Competishun

52/6, Opposite Metro Mas Hospital, Shipra Path, Mansarovar

Date: 14/10/2024

Time: 3 hours **Max. Marks:** 300

Comprehensive Cumulative Test CT-1 (2025)

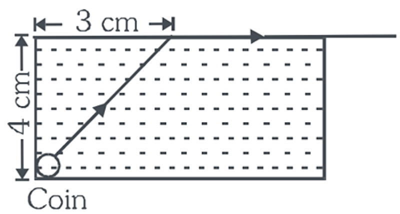
Physics

Single Choice Question

Q1 A particle is projected up the incline such that its component of velocity along the incline is 10 m/s. Time of flight is 2 second and maximum perpendicular distance during the motion from the incline is 5m. Then velocity of projection will be :-

a) $10\,m/s$ **b)** $10\sqrt{2}\,m/s$ **c)** $5\sqrt{5}\,m/s$ **d)** none of these

Q2 A small coin is resting on the bottom of a beaker filled with a liquid. A ray of light from the coin travels up to the surface of the liquid and moves along its surface (see figure).



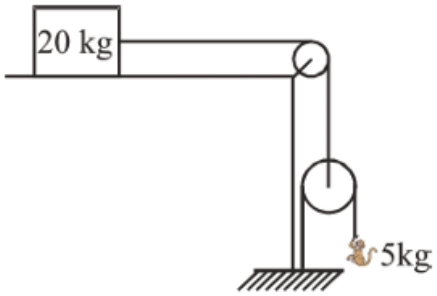
How fast is the light travelling in the liquid ?

a) $1.2\times10^{8}\,m/s$ **b)** $1.8\times10^{8}\,m/s$ **c)** $2.4\times10^{8}\,m/s$ **d)** $3.0\times10^{8}\,m/s$

Q3 An object is placed in front of a convex mirror at a distance of 50cm. A plane mirror is introduced covering the lower half of the convex mirror. If the distance between the object and the plane mirror is 30 cm, it is found that there is no parallax between the images formed by the two mirrors. What is the radius of curvature of the convex mirror?

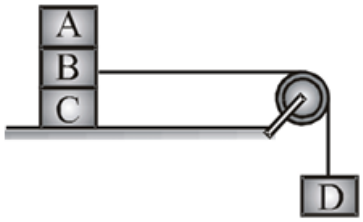
a) 12.5 cm **b)** 25 cm **c)** 75 cm **d)** 100 cm

Q4 What will be the acceleration of 20kg blocks. If the monkey climbs up the rope with acceleration of 2m/s^2. If all surfaces are smooth string and pulley are light.:-



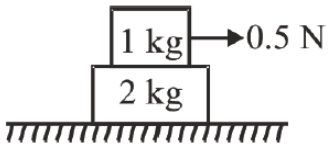
a) 2m/s^2 **b)** 3m/s^2 **c)** 4m/s^2 **d)** 0

Q5 These blocks A,B and C of equal mass m are placed one over the other on a smooth horizontal ground as shown in figure. Coefficient of friction between any two blocks of A,B and C is 1/2. The maximum value of mass of block D so that the blocks A, B and C move without slipping over each other is :-



a) 6m **b)** 5m **c)** 3m **d)** 4m

Q6 A force of 0.5 N is applied on the upper block as shown in figure. The coefficient of static friction between the two blocks is 0.1 and that between the lower block and the surface is zero. The work done by the lower block on the upper block for a displacement of 3 m of the upper block is :-



a) 1 J **b)** –1 J **c)** 2 J **d)** –2 J

Q7 A block of mass m is at rest with respect to a lift when placed on inclined plane of inclination θ inside the lift. If lift move upward at constant velocity v then work done by friction force on block in t time is :-

a) Zero **b)** $\text{mgt}^2 v\cos^2\theta$ **c)** $mgtv\sin^2\theta$ **d)** $\frac{1}{2}mgtv\sin 2\theta$

Q8 $F = 2x^2 - 3x - 2$. Choose correct option :-

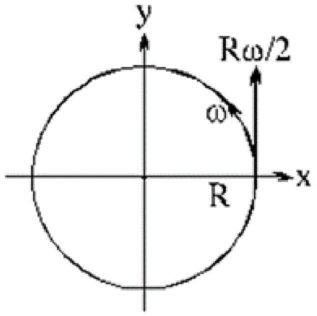
a) $x = -1/2$ is position of stable equilibrium

b) $x = 2$ is position of stable equilibrium

c) $x = -1/2$ is position of unstable equilibrium

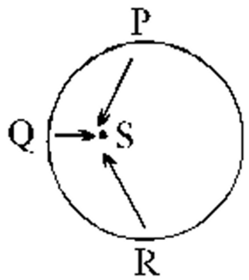
d) $x = 2$ is position of neutral equilibrium

Q9 A body moves in a circle of radius R having centre at origin, with an angular velocity ω in the x-y plane as shown in the figure. Another body moves parallel to y-axis with constant velocity ($R\omega/2$). At time t = 0, both particles are at (R,0). The value of time t, when first body has velocity only along positive x-axis w.r.t. the second body is



a) $\pi/6\omega$ b) $5\pi/3\omega$ c) $5\pi/6\omega$ d) None of these

Q10 An object moves counter-clockwise along the circular path shown below. As it moves along the path its acceleration vector continuously points towards point S. The object



a) speeds up at P,Q and R
b) slows down at P,Q and R
c) speeds up at P and slows down at R
d) slows down at P and speeds up at R

Q11 Which one of the following statement does not hold good when two balls of masses m_1 and m_2 undergo elastic collision?

a) If $m_1 = m_2$ and collision is oblique then after collision they move perpendicular to each other

b) When $m_1 >> m_2$ and m_2 at rest, after collision the ball of mass m_2 moves with double the velocity of m_1.

