

#### Max. Marks: 60

(a)

# JB 1 MR BATCH PHYSICS : DCT (SET B) Topics: Circular Motion

- A body is moving in a circle with a speed of 1 m/s. This speed increases at a constant rate of 2 m/s every second. Assume that the radius of the circle described is 25 m. The total acceleration of the body after 2 s is
  - (a)  $2 \text{ ms}^{-2}$  (b)  $25 \text{ ms}^{-2}$  (c)  $\sqrt{5} \text{ ms}^{-2}$  (d)  $\sqrt{7} \text{ ms}^{-2}$
- 2. A particle is moving on a circular path of radius 'r' with uniform speed 'v'. The change in velocity when the particle moves from P to Q is ( $\angle POQ = 40^\circ$ )



 $2v \cos 40^{\circ}$  (b)  $2v \sin 40^{\circ}$  (c)  $2v \sin 20^{\circ}$  (d)  $2v \cos 20^{\circ}$ 

3. A particle moves in a circle of radius 25 cm at 2 revolutions/s. The acceleration of the particle in  $m/s^2$  is

(a)  $\pi^2$  (b)  $8\pi^2$  (c)  $4\pi^2$  (d)  $2\pi^2$ 

- 4. A stone tied to the end of a string 100 cm long is whirled in a horizontal circle with a constant speed. If the stone makes 14 revolutions in 22s, then the acceleration of the stone is x
  - (a)  $16 \text{ ms}^{-2}$  (b)  $4 \text{ ms}^{-2}$  (c)  $12 \text{ ms}^{-2}$  (d)  $8 \text{ ms}^{-2}$
- 5. The magnitude of displacement of a particle moving in a circle of radius a with constant angular speed  $\omega$  varies with time t is
  - (a)  $2a \sin \omega t$  (b)  $2a \sin \frac{\omega t}{2}$  (c)  $2a \cos \omega t$  (d)  $2a \cos \frac{\omega t}{2}$

**Space for Rough Work** 

Date: 27.11.2022



- 6. A car of mass m moves in a horizontal circular path of radius r metre. At an instant its speed is V m/s and is increasing at a rate of a  $ms^{-2}$ . Then the acceleration of the car is
  - (a)  $\frac{V^2}{r}$  (b) a (c)  $\sqrt{a^2 + \left(\frac{V^2}{r}\right)^2}$  (d)  $\sqrt{a + \frac{V^2}{r}}$
- 7. A car speeds up in a circular path Moving in anticlockwise direction. Which of the following figures illustrates the net acceleration of the car?



8. A point P moves in a counter-clockwise direction on a circular path as shown in the figure. The movement of P is such that it sweeps out a length  $s = t^3 + 5$ , where s is in metre and t is in seconds. The radius of the path is 20 m. The magnitude acceleration of P at t = 2 s is:



Space for Rough Work



9. A particle is moving along a circular path in the XY plane. When it crosses the x-axis, it has an acceleration along the path of  $1.5 \text{ m/s}^2$ , and is moving with a speed of 10 m/s in the negative y-direction. The total acceleration of the particle is:



(a)  $50\hat{i} - 1.5\hat{j}\,\text{m/s}^2$  (b)  $-50\hat{i} - 1.5\hat{j}\,\text{m/s}^2$  (c)  $10\hat{i} - 1.5\hat{j}\,\text{m/s}^2$  (d)  $1.5\hat{i} - 50\hat{j}\,\text{m/s}^2$ 

10. A particle A moves along a circle of radius of R = 50 cm so that its radius vector r relative to the point O rotates with the constant angular velocity  $\omega = 0.40$  rad/s. Then speed of the particle, and the modulus of its total acceleration will be



(a)	$v = 0.4 \text{ m/s}, a = 0.4 \text{ m/s}^2$	(b)	$v = 0.4 \text{ m/s}, a = 0.32 \text{ m/s}^2$
(c)	$v = 0.2 \text{ m/s}, a = 0.08 \text{ m/s}^2$	(d)	changing for both v and w w.r.t. time

11. A plane is revolving around the earth with a speed of 100 km/h at a constant height from the surface of the earth. The change in the velocity as it travels half-circle is

(a)	200 km/h	(b)	150 km/h	(c)	100√2 km/h	(d)	0
-----	----------	-----	----------	-----	------------	-----	---



12. An object is projected obliquely at an angle  $\theta$  to the horizontal with a certain velocity. During its path of trajectory, what is the ratio of minimum to maximum radii of turning?

