

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

**[PHYSICS]**

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

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

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

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

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<sup>3</sup>.

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

$$= (5 \times 10^{-5}) + (1 \times 10^{-3}) = 1.05 \times 10^{-3}$$

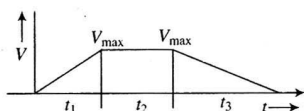
$$\Delta \rho = (1.05 \times 10^{-3}) \times \rho$$

$$= 1.05 \times 10^{-3} \times \frac{20.000}{10.00} = 0.002 \text{ g cm}^{-3}$$

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

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

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



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

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

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

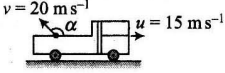
$$\frac{v_{\text{av}}}{v_{\max}} = \frac{8S}{14S} = \frac{4}{7}$$

Alternative:

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

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

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



$\Rightarrow \theta = 90^\circ + \alpha = 150^\circ$

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.,

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

7.  $x_A = x_B$

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

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

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

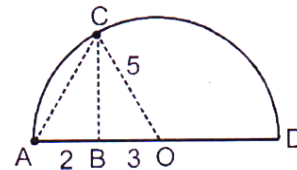
rejecting negative value  $t = 21 \text{ sec.}$

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

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

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

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



9. After 10 sec

$$\begin{array}{c} \xrightarrow{\quad} \\ u_B = 2 \times 10 = 20 \\ \xrightarrow{\quad} \\ A \leftarrow x = \frac{1}{2} \times a \times t^2 \rightarrow B \\ = 100 \end{array}$$

Now  $x_A = (40 t)$

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

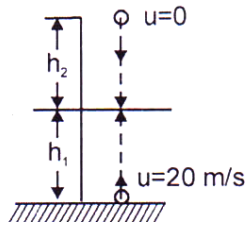
A will be ahead of B when

$$\begin{aligned} x_B < x_A &\Rightarrow 100 + 20 t + t^2 < 40 t \\ &\Rightarrow t^2 - 20 t + 100 < 0 \\ &\Rightarrow t^2 - 10 t - 10 t + 100 < 0 \\ &\Rightarrow t(t - 10) - 10(t - 10) < 0 \\ &\Rightarrow (t - 10)^2 < 0 \end{aligned}$$

which is not possible

10. Height of the building

$$\begin{aligned} H &= h_1 + h_2 \\ &= \frac{1}{2} g t^2 + ut - \frac{1}{2} g t^2 \\ &= ut = 60 \text{ m.} \end{aligned}$$



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

$$\begin{aligned} \tan 30^\circ &= \frac{VR}{OR} \\ &= \frac{1}{\sqrt{3}} = \frac{6}{OR} \end{aligned}$$

$$\text{OR} = 6\sqrt{3}$$

$\therefore$  Hence, the answer is (B)

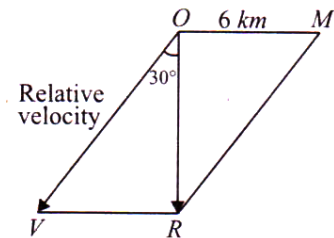
12.  $t = \frac{AB}{\sqrt{5^2 - 3^2}} = \frac{3}{4} = 45 \text{ minutes}$

$\therefore$  Answer is (C)

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

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

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



∴ 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 =  $v + u$

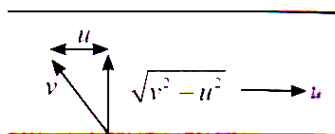
As given,  $\sqrt{v^2 - u^2} t = (v + u)T$

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

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

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

∴ (C) is correct option



### CHEMISTRY

16. 34 electrons

17.

18. Bond orders are :  $\text{He}_2^+ = 0.5$ ;  $\text{O}_2^- = 1.5$ ;  $\text{NO} = 2.5$ ;  $\text{C}_2^{2-} = 3.0$

19.

20. XeF has 8 electrons in valence shell. In  $\text{XeF}_2$ ,  $\text{XeF}_4$  and  $\text{XeF}_6$ , two sigma bonds, four sigma bonds and six sigma bonds are respectively formed. Hence, in  $\text{XeF}_2$  3 pairs of electrons are left, in  $\text{XeF}_4$  2 pairs of electron are left and in  $\text{XeF}_6$  only 1 pair of electron is left.

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

22. CO has triple bond :  $\text{:}\bar{\text{C}}\equiv\text{O:}^+$ ,  $\text{CO}_2$  has double bonds  $\text{O}=\text{C}=\text{O}$ ,

$\text{CO}_3^{2-}$  has C-O bond intermediate between single and double bond.

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

24. Bond orders are :  $\text{O}_2^- = 1.5$ ,  $\text{NO} = 2.5$ ,  $\text{C}_2^{2-} = 3.0$

25.  $\text{O}=\overset{\oplus}{\text{N}}=\text{O}$       $\text{O}=\overset{\cdot}{\text{N}}=\text{O}$       $\text{O}=\overset{\ominus}{\text{N}}=\text{O}$  ;  $\alpha > \beta > \gamma$

26.

27. Bond order of  $\text{N}_2^{2-}$  and  $\text{N}_2^+$  is 2.

Bond order of  $\text{N}_2^{2-}$  and  $\text{N}_2^+$  is 2.5

Bond order of  $\text{N}_2$  is 3

28. Bond orders of  $\text{O}_2^{2-}$ ,  $\text{O}_2^-$ ,  $\text{O}_2$  and  $\text{O}_2^+$  are 1, 1.5, 2 and 2.5 respectively. (Please, refer to the text article no. 5.25)