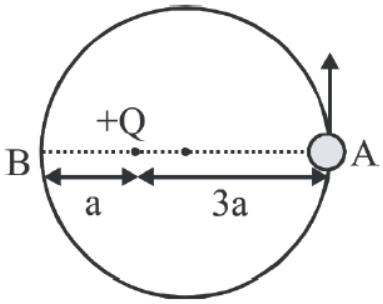
c) When $m_1 = m_2$ and m_2 at rest, there will be maximum transfer of kinetic energy.

d) When collision is oblique and m_2 at rest with $m_1 = m_2$, after collision the balls move in opposite directions.

Q12 A ball P of mass m moving with velocity u collides head on with another identical ball Q at rest. If the coefficient of restitution is e, then the ratio of velocities of P and Q after the collision is :-

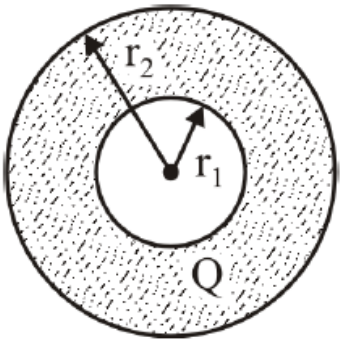
a) $\frac{1+e}{1-e}$ b) $\frac{1-e}{1+e}$ c) $\frac{1+e}{2}$ d) $\frac{1-e}{2}$

Q13 The diagram shows a small bead of mass m carrying charge q. The bead can freely move on the smooth fixed ring placed on a smooth horizontal plane. In the same plane a charge +Q has also been fixed as shown. The potential at the point A due to +Q is V. The minimum velocity with which the bead should projected from the point A so that it can complete a circle should be $\left(K = 1/4\pi\epsilon_0\right)$



a) $\sqrt{\frac{4KQq}{ma}}$ **b)** $\sqrt{\frac{6KQq}{ma}}$ **c)** $\sqrt{\frac{4KQq}{3ma}}$ **d)** $\sqrt{\frac{KQq}{ma}}$

Q14 A charge Q is distributed uniformly within the material of a hollow sphere of inner and outer radii r_1 and r_2 (See figure). The electric field at distance x from centre for $r_1 < x < r_2$ will be :-



a) $\frac{Q\left(x^3-r_1^3\right)}{4\pi\epsilon_0 x^2 r_2^3}$ **b)** $\frac{Q\left(x^3-r_1^3\right)}{4\pi\epsilon_0 x^2\left(r_2^3-r_1^3\right)}$ **c)** $\frac{Qx}{4\pi\epsilon_0\left(r_2^3-r_1^3\right)}$ **d)** $\frac{Q\left(x^3-r_1^3\right)}{4\pi\epsilon_0 r_1^2\left(r_2^2-r_1^2\right)}$

Q15 An asteroid of mass m is approaching earth initially at a distance of 10 Re from surface of earth and speed V_i . It hits the earth with a speed V_f (Re and Me are radius and mass of earth), then-

a) $V_f^2 = V_i^2 + \frac{2Gm}{MeR}\left(1-\frac{1}{10}\right)$ **b)** $V_f^2 = V_i^2 + \frac{2GMe}{Re}\left(1+\frac{1}{10}\right)$ **c)** $V_f^2 = V_i^2 + \frac{2GMe}{Re}\left(1-\frac{1}{10}\right)$

d) $V_f^2 = V_i^2 + \frac{2GM}{Re}\left(1-\frac{1}{10}\right)$

Q16 Two bodies of masses m_1 and m_2 are initially at rest at infinite distance apart. They are then allowed to move towards each other under mutual gravitational attraction. Their relative velocity of approach at a separation distance r between them is:-

a) $\left[2G\frac{(m_1-m_2)}{r}\right]^{1/2}$ **b)** $\left[\frac{2G}{r}(m_1+m_2)\right]^{1/2}$ **c)** $\left[\frac{r}{2G(m_1 m_2)}\right]^{1/2}$ **d)** $\left[\frac{2G}{r}m_1 m_2\right]^{1/2}$

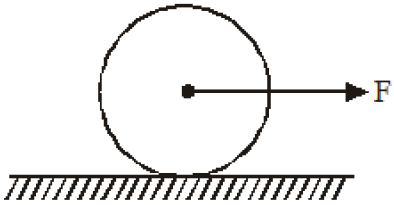
Q17 A circular platform is mounted on a frictionless vertical axle passing through centre. Its radius R = 2m and moment of inertia about the axis is 200 kg–m^2. It is initially at rest. A 50 kg man stands on the edge of platform and begins to walk along the edge at speed of 1 m/sec relative to the ground. Time taken by the man to complete one revolution is:-

a) 2π sec **b)** $\frac{\pi}{2}$ sec **c)** πsec **d)** $\frac{3\pi}{2}$ sec

Q18 When the kinetic energy of a body executing S.H.M. is 1/3 of the potential energy. The displacement of the body is x percent of the amplitude, where x is :-

