Rightarrow$

$\lambda = \frac{v}{n} = \frac{760}{30} = 25.3\ m.$

[CHEMISTRY]

21 B

22.

Reactivity of alkali metals: Li < Na < K < Rb < Cs .

Reactivity of halogens: Fe > Cl > Br > I

23.

It is as per their emf values. The reducing power does not only depend upon ionisation energy but also on enthalpy of atomisation and enthalpy of hydration also.

24 A

25.

The maximum covalency of Be is 4, *e.g.*, $Na_2[Be(OH)_4]$ while that of Al is 6, *e.g.*, $Na_3[AlF_6]$.

26. A

27. B

28.

IE of Mg: Na < Al < Mg

29.

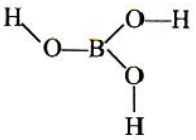
$KO_2 : \ +1+2x=0 \ \Rightarrow x = -\frac{1}{2}$

30.

$B(Z=5): 1s^2 2s^2 2p^1 \ ; Al(Z=13): 1s^2 2s^2 2p^6 3s^2 3p^1$

31. A

32.



; B is sp^2 and O is sp^3 hybridised.

33. D

34.

$\frac{1}{2} Al_2Cl_6 + 6H_2O \longrightarrow [Al(H_2O)_6]^{3+} + 3Cl^-$

35. Cs because of its low IE emits electron under the influence of even candle light.

36. $LiHCO_3$ is unstable and exists only in solution.

37. Non-metal oxides being acidic decompose carbonates to evolve CO_2 gas.

38. $NaNO_3$ is called chile salt petre.

39. Mixture of K_2CO_3 and Na_2CO_3 is called fusion mixture.

40. $BaCO_3 > SrCO_3 > CaCO_3 > MgCO_3$. Thermal stability decreases as the basic character of the metal hydroxide decreases.

[MATHEMATICS]

1. (a) Required probability $=\frac{4}{7}$.

2. (c) Required probability $=\frac{4}{36}=\frac{1}{9}$.

3. (a) Required probability $=\frac{4}{52}=\frac{1}{13}$.

4. c) Since there are one A, two I and one O, hence the required probability $=\frac{1+2+1}{11}=\frac{4}{11}$.

5. (b) Required probability is $1-P$ (All letters in right envelope) $=1-\frac{1}{n!}$

{As there are total number of $n!$ ways in which letters can take envelopes and just one way in which they have corresponding envelopes}.

6. (a) Favourable ways $\{29,92,38,83,47,74,56,65\}$

Hence required probability $=\frac{8}{100}=\frac{2}{25}$.

7. (c) To be both boys the probability $=\left(\frac{1}{2}\right)\left(\frac{1}{2}\right)=\frac{1}{4}$.

8. (b) Let $P(A)$ and $P(B)$ be the probability of the events then $P(A \text{ and } B)=P(A).P(B)=\frac{1}{2}\times\frac{2}{3}=\frac{1}{3}$.

9. (c) Total rusted items $=3+5=8$; unrusted nails $=3$.

$\therefore$ Required probability $=\frac{3+8}{6+10}=\frac{11}{16}$.

10. (b) Required probability $=\frac{2+1}{36}=\frac{1}{12}$.

11. (b) Total number of ways $=36$

Favourable numbers of cases are $(1\ 4),(2,\ 3),(3,\ 2),\ \ (4,\ 1),(1,\ 5),(2,\ 4),(3,\ 3),(4,\ 2),(5,\ 1)=9$

Hence the required probability $=\frac{9}{36}=\frac{1}{4}$.

12. (c) Total ways are 8 and favourable ways are 4

$S=\{HHH,HHT.....TTT\}$.

Hence probability $=\frac{4}{8}=\frac{1}{2}$.

13. (b) In a non-leap year, we have 365 days *i.e.,* 52 weeks and one day. So, we may have any day of seven days. Therefore, 53 Sunday, required probability = $\frac{1}{7}$.

14. (a) Required probability $=\frac{5}{25}=\frac{1}{5}$.

15. (d) Required probability $=\frac{4\ .\ 4}{52\ .\ 51}\times 2=\frac{8}{663}$.

16. (d) Probability for white ball $P(W)=\frac{4}{15}$

Probability for red ball $P(R)=\frac{6}{15}$

Probability (white or red ball) $=P(W)+P(R)$

$=\frac{4}{15}+\frac{6}{15}=\frac{10}{15}=\frac{2}{3}$.

17. (d) Required probability $=\frac{64}{64}$.

18. (c) P (tail in 3rd) . P (tail in 4th) $=\frac{1}{2}.\frac{1}{2}=\frac{1}{4}$.

19. (b) It is obvious.

20. (b) Same number can appear in 6 ways.

Hence required probability $=\frac{6}{216}=\frac{1}{36}$.