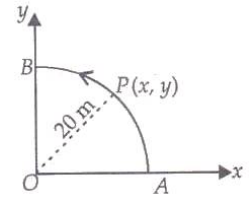


## physics

- Q.1 Which one of the following represent the correct dimensions of the coefficient of viscosity?  
 (a)  $ML^{-1}T^{-2}$   
 (b)  $MLT^{-1}$   
 (c)  $ML^{-1}T^{-1}$   
 (d)  $ML^{-2}T^{-2}$
- Q.2 A student uses a simple pendulum of exactly 1 m length to determine  $g$ , the acceleration due to gravity. He uses a stop watch with the least count of 1 sec for this and records 40 seconds for 20 oscillations. For this observation, which of the following statements is true?  
 (a) Error  $\Delta T$  in measuring  $T$ , the time period, is 0.15 seconds.  
 (b) Error  $\Delta T$  in measuring  $T$ , the time period, is 1 second.  
 (c) Percentage error in the determination of  $g$  is 5% .  
 (d) Percentage error in the determination of  $g$  is 2.5%
- Q.3 Two bodies are projected with the same velocity. If one is projected at an angle of  $30^\circ$  and the other at an angle of  $60^\circ$  to the horizontal, the ratio of the maximum heights reached is  
 (a) 3 : 1  
 (b) 1 : 3  
 (c) 1 : 2  
 (d) 2 : 1
- Q.4 From a tower of height  $H$ , a particle is thrown vertically upwards with a speed  $u$ . The time taken by the particle, to hit the ground, is  $n$  times that taken by it to reach the highest point of its path. The relation between  $H, u$  and  $n$  is :-  
 (a)  $gH = (n - 2)u^2$   
 (b)  $2gH = n^2u^2$   
 (c)  $gH = (n - 2)^2u^2$   
 (d)  $2gH = nu^2(n - 2)$
- Q.5 A point  $P$  moves in 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 metres and  $t$  is in seconds. The radius of path is 20 m. The acceleration of  $P$  when  $t = 2$  s is nearly

- (a)  $14 \text{ m s}^{-2}$   
 (b)  $13 \text{ m s}^{-2}$   
 (c)  $12 \text{ m s}^{-2}$   
 (d)  $7.2 \text{ m s}^{-2}$

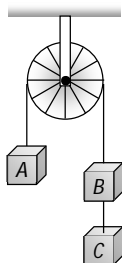


- Q.6 A body is at rest at  $x = 0$ . At  $t = 0$ , it starts moving in the positive  $x$ -direction with a constant acceleration. At the same instant another body passes through  $x = 0$  moving in the positive  $x$ -direction with a constant speed. The position of the first body is given by  $x_1(t)$  after time  $t$  and that of the second body by  $x_2(t)$  after the same time interval. which of the following graphs correctly describes  $(x_1 - x_2)$  as a function of time  $t$  ?
- (a)
- (b)
- (c)
- (d)
- Q.7 A particle is moving eastwards with a velocity of  $5 \text{ m/s}$ . In 10s the velocity changes to  $5 \text{ m/s}$  northwards. The average acceleration in this time is  
 (a) Zero  
 (b)  $\frac{1}{\sqrt{2}} \text{ m s}^{-2}$  towards north-west  
 (c)  $\frac{1}{\sqrt{2}} \text{ m s}^{-2}$  towards north-east

(d)  $\frac{1}{2}ms^{-2}$  towards north

- Q.8 A person start his journey at 9:00 am from Nahan to Chandigarh. Its position varies w.r.t. time as  $s = \alpha t^2$ . It crosses Kala-amb at 9:20 am. What will be its velocity and distance at 9:20 am ( $\alpha = 0.02 m/s^2$ ).
- (a) 28.8 m/s, 48 km  
 (b) 48 m/s, 28.8 km  
 (c) 28.8 m/s, 28.8 km  
 (d) 48 m/s, 48 km.