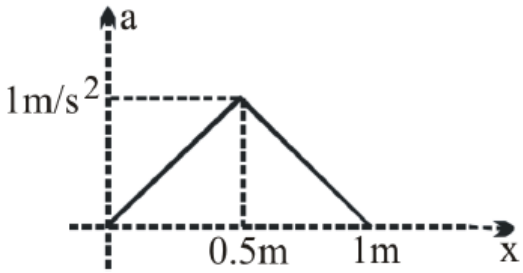
a) 33 **b)** 87 **c)** 67 **d)** 50

Q19 A solid sphere of mass m is lying at rest on a rough horizontal surface. The coefficient of friction between the ground and sphere is μ. The maximum value of F, So that the sphere will not slip, is equal to :



a) $\frac{7}{5}\mu mg$ **b)** $\frac{4}{7}\mu mg$ **c)** $\frac{5}{7}\mu mg$ **d)** $\frac{7}{2}\mu mg$

Q20 A body initially at rest, starts moving along x-axis in such a way so that its acceleration vs displacement plot is as shown in figure. The maximum velocity of particle is :-

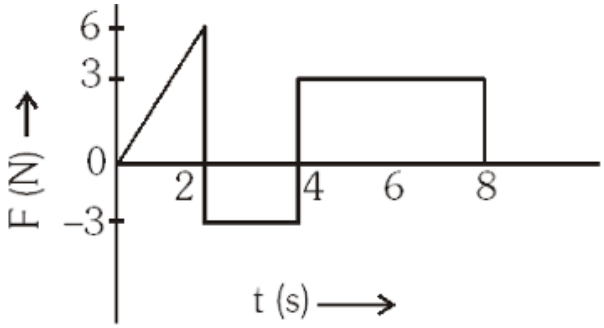


a) 1 m/s **b)** 6 m/s **c)** 2 m/s **d)** None

Numerical

Q21 A compound microscope has an eyepiece of focal length 10 cm and an objective of focal length 4cm. Calculate the magnification, if an object is kept at a distance of 5 cm from the objective so that final image is formed at the least distance of distinct vision (20 cm) :-

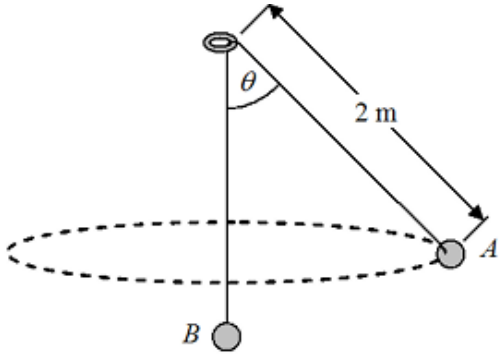
Q22 The force 'F' acting on a particle of mass 'm' is indicated by the force-time graph shown below. The change in momentum of the particle over the time interval from zero to 8s is :-



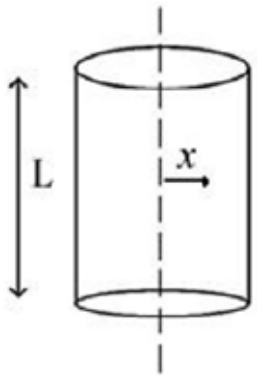
Q23 The potential energy of a 1 kg particle free to move along the x-axis is given by :-

$U(x)=\left(\frac{x^4}{4}-\frac{x^2}{2}\right)J$ The total mechanical energy of the particle is 2 J. Then the maximum speed (in m/s) is $\frac{N}{\sqrt{2}}$. Then N is :-

Q24 Two very small balls A and B of masses 4.0 kg and 5.0 kg are affixed to the ends of a light inextensible cord that passes through a frictionless ring of negligible radius compared to the length of the cord. The ring is fixed at some height above the ground. Ball A is pulled aside and given a horizontal velocity so that it starts moving on a circular path parallel to the ground, keeping ball B in equilibrium as shown. Speed of the ball A is closest to



Q25 A long cylindrical volume contains a uniformly distributed charge of density ρCm^{-3}. The electric field inside the cylindrical volume at a distance $x=\frac{2\varepsilon_0}{\rho}m$ from its axis is_____ Vm^{-1}

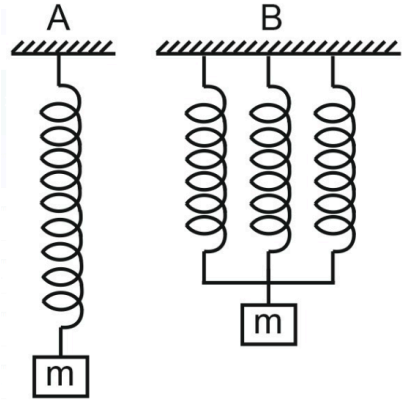


Q26 The mass of planet is 1/9 of the mass of the earth and its radius is half that of the earth. If a body weight 9 N on the earth. Its weight on the planet would be :- (in N)

