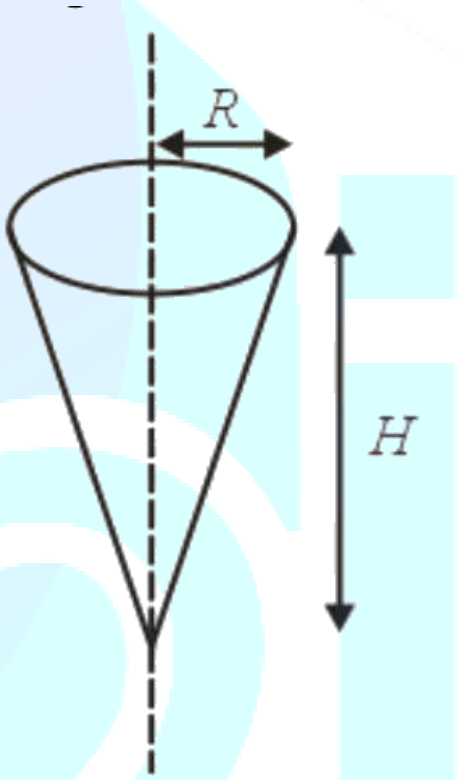
Q1. A clock has a continuously moving second's hand of 0.1 m length. The average acceleration of the tip of the hand (in units of ms^{-2}]) is of the order of :
(1) 10^{-3}
(2) 10^{-4}
(3) 10^{-2}
(4) 10^{-1}

Q2. An insect is at the bottom of a hemispherical ditch of radius 1 m . It crawls up the ditch but starts slipping after it is at height h from the bottom. If the coefficient of friction between the ground and the insect is 0.75 , then h is : ($g = 10\ m\ s^{-2}$)
(1) 0.20 m
(2) 0.45 m
(3) 0.60 m
(4) 0.80 m

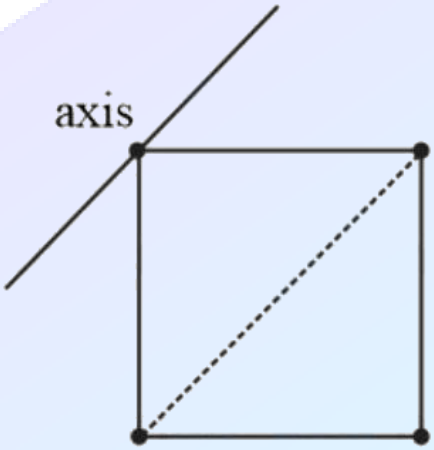
Q3. If the potential energy between two molecules is given by $U = \frac{A}{r^6} + \frac{B}{r^{12}}$, then at equilibrium, separation between molecules, and the potential energy are:
(1) $\left(\frac{B}{2A}\right)^{1/6}, -\frac{A^2}{2B}$
(2) $\left(\frac{B}{A}\right)^{1/6}, 0$
(3) $\left(\frac{2B}{A}\right)^{1/6}, \frac{A^2}{4B}$
(4) $\left(\frac{B}{2A}\right)^{\frac{1}{6}}, \frac{A^2}{2B}$

Q4. Shown in the figure is a hollow ice-cream cone (it is open at top). If its mass is M, radius of its top is R and height, H, then its moment of inertia about its axis is



(1) $\frac{MR^2}{2}$
(2) $\frac{M(R^2+H^2)}{4}$
(3) $\frac{MH^2}{3}$
(4) $\frac{MR^2}{3}$

Q5. Four point masses, each of mass m, are fixed at the corners of a square of side I. The square is rotating with angular frequency ω, about an axis passing through one of the corners of the square and parallel to tis diagonal, as shown in the figure. The angular momentum of the square about the axis is



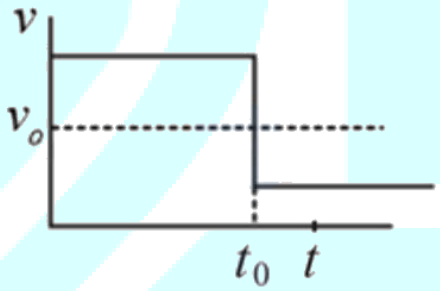
(1) $m\ell^2\omega$
(2) $4m\ell^2\omega$
(3) $3\ m\ell^2\omega$
(4) $2m\ell^2\omega$

