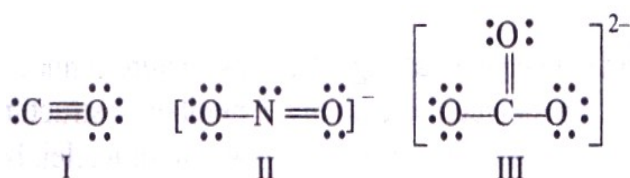


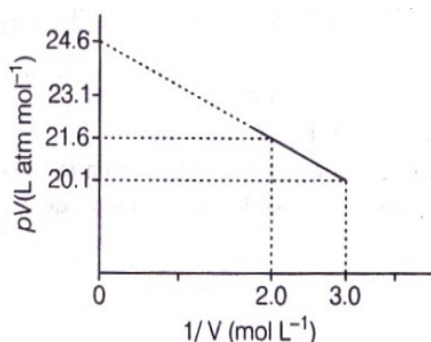
- Q.1 How many number of aluminum ions are present in 0.051 g of aluminum Oxide?  
 (a)  $6.023 \times 10^{23}$  ions (b) 3 ions  
 (c)  $6.023 \times 10^{20}$  ions (d) 9 ions
- Q.2 The angular momentum of electrons in d orbital  
 (a)  $\sqrt{6} \frac{h}{2\pi}$  (b)  $\sqrt{2} \frac{h}{2\pi}$   
 (c)  $\sqrt{3} \frac{h}{2\pi}$  (d)  $0 \frac{h}{2\pi}$
- Q.3 Henry Moseley plotted a graph between  $\sqrt{\nu}$  and Z, where  $\nu$  was the frequency of X-ray emitted by an atom and Z was its atomic number. This graph showed that  
 (a) The atomic mass is fundamental properties of an element  
 (b) The atomic number is fundamental properties of an element  
 (c) Both (a) and (b)  
 (d) The frequency ( $\nu$ ) was independent of atomic number
- Q.4 Lewis dot structure of CO,  $\text{NO}_2^-$  and  $\text{CO}_3^{2-}$  are I, II and III respectively



Which of the above structure(s) is/ are wrong?

- (a) Only I (b) Only II  
 (c) Only III (d) All of these
- Q.5 For one mole of a van der Waals' gas when  $b=0$  and  $T=300\text{k}$ , the  $pV$  vs  $1/V$  plot is shown below. The value of the van der Waals' constant  $a$  ( $\text{atm L mol}^{-2}$ )

- (a) 1.0  
 (b) 4.5  
 (c) 1.5  
 (d) 3.0

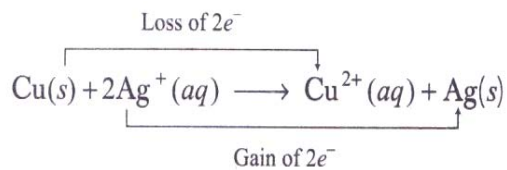


- Q.6 For the reaction,  $\text{X}_2\text{O}_4(l) \rightarrow 2\text{XO}_2(g)$ ,  $\Delta U = 2.1 \text{ kcal}$ ,  $\Delta S = 20 \text{ cal K}^{-1}$  at 300 K. Hence,  $\Delta G$  is  
 (a) 2.7 Kcal (b) -2.7 Kcal  
 (c) 9.3 Kcal (d) -9.3 Kcal
- Q.7 A 0.2 molar solution of formic acid is 3.2% ionized. Its ionization constant is  
 (a)  $9.6 \times 10^{-3}$  (b)  $2.1 \times 10^{-4}$

(c)  $1.25 \times 10^{-6}$

(d)  $4.8 \times 10^{-5}$

Q.8 In the reaction



Copper metal, Cu(s) is oxidized to  $\text{Cu}^{2+}(\text{aq})$ , While  $\text{Ag}^+(\text{aq})$  is reduced to silver metal, Ag(s), then the equilibrium greatly lies in favour of