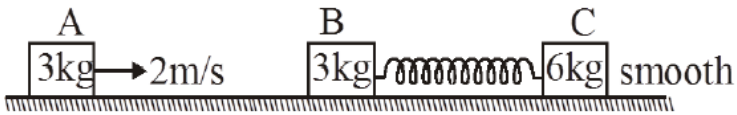
Q27 The moment of inertia of a square lamina about the perpendicular axis through its centre of mass is $20\,kg-m^2$. Then, its moment of inertia about an axis touching its side and in the plane of the lamina will be :-

Q28 The rotational kinetic energy of two bodies of moments of ineritia $9\,kg-m^2$ and $1\,kg-m^2$ are same. The ratio of their angular momentum is :-

Q29 The springs in fig. A and B are identical but length in A is three times each of that in B. The ratio of period T_A/T_B is :-



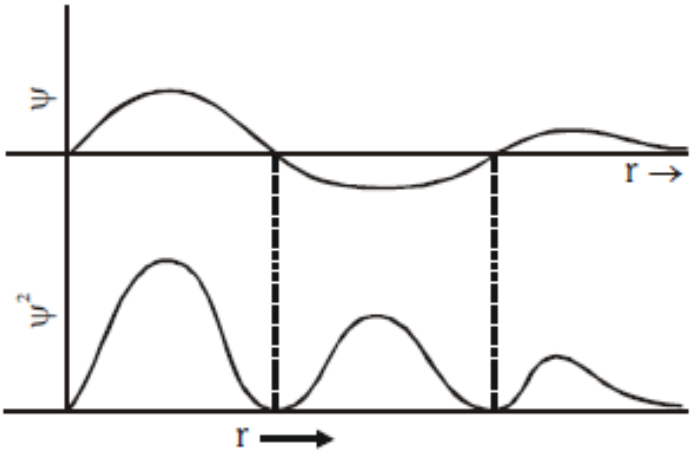
Q30 For shown situation, if collision between block A and B is perfectly elastic, then find the maximum energy stored in spring in joules.



Chemistry

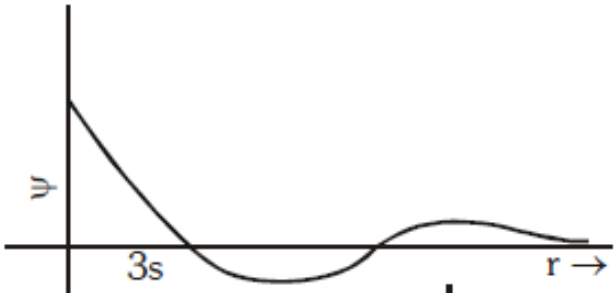
Single Choice Question

Q31 The wave function ψ vs radial distance (r) and square of wave function $(\psi)^2$ vs radial distance (r) graph of certain orbital is given. Identify the orbital.

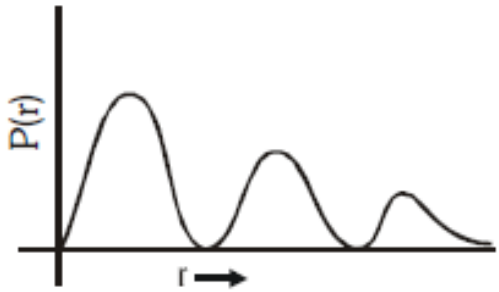


a) 3 s **b)** 4 d **c)** 3p **d)** 4 p

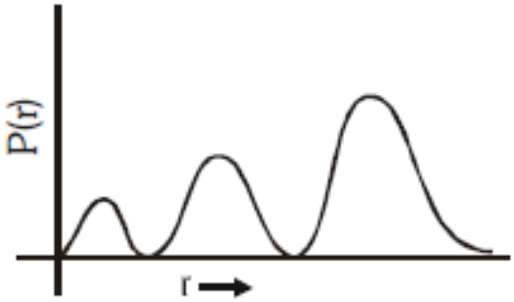
Q32 The wave function (ψ) verses radial distance (r) curve for certain orbital is given. Predict the shape of $\psi^2.4\pi r^2$ (radial probability distribution function) verses r graph.



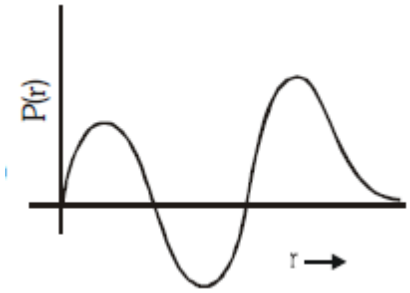
a)



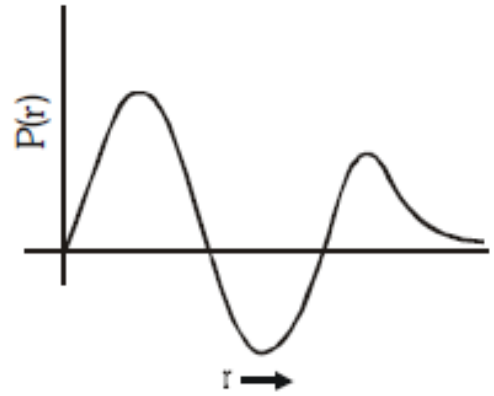
b)



c)