Q6. A satellite is in an elliptical orbit around a planet P. It is observed that the velocity of the satellite when it is farthest from the planet is 6 times less than that when it is closest to the planet. The ratio of distances between the satellite and the planet at closest and farthest points is :
(1) 1: 6
(2) 1: 3
(3) 1: 2
(4) 3: 4

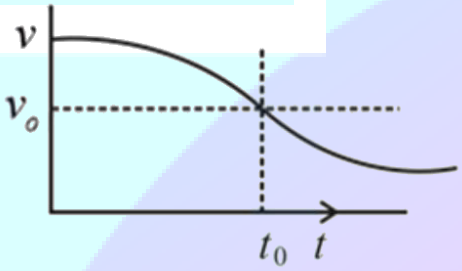
Q7. Molecules of an ideal gas are known to have three translational degrees of freedom. The gas is maintained at a temperature of T. The total internal energy, U of a mole of this gas, and the value of $\gamma = \left(\frac{C_p}{C_v}\right)$ are given, respectively, by
(1) $U = \frac{5}{2}RT$ and $\gamma = \frac{6}{5}$
(2) $U = 5RT$ and $\gamma = \frac{7}{5}$
(3) $U = \frac{5}{2}RT$ and $\gamma = \frac{7}{5}$
(4) $U = 5RT$ and $\gamma = \frac{6}{5}$

Q8. An object of mass m is suspended at the end of a massless wire of length L and area of cross-section, A. Young modulus of the material of the wire is Y. If the mass is pulled down slightly its frequency of oscillation along the vertical direction is :
(1) $f = \frac{1}{2\pi}\sqrt{\frac{mL}{YA}}$
(2) $f = \frac{1}{2\pi}\sqrt{\frac{YA}{mL}}$
(3) $f = \frac{1}{2\pi}\sqrt{\frac{mA}{VL}}$
(4) $f = \frac{1}{2\pi}\sqrt{\frac{YL}{mA}}$

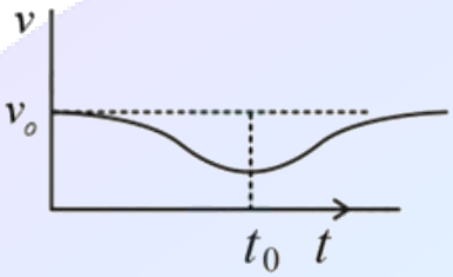
Q9. A sound source S is moving along a straight track with speed v, and is emitting sound of frequency v_0.An observer is standing at a finite distance, at the point O , from the track. The time variation of frequency heard by observer is best represented by : (to represents the instant when the distance between the source and observer is minimum)
(1)



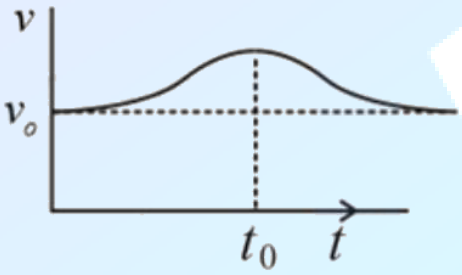
(2)



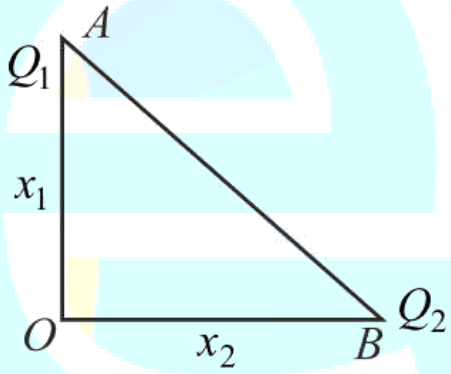
(3)



(4)

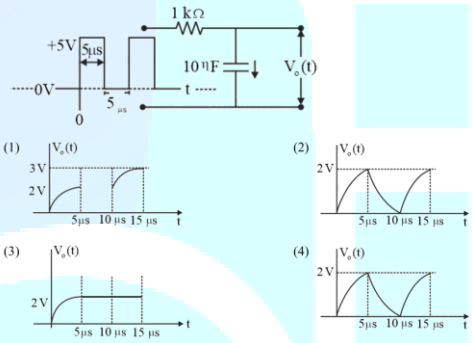


Q10. Charges Q_1 and Q_2 are at points A and B of a right-angled triangle OAB. The resultant electric field at point O is perpendicular to the hypotenuse, then Q_1/Q_2 is proportional to:



(1) $\frac{x_1^3}{x_2^3}$
(2) $\frac{x_2}{x_1}$
(3) $\frac{x_1}{x_2}$
(4) $\frac{x_2^2}{x_1^2}$

Q11. For the given input voltage waveform $V_{\text{in}}(t)$, the output voltage waveform $V_0(t)$, across the capacitor is correctly depicted by :



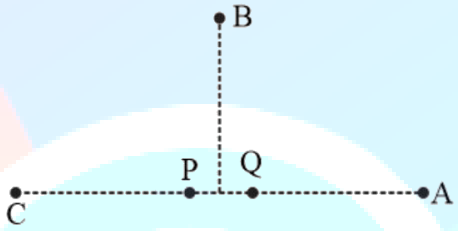
Q12. A particle of charge q and mass m is moving with a velocity $-v\hat{\imath}(v \neq 0)$ towards a large screen placed in the $Y-Z$ plane at distance d. If there is magnetic field $\vec{B} = B_0\hat{k}$, the minimum value of v for which the particle will not hit the screen is :
(1) $\frac{\text{qdB}_0}{3\text{ m}}$
(2) $\frac{2qdB_0}{m}$
(3) $\frac{qdB_0}{m}$
(4) $\frac{qdB_0}{2m}$

Q13. An electron is moving along $+x$ direction with a velocity of 6×10^6 ms^{-1}. It enters a region of uniform electric field of 300 V/cm pointing along $+y$ direction. The magnitude and direction of the magnetic field set up in this region such that the electron keeps moving along the x direction will be:
(1) 3×10^{-4} T, along +z direction
(2) 5×10^{-3} T, along $-z$ direction
(3) 5×10^{-3} T, along +z direction
(4) 3×10^{-4} T, along $-z$ direction

Q14. An AC circuit has $\text{R} = 100\Omega, \text{C} = 2\mu$ F and $\text{L} = 80$mH, connected in series. The quality factor of the circuit is :
(1) 2
(2) 0.5
(3) 20
(4) 400

Q15. A point like object is placed at distance of 1 m in front of a convex lens of focal length 0.5 m . A plane mirror is placed at a distance of 2 m behind the lens. The position and nature of the image formed by the system is
(1) 2.6 m from the mirror, real
(2) 1 m from the mirror, virtual
(3) 1 m from the mirror, real
(4) 2.6 m from the mirror, virtual

Q16. In the figure below, P and Q are two equally intense coherent sources emitting radiation of wavelength 20 m . The separation between P and Q is 5 m and the phase of P is ahead of that of Q by $90°$. A, B and C are three distinct point of observation, each equidistant from the midpoint of PQ . The intensities of radiation at A, B, C will be in the ratio :

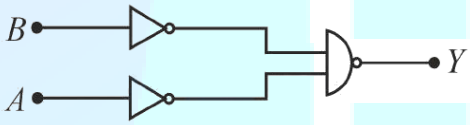


(1) 0: 1: 4
(2) 2: 1: 0
(3) 0: 1: 2
(4) 4: 1: 0

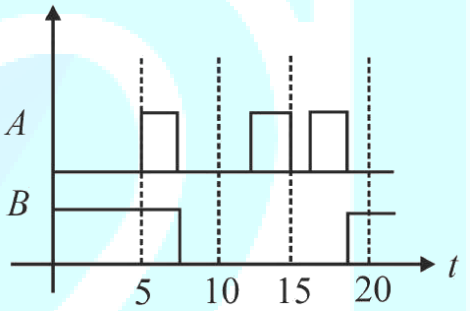
Q17. An electron, a doubly ionized helium ion $(He^{++})$and proton are having the same kinetic energy. The relation between their respective de-Broglie wavelength $\lambda_{e^*}\lambda_{He^{++}}$and λ_p is :
(1) $\lambda_e > \lambda_{He^{++}} > \lambda_p$
(2) $\lambda_e < \lambda_{He^{++}} == \lambda_p$
(3) $\lambda_e > \lambda_p > \lambda_{He^{++}}$
(4) $\lambda_e < \lambda_p < \lambda_{He^{++}}$

