WEEKLY TEST TYM -01 TEST - 15 Balliwala
SOLUTION Date 04-08-2019

[PHYSICS]

1. (c) $\frac{A}{B}=\frac{\text{Force}}{\text{Force}}=[M^0L^0T^0]$

$Ct=\text{angle} \Rightarrow C=\frac{\text{Angle}}{\text{Time}}=\frac{1}{T}=T^{-1}$

$Dx=\text{angle} \Rightarrow D=\frac{\text{Angle}}{\text{Distance}}=\frac{1}{L}=L^{-1}$

$\therefore \quad \frac{C}{D}=\frac{T^{-1}}{L^{-1}}=[M^0LT^{-1}]$

2. (d) Maximum error in measuring mass = 0.001 g, because least count is 0.001 g. Similarly, maximum error in measuring volume is 0.01 cm^3.

$$\frac{\Delta\rho}{\rho}=\frac{\Delta M}{M}+\frac{\Delta V}{V}=\frac{0.001}{20.000}+\frac{0.01}{10.00}$$

$$=(5\times10^{-5})+(1\times10^{-3})=1.05\times10^{-3}$$

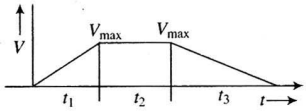
$$\Delta\rho=(1.05\times10^{-3})\times\rho$$

$$=1.05\times10^{-3}\times\frac{20.000}{10.00}=0.002 \text{ g cm}^{-3}$$

3. (d) $\frac{C^2}{g}=\frac{L^2T^{-2}}{LT^{-2}}=[L]$

4. (c) Graphically, the area of v–t curve represents displacement

$$S=\frac{1}{2}v_{max}t_1 \quad \text{or} \quad t_1=\frac{2S}{v_{max}}$$



$$2S = v_{max} t_2 \quad \text{or} \quad t_2 = \frac{2S}{v_{max}}$$

$$5S = \frac{1}{2} v_{max}\, t_3 \quad \text{or } t_3 = \frac{10S}{v_{max}}$$

$$v_{av} = \frac{\text{Total displacement}}{\text{Total time}} = \frac{S + 2S + 5S}{\frac{2S}{v_{max}} + \frac{2S}{v_{max}} + \frac{10S}{v_{max}}}$$

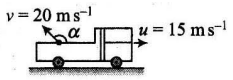
$$\frac{v_{av}}{v_{max}} = \frac{8S}{14S} = \frac{4}{7}$$

Alternative:

$$\frac{v_{av}}{v_{max}} = \frac{\text{Total displacement}}{2\left(\begin{matrix}\text{Total displacement}\\ \text{during acceleration}\\ \text{and retardation}\end{matrix}\right) + \left(\begin{matrix}\text{Displacement}\\ \text{during uniform}\\ \text{velocity}\end{matrix}\right)}$$

$$\frac{v_{av}}{v_{max}} = \frac{8S}{2(S+5S)+2S} = \frac{8}{14} = \frac{4}{7}$$

5. (b) $\sin\alpha = \frac{u}{v} = \frac{\sqrt{3}}{2} \Rightarrow \alpha = 60°$



$\Rightarrow \quad \theta = 90° + \alpha = 150°$

6. (a) For the person to be able to catch the ball, the horizontal component of velocity of the ball should be same as the speed of the person, i.e.,

$$v_0 \cos\theta = \frac{v_0}{2} \quad \text{or} \quad \cos\theta = \frac{1}{2} \quad \text{or} \quad \theta = 60°$$

7. $x_A = x_B$

$10.5 + 10t = \frac{1}{2} at^2$ $\qquad$ $a = \tan 45° = 1$

$t^2 - 20t - 21 = 0$ $\qquad$ $t^2 - 21t + t - 21 = 0$

$t(t - 21) + 1(t - 21) = 0 \Rightarrow$ $\qquad$ $t = 21, -1$

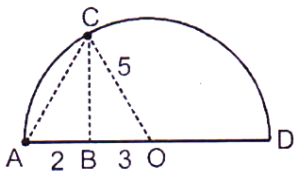
rejecting negative value $\qquad$ $t = 21$ sec.