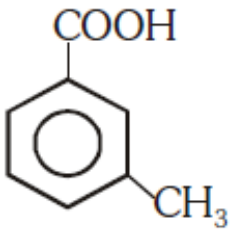


d)

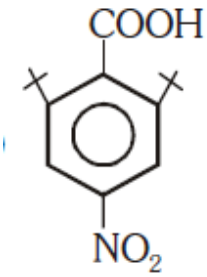


Q33 Which of the following is most acidic :

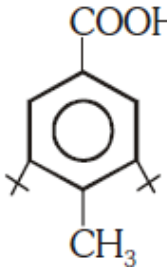
a)



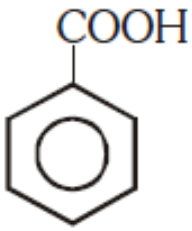
b)



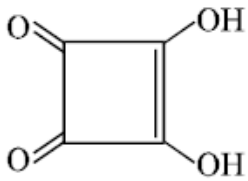
c)



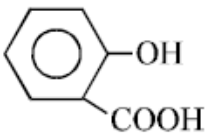
d)



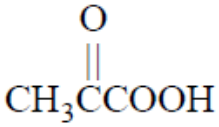
Q34 Consider the following compound



I



II

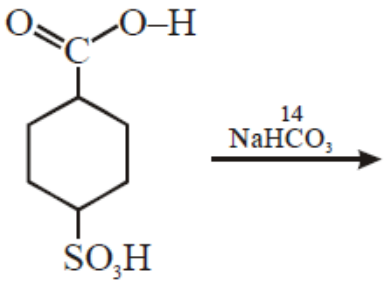


III

Which of the above compounds reacts with $NaHCO_3$ giving CO_2

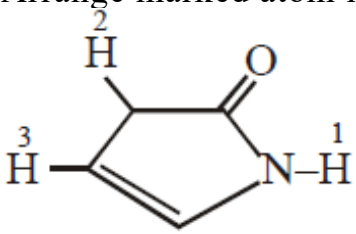
a) I, II and III **b)** I and III **c)** II and III **d)** I and II

Q35 In given reaction Gas liberated is/are



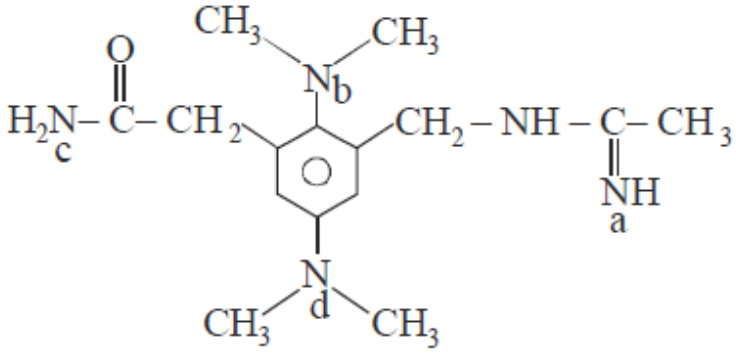
a) CO_2 & SO_3 **b)** SO_3 & $^{14}CO_2$ **c)** $^{14}CO_2$ only **d)** SO_2 only

Q36 Arrange marked atom in decreasing order of acidic strength



a) $1>2>3$ **b)** $3>2>1$ **c)** $2>1>3$ **d)** $2>3>1$

Q37 Basicity order of N following compound is :



a) b > d > a > c **b)** a > b > d > c **c)** a > b > c > d **d)** a > c > b > d

Q38 10 ml of $\frac{M}{200}H_2SO_4$ is mixed with 40 ml of $\frac{M}{200}H_2SO_4$. The pH of the resulting solution is

a) 1 **b)** 2 **c)** 2.3 **d)** none of these

Q39 Na_3PO_4 which should be added in 10 L of $1.0\times10^{-5}M-BaCl_2$ solution without any precipitation of $Ba_3(PO_4)_2$ is $\left[Ksp^2 \text{ of } Ba_3(PO_4)_2\right]=4\times10^{-23}$

a) 2×10^{-4} gm **b)** 0.328 gm **c)** 0.164 gm **d)** 0.82 gm

Q40 The electronic configuration of elements X and Z are $1s^2 2s^2 2p^6 3s^2 3p^5$ and $1s^2 2s^2 2p^5$ respectively What is the position of element X with respect to position of Z in the periodic table -

a) Just below element Z **b)** Just above Z **c)** Left to the Z **d)** right to the Z

Q41 Decreasing ionization potential for K, Ca & Ba is

a) $Ba > K > Ca$ **b)** $Ca > Ba > K$ **c)** $K > Ba > Ca$ **d)** $K > Ca > Ba$

Q42 The types of bonds present in $CuSO_4 \cdot 5H_2O$ are

a) electrovalent and covalent **b)** electrovalent, coordinate covalent & H-bond

c) covalent, coordinate covalent & H-bonds

d) electrovalent, covalent, coordinate covalent & H-bond

Q43 If ethylene molecule lies in X -Y plane then nodal planes of the π-bond will lie in

a) XZ plane **b)** YZ plane **c)** In a plane that bisects $C-C$ axis **d)** XY plane