Q18. You are given that $^7_3\text{Li} = 7.0160\text{u}$, Mass of Mass of $^4_2\text{He} = 4.0026\text{u}$ and Mass of $^1_1\text{He} = 1.0079\text{H}$ When 20 g of ^7_3Li is converted into ^4_2He by proton capture, the energy liberated, (in kWh), is : [Mass of nucleon $= 1\text{GeV}/c^2$]
(1) 4.5×10^5
(2) 8×10^6
(3) 6.82×10^5
(4) 1.33×10^6

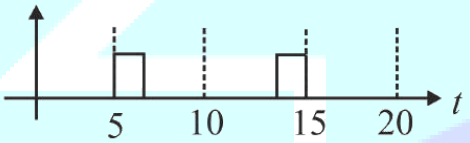
Q19. Identify the correct output signal Y in the given combination of gates (as shown n) for the given inputs A and B



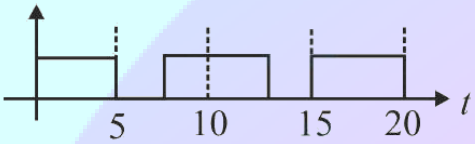
(1)

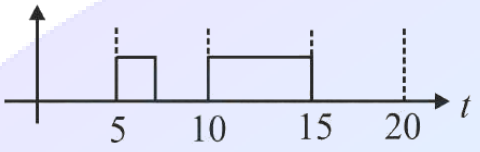


(2)

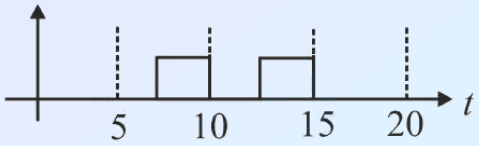


(3)





(4)



Q20. A screw gauge has 50 divisions on its circular scale. The circular scale is 4 units ahead of the pitch scale marking, prior to use. Upon one complete rotation of the circular scale, a displacement of 0.5 mm is noticed on the pitch scale. The nature of zero error involved and the lest count of the screw gauge, are respectively:
(1) Negative, 2μ m
(2) Positive 10μ m
(3) Positive 0.1 mm
(4) Positive, 0.1μ m

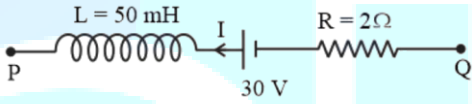
Q21. The density of a solid metal sphere is diameter. The maximum error in the density of the sphere is $\left(\frac{x}{100}\right)$%. If the relative errors in measuring the mass and the diameter are 6.0% and 1.5% respectively, the value of x is -

Q22. Two bodies of the same mass are moving with the same speed, but in different directions in a plane. They have a completely inelastic collision and move together thereafter with a final speed which is half of their initial velocities of the two bodies (in degree) is -

Q23. Initially a gas of diatomic molecules is contained in a cylinder of volume V_1 at a pressure P_1 and temperature 250 K . Assuming that 25% of the molecules get dissociated causing a change in number of moles. The pressure of the resulting gas at temperature 2000 K , when contained in a volume 2 V_1 is given by P_2. The ratio P_2/P_1 is -

Q24. Suppose that intensity of a laser is $\left(\frac{315}{\pi}\right)$ Wm^{-2}. The rms electric field, in units of Vm^{-1} associated with this source is close to the nearest integer is $-(\varepsilon_0 = 8.86 \times 10^{-12} C^2\ N\ m^{-2}; c = 3 \times 10^8\ m\ s^{-1})$

Q25. A part of a complete circuit is shown in the figure. At some instant, the value of current I is 1 A and it is decreasing at a rate of $10^2 As^{-1}$. The value of the potential difference $V_p - V_Q$, (in volts) at that instant is-



Q26. A solution of two components containing n_1 moles of the 1st component and n_2 moles of the 2nd component is prepared. M_1 and M_2 are the molecular weights of component 1 and 2 respectively. If d is the density of the solution in gmI^{-1}, C_2 is the molarity and x_2 is the mole fraction of the 2nd component, then C_2 can be expressed as :
(1) $C_2 = \frac{1000x_2}{M_1+x_2(M_2-M_1)}$
(2) $C_2 = \frac{dx}{M_1+x_2(M_2-M_1)}$
(3) $C_2 = \frac{1000dx_2}{M_1+x_2(M_2-M_1)}$
(4) $C_2 = \frac{dx_1}{M_2+x_2(M_2-M_1)}$