(a)  $\text{Ag}^+(\text{s})$  and  $\text{Cu}^{2+}(\text{aq})$

(b)  $\text{Ag}^+(\text{aq})$  and  $\text{Cu}^{2+}(\text{s})$

(c) Ag(s) and  $\text{Cu}^{2+}(\text{aq})$

(d)  $\text{Cu}^{2+}(\text{aq})$  and Ag(s)

Q.9 Given, force =  $\frac{\alpha}{\text{Density} + \beta^3}$

What are the dimensions of  $\alpha$ .  $\beta$

(a)  $[\text{ML}^2\text{T}^{-2}]$ ,  $[\text{ML}^{-1/3}]$

(b)  $[\text{M}^2 \text{L}^4\text{T}^{-2}]$ ,  $[\text{M}^{1/3} \text{L}^{-1}]$

(c)  $[\text{M}^2 \text{L}^{-2}\text{T}^{-2}]$ ,  $[\text{M}^{1/3} \text{L}^{-1}]$

(d)  $[\text{M}^2 \text{L}^{-2}\text{T}^{-2}]$ ,  $[\text{ML}^{-2}]$

Q.10 Find the dimensions of a/b in the equation  $F = a\sqrt{x} + bt^2$ , Where F is a force, x is distance and t is time.

(a)  $[\text{L}^{-1/2} \text{T}^2]$

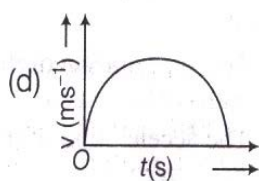
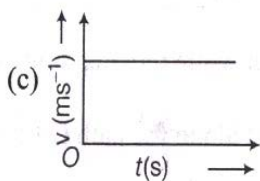
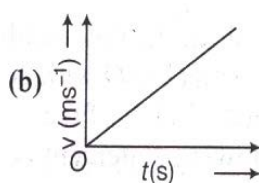
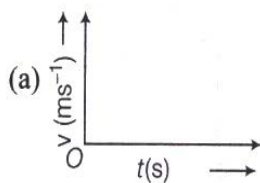
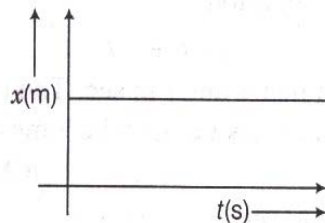
(b)  $[\text{L}^2 \text{T}^{-3/2}]$

(c)  $[\text{L} \text{T}^{-4}]$

(d)  $[\text{L}^{3/2} \text{T}^4]$

Q.11 For the x-t graph given below, the v-t graph is given as

(a)



Q.12 The speed of a projectile at the maximum height is  $\frac{1}{2}$  its initial speed. Find the ratio of range of projectile to the maximum height attained.

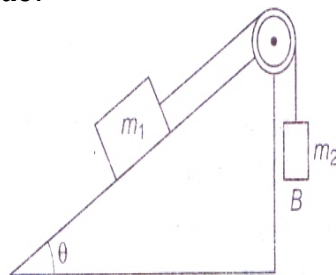
(a)  $4\sqrt{3}$

(b)  $\frac{4}{\sqrt{3}}$

(c)  $\frac{\sqrt{3}}{4}$

(d) 6

Q.13 Mass  $m_1$  moves on a slope making an angle  $\theta$  with the horizontal and is attached to mass  $m_2$  by a string passing over a frictionless pulley as shown in figure. The coefficient of friction between  $m_1$  and the sloping surface is  $\mu$ . Which of the following statements are true?



(a) If  $m_2 > m_1 \sin\theta$ , the body will move up the plane

(b) If  $m_2 > m_1 (\sin\theta + \mu\cos\theta)$  the body will move up the plane

(c) If  $m_2 < m_1 (\sin\theta + \mu\cos\theta)$  the body will move up the plane

(d) If  $m_2 < m_1 (\sin\theta - \mu\cos\theta)$  the body will move down the plane