Q44 Bond angle and bond polarity are important parameters associated for bonding in molecule.
Which of the following bond angle order is incorrect.

a) $NH_3 > PH_3$ **b)** $BF_3 < BH_3$ **c)** $O(CH_3)_2 < O(C_2H_5)_2$ **d)** $CO_3^{2-} < CO_2$

Q45 Bond angle and bond polarity are important parameters associated for bonding in molecule.
Which of the following molecule is polar and non-planar

a) CH_2Cl_2 **b)** PCl_5 **c)** SO_2 **d)** XeF_4

Q46 The pair of species having identical shapes for molecules of both species is

a) XeF_2, CO_2 **b)** BF_3, PCl_3 **c)** PF_5, IF_5 **d)** CF_4, SF_4

Q47 Which is the incorrect match for the energy distance function for following interaction -

a) Debye force : r^{-6} **b)** Ion-induced dipole interaction : r^{-2}

c) London force : r^{-6} **d)** Keesom force: r^{-3}

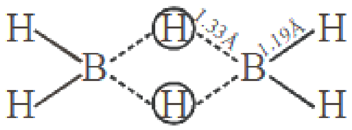
Q48 $C-H$ bond distance is the longest in:

a) C_2H_2 **b)** C_2H_4 **c)** C_2H_6 **d)** $C_2H_2Br_2$

Q49 In which of the following molecule $C-C$ bond length will be highest ?

a) CF_3-CF_3 **b)** $F_2CH-CHF_2$ **c)** FCH_2-CH_2F **d)** CH_3-CF_3

Q50 The molecular shape of diborane, is shown



Consider the following statements for diborane :

(1) Boron is approximately sp^3 hybridised

(2) $B-H-B$ angle is 180°

(3) There are two terminal B-H bonds for each boron atom

(4) There are only 12 bonding electrons available

Of these statements:

a) 1,3 and 4 are correct **b)** 1,2 and 3 are correct **c)** 2,3 and 4 are correct

d) 1,2 and 4 are correct

Numerical

Q51 Find the total number of following molecule(s) which have all bond lengths are same.

$XeF_4, SF_4, SH_2, NO_3^-, SiF_4, ClF_3, PF_2Cl_3, XeO_3F_2$

Q52 Among the following total number of planar molecules is / are

$Cl_2O, P(CH_3)_3, N(CH_3)_3, ClO_2, {}^{\circ}CH_3, NCl_3$

Q53 How many compound(s) gives diprotic acid on hydrolysis?

$SO_2Cl_2, SOCl_2, POCl_3, XeF_2, N_2O_5, P_4O_6, SF_4, BCl_3$

Q54 The London force is proportional to r^{-x}, (where r is inter atomic/molecular distance). What is the value of x.

Q55 A vessel contains $A(g)$ and $B(g)$ at 2 atm and 4 atm respectively at TK , the mixture is allowed to attain equilibrium at TK , according to the reaction

$$8B(g) \rightleftharpoons 8A(g) + C(s)$$

At equilibrium, $\left(\frac{n_A}{n_B}\right)_{eq} = \left(\frac{n_B}{n_A}\right)_{inital}$

Find the value of y if $K_c = 2^y$

Q56 What is the pH of 0.1 M of aq Borax solution (K_a for $H_3BO_3 = 2 \times 10^{-10}$) (log 2 = 0.30 [Report your answer nearest integer]

Q57 Calculate the pH after mixing 1 mole each of $H_3PO_4, NaH_2PO_4, Na_2HPO_4$ and Na_3PO_4 For H_3PO_4 $K_{a_1} = 10^{-3}, K_{a_2} = 10^{-7}, K_{a_3} = 10^{-11}$

Q58 How many electrons are present in gerade molecular orbital of C_2.

Q59 Calculate pH at which $Mg(OH)_2$ begins to precipitate from a solution containing $0.1M\,Mg^{2+}$ ions.
K_{sp} of $Mg(OH)_2 = 10^{-11}$

Q60 Assuming there no $2s-2p$ mixing, the number of paramagnetic species amongst the following : $H_2, He_2^+, Li_2, Be_2, B_2, C_2, C_2^{2-}, N_2^+, N_2, O_2, O_2^-, S_2$ & F_2 are

Mathematics

Single Choice Question

Q61 If the equation $x^{\log_a x^2} = \frac{x^{k-2}}{a^k}, a \neq 0$, has exactly one solution for x, then value(s) of k are

a) both integral **b)** irrational **c)** prime **d)** nonreal

Q62 a,b,c are three real number such that $a^2+2c=7, c^2+4b=-7$ and $b^2+6a=-14$ then which of the following statement is correct

a) Roots of the equation $x^2+ax+bc=0$ are real and distinct

b) Roots of the equation $x^2+ax+bc=0$ are real and same

c) Roots of the equation $x^2+ax+bc=0$ are real and irrational

d) Roots of the equation $x^2+ax+bc=0$ are imaginary.