8. From triangle BCO $\Rightarrow$ $\qquad$ BC = 4

From triangle BCA $\Rightarrow$ $\qquad$ $AC = \sqrt{2^2 + 4^2} = 2\sqrt{5}$

$AC = u_1 t, \qquad BC = u_2 t$

$$\therefore \quad \frac{u_1}{u_2} = \frac{AC}{BC} = \frac{2\sqrt{5}}{4} = \frac{\sqrt{5}}{\sqrt{4}}$$



9. After 10 sec

$u_B = 2 \times 10 = 20$

A ⟵ $x = 1/2 \times a \times 10^2$ ⟶ B

$= 100$

Now $x_A = (40\ t)$

$$x_B = 100 + (ut) + \frac{1}{2}(2)\ t^2 = 100 + 20\ t + t^2$$

A will be ahead of B when

$x_B < x_A \Rightarrow 100 + 20\ t + t^2 < 40\ t$

$\Rightarrow t^2 - 20\ t + 100 < 0$

$t^2 - 10t - 10\ t + 100 < 0$

$t(t - 10) - 10\ (t - 10) < 0$

$(t - 10)^2 < 0$

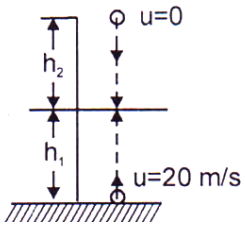
which is not possible

10. Height of the building

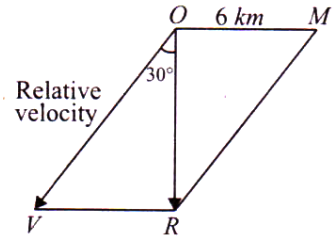
$H = h_1 + h_2$

$= \frac{1}{2} gt^2 + ut - \frac{1}{2} gt^2$

$= ut = 60$ m.



11. Velocity of rain = Velocity of man + Relative velocity of rain OR gives the actual velocity.



$$\tan 30^\circ = \frac{VR}{OR}$$

$$= \frac{1}{\sqrt{3}} = \frac{6}{OR}$$

$OR = 6\sqrt{3}$

∴ Hence, the answer is (B)

12. $$t = \frac{AB}{\sqrt{5^2 - 3^2}} = \frac{3}{4} = 45 \text{ minutes}$$

∴ Answer is (C)

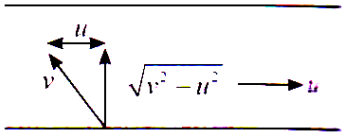
13. Disance covered in 15 minutes $= 5\text{km/hr} \times \frac{15}{60}\text{hr} = 1.25$ km

Extra distance along river covered $= \sqrt{(1.25)^2 - (1)^2} = 0.75$ km

Velocity of river $= \frac{0.75}{(15/60)\text{hr}} = \frac{0.75 \times 4}{1} = 3\text{km/hr}$

$\therefore$ Answer is (B)

14. Let velocity of man in still water be v and that of water with respect to ground be u. Velocity of man downstream = v + u



As given, $\sqrt{v^2-u^2}\ t = (v+u)T$

$\Rightarrow$ $(v^2-u^2)t^2 = (v+u)^2T^2$

$\Rightarrow$ $(v-u)^2 = (v+u)T^2$

$\therefore$ $\dfrac{v}{u} = \dfrac{t^2+T^2}{t^2-T^2}$

$\therefore$ (C) is correct option

[CHEMISTRY]

16. 34 electrons

17.

18. Bond orders are : $He_2^+ = 0.5$; $O_2^- = 1.5$; $NO = 2.5$; $C_2^{2-} = 3.0$

19.

20. XeF has 8 electrons in valence shell. In XeF_2, XeF_4 and XeF_6, two sigma bonds, four sigma bonds and six sigma bonds are respectively formed. Hence, in XeF_2 3 pairs of electrons are left, in XeF_4 2 pairs of electron are left and in XeF_6 only 1 pair of electron is left.

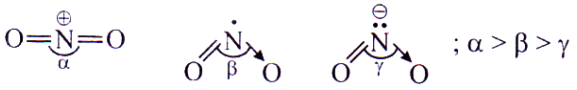
21. Each f C^1 and C^2 are forming two sigma bonds. Hence, both are sp-hybridised.

22. CO has triple bond $:\bar{C}\equiv\overset{+}{O}:$, CO_2 has double bonds O=C=O,

CO_3^{2-} has C–O bond intermediate between single and double bond.

23. In methane C-atom is sp^3-hybridized with 25 s-character. In ethene, it is sp^2 with 33 s-character has to be less than 25 (actual value is 21.43)

24. Bond orders are : $O_2^- = 1.5$, $NO = 2.5$, $C_2^{2-} = 3.0$

25. 

; $\alpha > \beta > \gamma$

26.

27. Bond order of N_2^{2-} and N_2^{2+} is 2.

Bond order of N_2^{2-} and N_2^{2+} is 2.5

Bond order of N_2 is 3

28. Bond orders of O_2^{2-}, O_2^-, O_2 and O_2^+ are 1, 1.5, 2 and 2.5 respectively. (Please, refer to the text article no. 5.25)