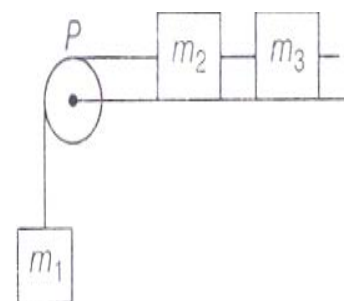
Q.14 A system consists of three masses  $m_1$ ,  $m_2$  and  $m_3$  connected by a string passing over a pulley P. The mass  $m_1$  hangs freely and  $m_2$  and  $m_3$  are on a rough horizontal table (the coefficient of friction =  $\mu$ ). The pulley is frictionless and of negligible mass. The downward acceleration of mass  $m_1$  is (Assume,  $m_1 = m_2 = m_3 = m$ )

(a)  $\frac{g(1-g\mu)}{9}$

(b)  $\frac{2g\mu}{3}$

(c)  $\frac{g(1-2\mu)}{3}$

(d)  $\frac{g(1-2\mu)}{2}$



Q.15 When a stone is rotated with uniform speed in horizontal plane by means of a string, the magnitude of the momentum is fixed but its direction changes. A force is needed to cause this change in momentum vector. This force is provided by



- (a) gravity  
 (b) our hand through the string  
 (c) Both gravity and our hand through the string  
 (d) None of the above
16. If  $A = \{1, 2, 3\}$ ,  $B = \{3, 4\}$ ,  $C = \{4, 5, 6\}$ , then  $(A \times B) \cap (B \times C)$  is equal to
- (A)  $\{1, 4\}$  (B)  $\{3, 4\}$   
 (C)  $\{(1, 4), (3, 4)\}$  (D) None of these.
17. For a complex number  $z$ , the minimum value of  $|z| + |z-2|$  is
- (A) 1 (B) 2  
 (C) 3 (D) none of these
18. Let  $a, b, c$  be real numbers with  $a \neq 0$  and let  $\alpha, \beta$  be the roots of the equation  $ax^2 + bx + c = 0$ . Then the roots of  $a^3x^2 + abcx + c^3 = 0$  in terms of  $\alpha, \beta$  are given by
- (A)  $\alpha, \beta$  (B)  $\frac{c\alpha}{a}, \frac{c\beta}{a}$   
 (C)  $a\alpha, c\beta$  (D)  $c\alpha, a\beta$
19. Everybody in a room shakes hand with everybody else. The total number of hand shake is equal to 153. The total number of persons in the room is equal to:
- (A) 18 (B) 19  
 (C) 17 (D) 16
20. The term independent of  $x$  in  $\left[ \sqrt{\frac{x}{3}} + \sqrt{\left(\frac{3}{2x^2}\right)} \right]^{10}$  is
- (A) 1 (B)  $5/12$   
 (C)  ${}^{10}C_1$  (D) None of these

21. The sum of  $n$  terms of the series  $\frac{3}{1^2} + \frac{5}{1^2 + 2^2} + \frac{7}{1^2 + 2^2 + 3^2} + \dots$  is:
- (A)  $\frac{6n}{n+1}$  (B)  $\frac{n}{n+1}$   
(C)  $\frac{6}{n+1}$  (D) None of these
22. If  $\sin\alpha$ ,  $\sin\beta$  and  $\cos\alpha$  are in G.P, then roots of the equation  $x^2 + 2x \cot \beta + 1 = 0$  are always.
- (A) equal (B) real  
(C) imaginary (D) greater than 1
23. The distance of the line  $2x - 3y = 4$  from the point  $(1, 1)$  in the direction of the line  $x + y = 1$  is
- (A)  $\sqrt{2}$  (B)  $5\sqrt{2}$   
(C)  $1/\sqrt{2}$  (D) none of these
24. The letter the word 'ASSASION' are written down at random in row the probability that no two 's' are together is
- (A)  $\frac{1}{35}$  (B)  $\frac{1}{14}$   
(C)  $\frac{1}{5}$  (D) None
25. The value of  $\sin 12^\circ \cdot \sin 48^\circ \cdot \sin 54^\circ =$
- (A)  $1/8$  (B)  $1/6$   
(C)  $1/4$  (D)  $1/2$

**ANSWER KEY**

1.c	2.a	3.b	4.a	5.c
6.b	7.b	8.d	9.c	10.a
11.a	12.b	13.b	14.c	15.b
16.b	17.b	18.b	19.c	20.d
21.a	22.b	23.a	24.a	25.a