(a)  $1:\cos^2 \theta$  (b)  $\cos^2 \theta:1$  (c)  $\cos^3 \theta:1$  (d)  $1:\cos^3 \theta$ 

13. An object is moving along a curved path for which its acceleration is  $(2\hat{i} + \hat{j}) \text{ m/s}^2$  and its velocity is  $(\hat{i} - 3\hat{j}) \text{ m/s}^2$  at an instant. The body is

- (a) speeding up (b) speeding down
- (c) moving with uniform velocity (d) moving with uniform acceleration

14. Two cars going round curve with speeds one at 90 km/h and other at 15 km/h. Each car experiences same acceleration. The radii of curves are in the ratio of

(a) 4:1(b) 2:1(c) 16:1(d) 36:1

15. The linear velocity of a rotating body is given by  $\vec{V} = \vec{\omega} \times \vec{r}$ , where  $\vec{\omega}$  is the angular velocity and  $\vec{r}$  is the radius vector. The angular velocity of a body is  $\vec{\omega} = \hat{i} - 2\hat{j} + 2\hat{k}$  and the radius vector  $\vec{r} = 4\hat{j} - 3\hat{k}$  then  $|\vec{v}|$  is (a)  $\sqrt{29}$  units (b)  $\sqrt{31}$  units (c)  $\sqrt{37}$  units (d)  $\sqrt{41}$  units







## JB 1 MR BATCH CHEMISTRY : DCT (SET B) Topic: Chemical Bonding + Mole Concept + Periodic Properties

The EN's of F, Cl, Br and I are 4.0, 3.0, 2.8 and 2.5 respectively. The hydrogen halide with a highest percentage 16. of ionic character is HI (b) (a) HBr (c) HCl (d) HF 17. Among the following which is polar?  $CO_2$ (b)  $SO_2$ (d) (a) (c) BeCl<sub>2</sub> 18. The resultant dipole moment ( $\mu$ ) of two compounds NOF and NO<sub>2</sub>F is 1.81 D and 0.47 D respectively. Which dipole moment do you predict? (a) 1.81 D for  $NO_2F$  and 0.47 D for NOF 0.47 D for NO<sub>2</sub>F and 1.81 D for NOF (b) For both NO<sub>2</sub>F and NOF, dipole moment ( $\mu$ ) is 1.81 D (c) For both NO<sub>2</sub>F and NOF, dipole moment ( $\mu$ ) is 0.47 D (d) 19. Which of the following molecule(s) have dipole moment? I. Trans-pent-2-ene II. cis-hex-3-ene III. 2, 2-Dimethyl propane IV. 2, 2, 3, 3-tetramethyl butane (a) I, II (b) II, III (c) I. III (d) I, IV The shapes of  $PCl_4^{\oplus}$ ,  $PCl_4^{\ominus}$  and  $AsCl_5$  are respectively 20. Square planar, tetrahedral and see-saw. (a) Tetrahedral, see-saw and trigonal bipyramidal. (b) Tetrahedral, square planar and pentagonal bipyramidal. (c) Trigonal bipyramidal, tetrahedral and square pyramidal. (d) **Space for Rough Work** 