Q27. The variation of equilibrium constant with temperature is given below :
Temperature EquilibriumConstant

$$T_1 = 25°C \quad K_1 = 10$$
$$T_2 = 100°C \quad K_2 = 100$$

The values of $\Delta H°, \Delta G°$ at T_1 and $\Delta G°$ at T_2 (in $kJmol^{-1}$) respectively, are close to [use R = $8.314 JK^{-1}\ mol^{-1}$]
(1) 28.4, −7.14 and -5.71
(2) 0.64, −7.14 and -5.71
(3) 28.4, −5.71 and -14.29
(4) 0.64, −5.71 and -14.29

Q28. For the reaction
$Fe_2\ N(s) + \frac{3}{2}H_2(g) \rightleftharpoons 2Fe(s) + NH_3(g)$
(1) $K_c = K_p(RT)$
(2) $K_c = K_p(RT)^{-1/2}$

(3) $K_c = K_p(RT)^{1/2}$
(4) $K_c = K_p(RT)^{3/2}$

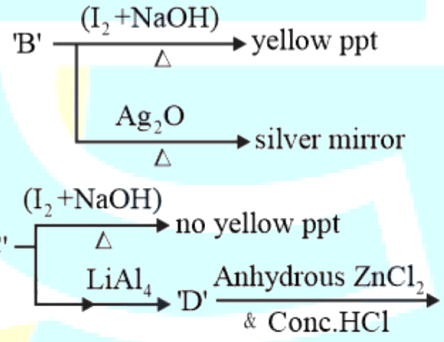
Q29. Arrange the following solutions in the decreasing order of pOH :
(A) 0.01 MHCl
(B) 0.01 MNaOH
(C) $0.01 M CH_3COONa$
(D) 0.01 MNaCl
(1) (A) > (C) > (D) > (B)
(2) (A) > (D) > (C) > (B)
(3) (B) > (C) > (D) > (A)
(4) (B) > (D) > (C) > (A)

Q30. Among the sulphates of alkaline earth metals, the solubilities of $BeSO_4$ and $MgSO_4$ in water, respectively, are
(1) poor and poor
(2) high and poor
(3) high and high
(4) poor and high

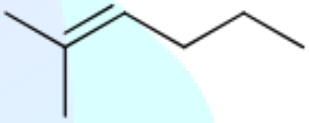
Q31. Which of the following compounds shows geometrical isomerism?
(1) 2-methylpent-2-ene
(2) 4-methylpent-2-ene
(3) 4-methylpent-1-ene
(4) 2-methylpent-1-ene

Q32. Consider the following reactions:

$$\underset{(C)}{\overset{A'}{\rightarrow}} \xrightarrow{\text{ozonolysis}} B' + C'$$
(C_7H_{14})

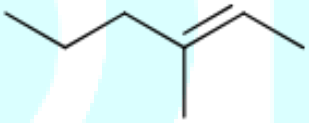


gives white turbidity minutes
' A ' is
(1)

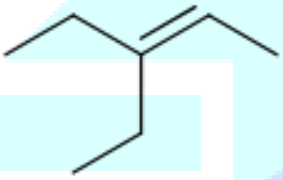


(2)

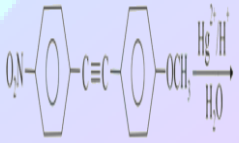
(3)



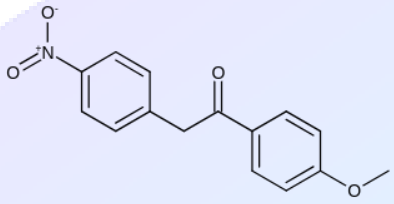
(4)



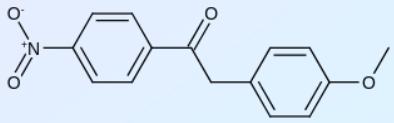
Q33. The major product obtained from the following reaction is :