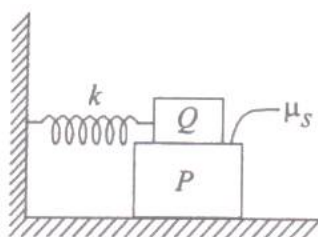
- Q.9 Three equal weights A, B and C of mass 2 kg each are hanging on a string passing over a fixed frictionless pulley as shown in the figure. The tension in the string connecting weights B and C is



- (a) Zero  
 (b) 13 N  
 (c) 3.3 N  
 (d) 19.6 N

- Q.10 A block P of mass  $m$  is placed on a horizontal frictionless plane. A second block of same mass  $m$  is placed on it and is connected to a spring of spring constant  $k$ . The two blocks are pulled by distance  $A$ . Block Q oscillates without slipping. What is the maximum value of frictional force between the two blocks?

- (a)  $kA/2$   
 (b)  $kA$   
 (c)  $\mu_s mg$   
 (d) zero



#### ANSWER KEY:-

- 1.(C) 2.(C) 3.(B) 4.(D) 5.(A) 6.(C)  
 7.(B) 8.(B) 9.(B) 10.(A)

## Chemistry

- Q.11 The equivalent weight of an element is 4. Its chloride has a vapour density 59.25. Then the valency of the element is
- (a) 4  
 (b) 3  
 (c) 2  
 (d) 1
- Q.12  $6.022 \times 10^{20}$  molecules of urea are present in 100 mL of its solution. The concentration of solution is
- (a) 0.02  
 (b) 0.01  
 (c) 0.001  
 (d) 0.1.
- Q.13 The energies  $E_1$  and  $E_2$  of two radiations are 25 eV, and 50eV, respectively. The relation between their wavelengths, i.e.,  $\lambda_1$  and  $\lambda_2$  will be
- (a)  $\lambda_1 = \frac{1}{2}\lambda_2$   
 (b)  $\lambda_1 = \lambda_2$   
 (c)  $\lambda_1 = 2\lambda_2$   
 (d)  $\lambda_1 = 4\lambda_2$ .
- Q.14 The total number of maximum different spectral lines obtained with an excited electron in a single H atom at 5<sup>th</sup> excited state de-excites.
- (a) 5  
 (b) 15  
 (c) 1  
 (d) 10
- Q.15 The first ionisation potential of Na is 5.1 eV. The value of electron gain enthalpy of  $Na^+$  will be
- (a) -2.55 eV  
 (b) -5.1 eV  
 (c) -10.2 eV  
 (d) +2.55 eV.
- Q.16 Match the Column I with Column II and select the correct answer using given codes.

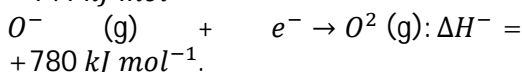
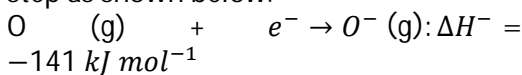
Column I (Elements)	Column II (Properties)
A. $Li^+ < Al^{3+} < Mg^{2+} < K^+$	1. EA (Electron affinity)
B. $Li^+ > Al^{3+} > Mg^{2+} > K^+$	2. Ionic radii
C. $Cl > F > Br > I$	3. EN (Electronegativity)
D. $F > Cl > Br > I$	4. ENC (Effective nuclear charge)

Codes

	A	B	C	D
(a)	2	4	3	1
(b)	2	4	1	3
(c)	4	2	3	1
(d)	4	2	1	3

- Q.17 The electronic configuration of gadolinium (atomic number = 64) is
- (a)  $[Xe] 4f^3 5d^5 6s^2$   
 (b)  $[Xe] 4f^7 5d^2 6s^1$   
 (c)  $[Xe] 4f^7 5d^1 6s^2$   
 (d)  $[Xe] 4f^8 5d^6 6s^2$ .

- Q.18 The formation of oxide ion  $O^{2-}(g)$ , from oxygen atom requires first an exothermic and then an endothermic step as shown below.



Thus, process of formation of  $O^{2-}$  in gas phase is unfavorable even though  $O^{2-}$  is isoelectronic with neon. It is due to the fact that

- (a) Oxygen is more electronegative  
 (b) Addition of electron in oxygen results in larger size of the ion  
 (c) Electron repulsion out weights the stability gained by achieving noble gas configuration  
 (d)  $O^-$  ion has comparatively smaller size than O-atom
- Q.19 Isostructural species are those which have the same shape and hybridisation. Among the given species identify the isostructural pairs
- (a)  $[NF_3 \text{ and } BF_3]$   
 (b)  $[BF_4^- \text{ and } NH_4^+]$   
 (c)  $[BCl_3 \text{ and } BrCl_3]$   
 (d)  $[NH_3 \text{ and } NO_3^-]$
- Q.20 If Z is a compressibility factor, van der Waals' equation at low pressure can be written as
- (a)  $Z = 1 + \frac{RT}{pb}$   
 (b)  $Z = 1 - \frac{a}{VRT}$   
 (c)  $Z = 1 - \frac{pb}{RT}$   
 (d)  $Z = 1 + \frac{pb}{RT}$