21.	How n	How many moles of $O_2$ will be liberated by one mole of $CrO_5$ is the following reaction:									
	$CrO_5 + H_2SO_4 \rightarrow Cr_2(SO_4)_3 + H_2O + O_2$										
	(a)	4.5	(b)	2.5	(c)	1.25	(d)	None			
22.	1 mol o	of $MnO_4^{2-}$ in neutral	l aqueou	s medium dis-	propertionate	s to					
	(a)	$\frac{2}{3}$ mol of MnO <sub>4</sub> <sup>©</sup>	and $\frac{1}{3}$ m	nol of MnO <sub>2</sub>	(b)	$\frac{1}{3}$ mol of N	$MnO_4^{\odot} \text{ and } \frac{2}{3} \text{ m}$	ol of MnO <sub>2</sub>			
	(c)	$\frac{1}{3}$ mol of Mn <sub>2</sub> O <sub>7</sub> a	and $\frac{2}{3}$ n	nol of MnO <sub>2</sub>	(d)	$\frac{2}{3}$ mol of N	$Mn_2O_7$ and $\frac{1}{3}$ me	ol of MnO <sub>2</sub>			
23.	If equa	al volumes of 1 M H	KMnO <sub>4</sub>	and 1M K <sub>2</sub> Cr <sub>2</sub>	O7 solutions a	re used to oxi	dise Fe <sup>2+</sup> in acid	lic medium, then Fe <sup>2+</sup>			
	will be oxidised										
	(a)	More by K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub>		(b)	More by KMnO <sub>4</sub>						
	(c)	Equal in both the c	cases		(d)	The data is	insufficient to p	redict the answer			
24.	An atom with high EA generally has										
	(a)	Tendency to form	+ve ion	8	(b)	High ioniza	ation energy				
	(c)	Large atomic size			(d)	Low electro	on affinity				
25.	Due to	screening effect of	electron	s in an atom							
	(a)	IE decreases									
	(b)	IE increases									
	(c)	No change in IE									
	(d)	(d) Attraction of nucleus on the valence electron increases									
26.	Which statement(s) is (are) wrong for bond angle?										
	(a)	$CH \equiv CH > BF_3 >$	CH <sub>4</sub>		(b)	$H_2O > NH_3$	i				
	(c)	$\stackrel{\oplus}{\mathrm{N}}\mathrm{H}_4 > \mathrm{NH}_3 > \mathrm{PC}$	Cl <sub>5</sub>		(d)	$\rm CO_2 > NH_3$	$> CH_4$				





- 27. Which statement(s) is (are) correct for AB<sub>x</sub> type molecule?
  - (a) If the EN of central atom decreases, the bond angle decreases.
  - (b) If the size of central atom increases, the bond angle decreases.
  - (c) If the EN of atom B decreases that bond angle increases.
  - (d) If the EN of atom B decreases, the bond angle decreases.
- 28. Paramagnetic pair(s) among the following is (are)
  - (a)  $[BaO_2, NO_2]$  (b)  $[KO_2, NO]$
  - (c)  $[H_2O_2, NO]$  (d)  $K_3[Fe(CN)_6], CuCl_2$
- 29. Which of the following statements is incorrect?
  - (a)  $NH_3$  is more basic than  $PH_3$ .
  - (b)  $NH_3$  has a higher boiling point than that of HF.
  - (c)  $N_2$  is less reactive than  $P_4$ .
  - (d) The dipole moment of  $NH_3$  is less than that of  $SO_2$ .
- 30. If one assumes linear structure instead of bent structure for water, then which one of the following properties cannot be explained?
  - (a) The formation of intermolecular hydrogen bond in water.
  - (b) The high boiling point of water.
  - (c) Solubility of polar compounds in water.
  - (d) Ability of water to form coordinate covalent bond.

\* \* \* \* \*





#### Max. Marks: 60

Date: 27.11.2022

# JB 1 MR BATCH PHYSICS : DCT (SET B) ANSWER KEY Topics: Circular Motion

1.	(c)	2.	(c)	3.	(c)	4.	(a)	5.	(b)
6.	(c)	7.	(d)	8.	(a)	9.	(b)	10.	(b)
11.	(a)	12.	(c)	13.	(b)	14.	(d)	15.	(a)

Max Marks: 60

Date: 27.11.2022

# JB 1 MR BATCH CHEMISTRY : DCT (SET B) ANSWER KEY Topic: Chemical Bonding + Mole Concept + Periodic Properties

16.	(d)	17.	(b)	18.	(b)	19.	(a)	20.	(b)
21.	(d)	22.	(a)	23.	(a)	24.	(b)	25.	(a)
26.	(b, d)	27.	(a, b, c)	28.	(b, d)	29.	(b)	30.	(c)