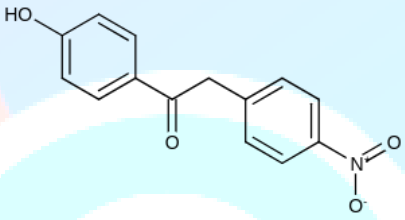
(1)



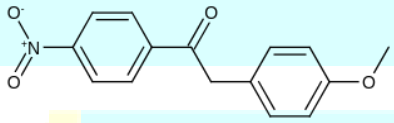
(2)



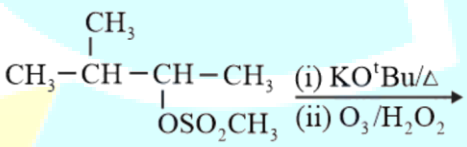
(3)



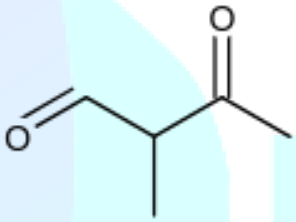
(4)



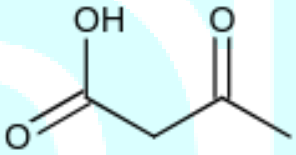
Q34. The major products of the following reaction are :



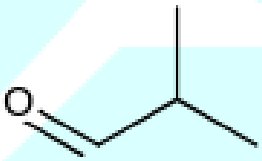
(1)



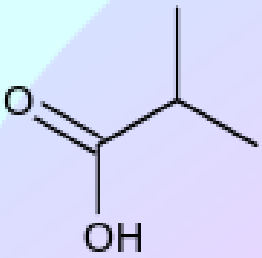
(2)



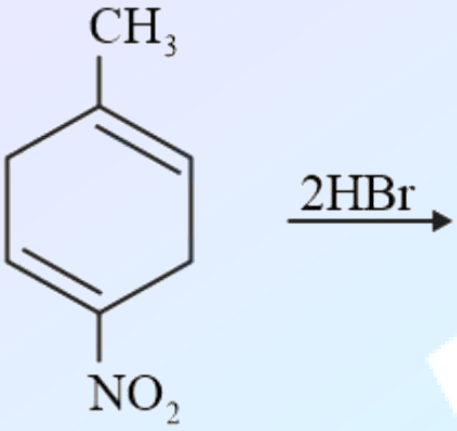
(3)



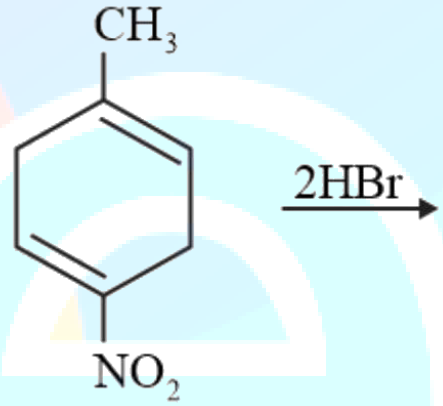
(4)



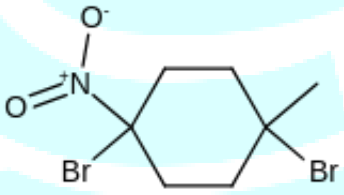
Q35. The major product of the following reaction is :



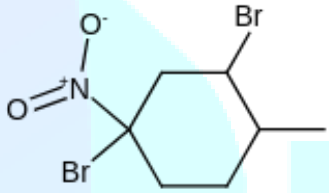
(1)



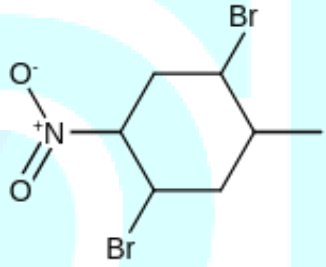
(2)

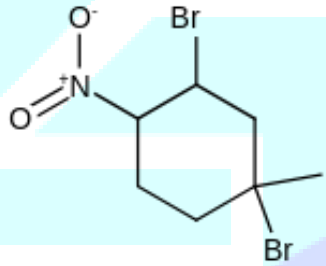


(3)



(4)