Q63 Let $P(x)=x^5+x^2+1$ have five roots $\alpha_1,\alpha_2,\alpha_3,\alpha_4,\alpha_5$ and $g(x)=x^2-2$ then the value of $g(\alpha_1)g(\alpha_2)g(\alpha_3)g(\alpha_4)g(\alpha_5)$ is :

a) -21 **b)** -19 **c)** -23 **d)** -25

Q64 If $\tan 1^\circ = t$, then value of $\cos 2^\circ + t\sin 2^\circ$ is

a) -2 **b)** -1 **c)** $\frac{1}{2}$ **d)** 1

Q65 Let R and S be two non-void relations an a set A. Which of the following statements is not true

a) R and S are transitive $\Rightarrow R\cup S$ is transitive

b) R and S are transitive $\Rightarrow R\cap S$ is transitive

c) R and S are symmetric $\Rightarrow R\cup S$ is symmetric

d) R and S are reflexive $\Rightarrow R\cap S$ is reflexive

Q66 The sum of the series $\cot^{-1}\left(2^2+\frac{1}{2}\right)+\cot^{-1}\left(2^3+\frac{1}{2^2}\right)+\cot^{-1}\left(2^4+\frac{1}{2^3}\right)+\ldots\ldots\infty$

a) $\tan^{-1}(2)$ **b)** $\tan^{-1}\left(\frac{1}{2}\right)$ **c)** $-\tan^{-1}\left(\frac{1}{2}\right)$ **d)** None of these

Q67 If $0<\theta<90^{\circ}$ and $\theta=\tan^{-1}\left(2\tan^2\theta\right)-\tan^{-1}\left(\frac{1}{3}\tan\theta\right)$ then -

a) $\tan\theta=1$ **b)** $\tan\theta=\frac{1}{2}$ **c)** $\tan\theta=2$ **d)** $\tan\theta=\frac{3}{2}$

Q68 If $A_1, A_2, A_3, \ldots\ldots$ are in A.P. then $\sum_{i=1}^{2n}(-1)^i\left(\frac{A_i+A_{i+1}}{A_i-A_{i+1}}\right)$ is equal to -

a) $2n-1$ **b)** $n-1$ **c)** $-2n$ **d)** $n+2$

Q69 The first three terms of A.G.P. are $3,-1,-1$ then next positive term is

a) 2 **b)** 3 **c)** $\frac{5}{27}$ **d)** $\frac{5}{9}$

Q70 The existance of the unique solution of the system of equations $2x+y+z=\beta, 10x-y+\alpha z=10$ and $4x+3y-z=6$ depends on

a) Both α and β **b)** Neither β nor α **c)** β only **d)** α only

Q71 The co-ordinates of the orthocentre of the triangle formed by the lines $2x^2-2y^2+3xy+3x+y+1=0$ and $3x+2y+1=0$ are :-

a) $\left(\frac{4}{5},\frac{3}{5}\right)$ **b)** $\left(-\frac{3}{5},-\frac{1}{5}\right)$ **c)** $\left(\frac{1}{5},-\frac{4}{5}\right)$ **d)** $\left(\frac{2}{5},-\frac{1}{5}\right)$

Q72 If a circle of radius R passes through the origin O and intersects the coordinate axes at A and B, then the locus of the foot of perpendicular from O on AB is :

a) $\left(x^2+y^2\right)^2=4Rx^2y^2$ **b)** $\left(x^2+y^2\right)(x+y)=R^2xy$ **c)** $\left(x^2+y^2\right)^3=4R^2x^2y^2$

d) $\left(x^2+y^2\right)^2=4R^2x^2y^2$

Q73 If the function

$$f(x)=\begin{cases}\dfrac{\sqrt{2+\cos x}-1}{(\pi-x)^2}, & x\neq\pi\\ k & x=\pi\end{cases}$$

is continuous at $x=\pi$, then k equals :-

a) $\frac{1}{4}$ **b)** $\frac{1}{2}$ **c)** 2 **d)** 0

Q74 Let $f(x)=\begin{cases}x^2; & x\in Q\\ 1-x^2 & ;x\notin Q\end{cases}$, then $f(x)$ is continuous at

a) $x=0$ **b)** $x=\pm\frac{1}{2}$ **c)** $x=\pm\frac{1}{\sqrt{2}}$ **d)** $x=\frac{1}{\sqrt{2}}$

Q75 The value of $\lim_{n\to\infty} n^2\left\{\sqrt{\left(1-\cos\frac{1}{n}\right)\sqrt{\left(1-\cos\frac{1}{n}\right)\sqrt{\left(1-\cos\frac{1}{n}\right)\ldots\infty}}}\right\}$ is

a) 1 **b)** 2 **c)** 0 **d)** 1/2

Q76 If $\lim_{x\to\infty}\left(\frac{3x^2+x+1}{x+1}-ax-b\right)=2012$; then a & b are:

a) $a=1,b=4$ **b)** $a=1,b=-4$ **c)** $a=3,b=2010$ **d)** $a=3,b=-2014$

Q77 The perimeter of a triangle is 14 and two of its vertices are $(-3,0)$ and $(3,0)$, then the locus of the third vertex is

a) $\frac{x^2}{16}+\frac{y^2}{7}=1$ **b)** $\frac{x^2}{25}+\frac{y^2}{16}=1$ **c)** $\frac{x^2}{7}+\frac{y^2}{16}=1$ **d)** $\frac{x^2}{16}+\frac{y^2}{25}=1$