19.(B)      20.(B)

## Mathematics

Q.21 If  $f(x) = \ln \left( \frac{1+x}{1-x} \right)$ , then  $f \left( \frac{2x}{1+x^2} \right) =$

- (a)  $f(x)$   
 (b)  $f \left( \frac{1}{x} \right)$   
 (c)  $2f(x)$   
 (d)  $2f \left( \frac{1}{x} \right)$

Q.22 The number of roots of the equation  $\sin x = 3 \cos 2x - 1$  in  $[-\pi, \pi]$  is

- (a) 1  
 (b) 2  
 (c) 3  
 (d) 4

Q.23 For all complex numbers  $z_1$  and  $z_2$  satisfying

$$|z_1| = 12 \text{ and } |z_2 - 3 - 4i| = 5 \text{ then minimum value of } |z_1 - z_2| \text{ is}$$

- (a) 0  
 (b) 2  
 (c) 7  
 (d) 17

Q.24 If  $\alpha, \beta, \gamma$  are the roots of the equation  $x^3 + 27 = 0$  then the quadratic whose

$$\text{roots are } \left( \frac{\gamma}{\alpha} \right)^2 \text{ and } \left( \frac{\beta}{\alpha} \right)^2 \text{ is}$$

- (a)  $x^2 + x - 1 = 0$   
 (b)  $x^2 + 3x + 9 = 0$   
 (c)  $x^2 + x + 1 = 0$   
 (d)  $x^2 - x + 1 = 0$

Q.25 A father with 8 children, takes 3 at a time to zoo as often as he can without taking the same children together more than once. The number of times he visits zoo is a and the number of times each child visit visits zoo is b. Then  $a + b =$

- (a) 55  
 (b) 66  
 (c) 77  
 (d) 88

Q.26 The number of words formed with the letters of word CAREERACADEMY without changing the order of the vowels and consonants is

- (a) 25100  
 (b) 25200  
 (c) 25300  
 (d) None

ANSWER KEY:-

- 11.(B)    12.(B)    13.(C)    14.(A)  
 15.(B)    16.(B)    17.(C)    18.(C)

Q.27 The coefficient of  $x^9$  in the expansion of  $(1 + x + x^2 + x^3)^3(1 - x)^6$  is  
 (a)  $-7$   
 (b)  $7$   
 (c)  $9$   
 (d)  $-9$

Q.28 The number of irrational terms in the expansion of  $(\sqrt[8]{5} + \sqrt[6]{2})^{100}$  is  
 (a)  $97$   
 (b)  $98$   
 (c)  $96$   
 (d)  $99$

Q.29 If  $a_1, a_2, \dots, a_n$  are in A.P. where  $a_i > 0$  for all  $i$  then

$$\frac{1}{\sqrt{a_1} + \sqrt{a_2}} + \frac{1}{\sqrt{a_2} + \sqrt{a_3}} + \dots + \frac{1}{\sqrt{a_{n-1}} + \sqrt{a_n}} =$$

- (a)  $\frac{1}{\sqrt{a_1} + \sqrt{a_n}}$
- (b)  $\frac{n}{\sqrt{a_1} + \sqrt{a_n}}$
- (c)  $\frac{n+1}{\sqrt{a_1} + \sqrt{a_n}}$
- (d)  $\frac{n-1}{\sqrt{a_1} + \sqrt{a_n}}$

Q.30 Let  $\alpha, \beta$  be the roots of  $x^2 - x + p = 0$  and  $\gamma, \delta$  be the roots of  $x^2 - 4x + q = 0$ . If  $\alpha, \beta, \gamma, \delta$  are in G.P. then the integral values of  $p$  and  $q$  respectively are  
 (a)  $-2, -36$   
 (b)  $-2, 3$   
 (c)  $-2, -32$   
 (d) None