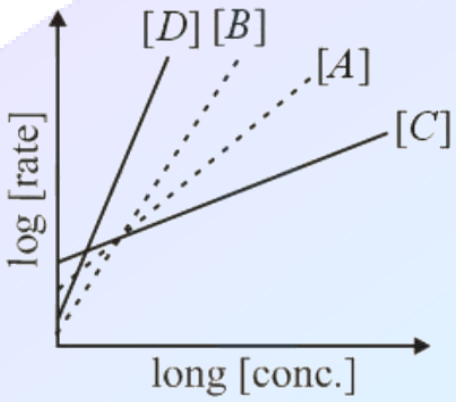




Q36. Consider the following reactions

$$A \rightarrow P1; B \rightarrow P2; C \rightarrow P3; D \rightarrow P4$$

The order of the above reactions are a, b, c and d,respectively. The following graph is obtained when log [rate] vs. log [conc.] are plotted:



Among the following, the correct sequence for the order of the reactions is :
(1) $d > a > b > c$
(2) $a > b > c > d$
(3) $c > a > b > d$
(4) $d > b > a > c$

Q37. Kraft temperature is the temperature:
(1) below which the aqueous solution of detergents starts freezing.
(2) below which the formation of micelles takes place.
(3) above which the aqueous solution of detergents starts boiling.
(4) above which the formation of micelles takes place.

Q38. The correct statement with respect to dinitrogen is:
(1) N_2 is paramagnetic in nature.
(2) it can combine with dioxygen at $25^{\circ}C$
(3) liquid dinitrogen is not used in cryosurgery.
(4) it can be used as an inert diluent for reactive chemicals

Q39. The presence of soluble fluoride ion upto 1 ppm concentration in drinking water, is :
(1) harmful for teeth
(2) harmful to skin
(3) harmful to bones
(4) safe for teeth

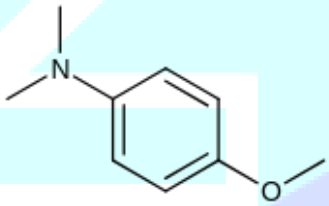
Q40. The INCORRECT statement is :
(1) bronze is an alloy of copper and tin.
(2) cast iron is used to manufacture wrought iron.
(3) german silver is an alloy of zinc, copper and
(4) brass is an alloy of copper and nickel. nickel.

Q41. The set that contains atomic numbers of only transition elements, is :
(1) 37,42,50,64
(2) 21,25,42,72
(3) 9,17,34,38
(4) 21,32,53,64

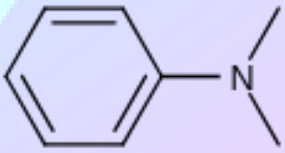
Q42. The lanthanoid that does NOT show +4 oxidation state is:
(1) Dy
(2) Ce
(3) Eu
(4) Tb

Q43. The species that has a spin-only magnetic moment of 5.9 BM, is :
(T_d = tetrahedral)
(1) $[Ni(CN)_4]^{2-}$ (square planar)
(2) $[NiCl_4]^{2-}(T_d)$
(3) $Ni(CO)_4(T_d)$
(4) $[MnBr_4]^{2-}(T_d)$

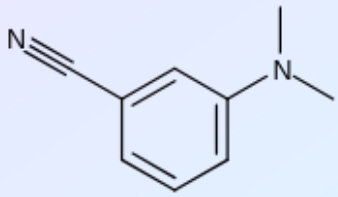
Q44. The increasing order of pK_b values of the following compounds is :



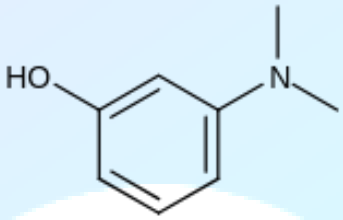
I



II



III



IV

(1) II < IV < III < I
(2) I < II < IV < III
(3) II < I < III < IV
(4) I < II < III < IV

Q45. Consider the Assertion and Reason given below.
Assertion (A) : Ethene polymerized in the presence of Ziegler Natta Catalyst at high temperature and pressure is used to make buckets and dustbins.
Reason (R) : High density polymers are closely packed and are chemically inert. Choose the correct answer from the following:
(1) (A) is correct but (R) is wrong.
(2) Both (A) and (R) are correct but (R) is not the correct explanation of (A).
(3) Both (A) and (R) are correct and (R) is the
(4) (A) and (R) both are wrong. correct explanation of (A).