Q78 If θ be the angle subtended by the circle $x^2+y^2+2gx+2fy+c=0$ at a point (x_1,y_1) and $s_1=x_1^2+y_1^2+2gx_1+2fy_1+c$, then which is NOT correct?

a) $\cot\theta=\frac{2\sqrt{s_1}}{\sqrt{g^2+f^2-c}}$ **b)** $\cot\frac{\theta}{2}=\frac{\sqrt{s_1}}{\sqrt{g^2+f^2-c}}$ **c)** $\theta=2\tan^1=\sqrt{\frac{g^2+f^2-c}{s_1}}$

d) $\cos\theta=\frac{s_1+c-g^2-f^2}{s_1-c+g^2+f^2}$

Q79 If $\begin{bmatrix}1&2&\alpha\\0&1&4\\0&0&1\end{bmatrix}^n=\begin{bmatrix}1&22&2024\\0&1&44\\0&0&1\end{bmatrix}$, then $n+\alpha$ is equal to

a) 144 **b)** 155 **c)** 181 **d)** 191

Q80 The mean of 5 observations is 4.4 and their variance is 8.24 . If three of the observations are 1,2 and 6 . Find the other two observation:

a) 4,9 **b)** 8,4 **c)** 4,4 **d)** 9,9

Numerical

Q81 If α and β are the roots of the equation $x^2-3x+1=0$ and $a_n=\alpha^n+\beta^n, n\in N$ then value of $\frac{a_7+a_5}{a_6}=$

Q82 If $2^x=3^y=6^{-z}$, then $\left(\frac{1}{x}+\frac{1}{y}+\frac{1}{z}\right)$ is equal to

Q83 Let $f(x)=-4\cdot\sqrt{e^{1-x}}+1+x+\frac{x^2}{2}+\frac{x^3}{3}$. If $g(x)$ is inverse of $f(x)$, then the value of $\frac{1}{g'\left(-\frac{7}{6}\right)}$ is.

Q84 Let $\begin{vmatrix} x & 2 & x \\ x^2 & x & 6 \\ x & x & 6 \end{vmatrix} = Ax^4+Bx^3+Cx^2+Dx+E$. Then the value of $|5A+4B+3C+2D+E|$ is equal to

Q85 If two parallel lines L_1 and L_2 with positive slopes are tangent to the circle $C_1: x^2+y^2-2x-16y+64=0$. If L_1 is also tangent to circle $C_2: x^2+y^2-2x+2y-2=0$ and the equation of L_2 is $a\sqrt{a}x-by+c-a\sqrt{a}=0$ where $a,b,c\in N$, then the value of $\frac{a+b+c}{2}=$

Q86 If a tangent of slope 2 of ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is normal to the circle $x^2+y^2+4x+1=0$, then the maximum value of ab is

Q87 A point P moves in xy-plane in such a way that [|x|]+[|y|]=1, where [.] denotes the greatest integer function. Area of the region representing all possible of the point P is equal to.

Q88 If $x\in R$ then absolute difference between the maximum and minimum values of the expression $\frac{x^2+14x+9}{x^2+2x+3}$ is

Q89 If A = {2, 4, 5}, B = {7, 8, 9}, then n(A × B) is equal to

Q90 The value of $\lim_{n\to\infty}\left[\dfrac{2n}{2n^2-1}\cos\dfrac{n+1}{2n-1}-\dfrac{n}{1-2n}\cdot\dfrac{n(-1)^n}{n^2+1}\right]$ is (here $n \in N$)

Answer Key

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**B**	**B**	**B**	**B**	**C**	**B**	**C**	**A**	**B**	**C**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**D**	**B**	**A**	**B**	**C**	**B**	**A**	**B**	**D**	**A**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**12**	**12**	**3**	**3**	**1**	**4**	**40**	**3**	**3**	**4**
Que.	31	32	33	34	35	36	37	38	39	40
Ans.	**D**	**B**	**B**	**A**	**C**	**C**	**B**	**B**	**B**	**A**
Que.	41	42	43	44	45	46	47	48	49	50
Ans.	**B**	**D**	**D**	**B**	**A**	**A**	**B**	**C**	**C**	**A**
Que.	51	52	53	54	55	56	57	58	59	60
Ans.	**4**	**3**	**4**	**6**	**8**	**10**	**7**	**4**	**9**	**6**
Que.	61	62	63	64	65	66	67	68	69	70
Ans.	**B**	**A**	**C**	**D**	**A**	**B**	**A**	**C**	**B**	**D**
Que.	71	72	73	74	75	76	77	78	79	80
Ans.	**B**	**C**	**A**	**C**	**D**	**D**	**A**	**A**	**B**	**A**
Que.	81	82	83	84	85	86	87	88	89	90
Ans.	**3**	**0**	**5**	**11**	**7**	**4**	**8**	**9**	**9**	**0**