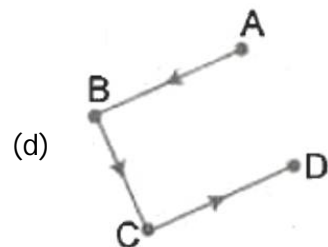
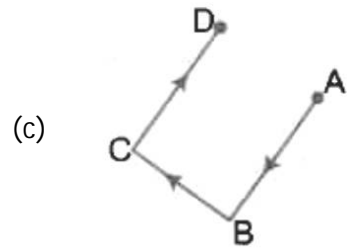
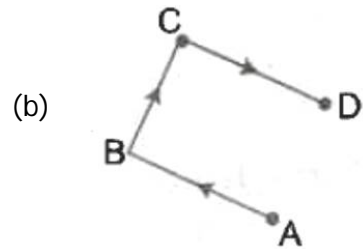
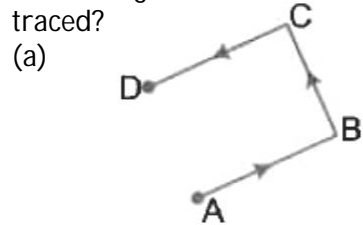
**ANSWER KEY:-**

- 21.(C) 22.(D) 23.(B) 24.(C) 25.(C)  
 26.(B) 27.(D) 28.(A) 29.(D) 30.(C)

## Mental ability

Q.31 If the word 'TRADE' is coded as 'XVEHI', how the word 'PUBLIC' should be coded?  
 (a) TYFMPG  
 (b) SXEOLF  
 (c) TYFPMG  
 (d) SXLLOP.

Q.32 Raju from A moved North- West side 2 km to B from there he turned 90° clockwise and moved 2 km to C. From there, he turned 90° clockwise and travelled 2 km to D. Which of the answer figures shows he exact path he traced?



Q.33 Anuj started walking positioning his back towards the Sun. After sometime, he turned left, then turned right and then towards the left again. In which direction is he going now?  
 (a) North or South  
 (b) East or West  
 (c) North or West  
 (d) South or West.

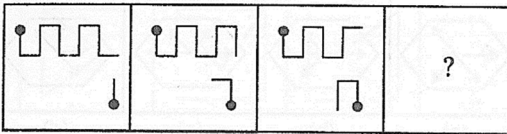
Q.34 Complete the series 17, 25, 41, 65, 97, ...  
 (a) 147 (b) 100  
 (c) 137 (d) 98

Q.35 Complete the given series.  
 OTE, PUF, QVG, RWH, .....  
 (a) SYJ  
 (b) TXI

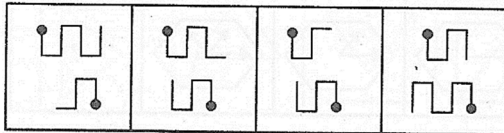
- (c) SX J
- (d) SXI

Q.36 Ram is the brother of Shyam and Mahesh is the father of Ram Jagat is the brother of Priya and Priya is daughter of Shyam. Who is the uncle of Jagat?  
 (a) Shyam  
 (b) Mahesh  
 (c) Ram  
 (d) None of these

Q.37 **Problem Figures**

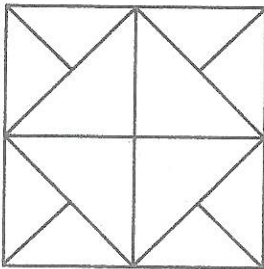


**Answer Figures**



- (a)
- (b)
- (c)
- (d)

Q.38 How many triangles are contained in the given figure?

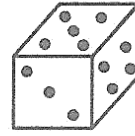


- (a) 9
- (b) 12
- (c) 13
- (d) 20

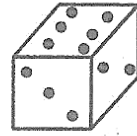
Q.39 Rakesh obtained more marks than Suresh but less than Santosh. Ramesh obtained more than Rajesh but less than Harish. Santosh obtained less than Rajesh. Who obtained the highest marks?  
 (a) Harish  
 (b) Santosh  
 (c) Ramesh

(d) Rakesh

Q.40 If the bottom face is marked as number 1, which number will be on the top among the following two figures?



(I)



(II)

- (a) 2
- (b) 3
- (c) 4
- (d) 5

**ANSWER KEY:-**

- 31.(C) 32.(B) 33.(A) 34.(C) 35.(D)
- 36.(C) 37.(A) 38.(D) 39.(A) 40.(B)