Q46. A spherical balloon of radius 3 cm containing helium gas has a pressure of 48×10^{-3} bar. At the same temperature, the pressure, of a spherical balloon of radius 12 cm containing the same amount of gas will be. . . .. $\times 10^{-6}$ bar.

Q47. In an estimation of bromine by Carius method, 1.6 g of an organic compound gave 1.88 g of AgBr . The mass percentage of bromine in the compound is .....
(Atomic mass, Ag = 108, Br = 80gmol^{-1}
Q48. The elevation of boiling point of 0.10 m aqueous $CrCl_3.xNH_3$ solution is two times that of 0.05 m aqueous $CaCl_2$ solution. The value of x is
[Assume 100% ionisation of the complex and $CaCl_2$, coordination number of Cr as 6 , and that all NH_3 molecules are present inside the coordination sphere]

Q49. Potassium chlorate is prepared by the electrolysis of KCl in basic solution $6OH^- + Cl^- \rightarrow ClO_3^- + 3H_2O + 6e^-$. If only 60% of the current is utilized in the reaction, the time (rounded to the nearest hour) required to produce 10 g of $KClO_3$ using a current of 2 A is (Given : F = 96,500Cmol; molar mass of $KClO_3$ = 122 g mol^{-1})

Q50. The number of Cl = O bonds in perchloric acid is, 11 ...
Q51. If α and β be two roots of the equation $x^2 - 64x + 256 = 0$. Then the value of $\left(\frac{\alpha^3}{\beta^5}\right)^{\frac{1}{8}} + \left(\frac{\beta^3}{\alpha^5}\right)^{\frac{1}{8}}$ is :
(1) 2
(2) 3
(3) 1
(4) 4

Q52. The region represented by $\{z = x + iy \in C : |z| - \mathrm{Re}(z) \leq 1\}$ is also given by the inequality
(1) $y^2 \geq 2(x + 1)$
(2) $y^2 \leq 2\left(x + \frac{1}{2}\right)$
(3) $y^2 \leq \left(x + \frac{1}{2}\right)$
(4) $y^2 \geq x + 1$

Q53. Two families with three members each and one family with four members are to be seated in a row. In how many ways can they be seated so that the same family members are not separated?
(1) 2 ! 3! 4 !
(2) $(3!)^3 \cdot (4!)$
(3) (3!)2. (4!)
(4) 3! $(4!)^3$

Q54. Let a, b, c, d and p be non-zero distinct real numbers such that $(a^2+b^2+c^2)p^2 - 2(ab+bc+cd)p + (b^2+c^2+d^2) = 0$. Then
(1) a, b, c are in A.P.
(2) a, c, p are in G.P.
(3) a, b, c, d are in G.P.
(4) a, b, c, d are in A.P.

Q55. If $\{p\}$ denotes the fractional part of the number p, then $\left\{\frac{3^{200}}{8}\right\}$ is equal to
(1) $\frac{5}{8}$
(2) $\frac{7}{8}$
(3) $\frac{3}{8}$
(4) $\frac{1}{8}$

Q56. A ray of light coming from the point $(2,2\sqrt{3})$ is incident at an angle 30° on the line $x = 1$ at the point A. The ray gets reflected on the line $x = 1$ and meets x-axis at the point B. Then, the line AB passes through the point
(1) $\left(3, -\frac{1}{\sqrt{3}}\right)$
(2) $\left(4, -\frac{\sqrt{3}}{2}\right)$
(3) $(3, -\sqrt{3})$
(4) $(4, -\sqrt{3})$

Q57. Let L_1 be a tangent to the parabola $y^2 = 4(x+1)$ and L_2 be a tangent to the parabola $y^2 = 8(x+2)$ such that L_1 and L_2 intersect at right angles. Then L_1 and L_2 meet on the straight line:
(1) $x + 3 = 0$
(2) $2x + 1 = 0$
(3) $x + 2 = 0$
(4) $x + 2y = 0$

Q58. Which of the following points lies on the locus of the foot of perpendicular drawn upon any tangent to the ellipse, $\frac{x^2}{4} + \frac{y^2}{2} = 1$ from any of its foci?
(1) $(-2, \sqrt{3})$
(2) $(-1, \sqrt{2})$
(3) $(-1, \sqrt{3})$
(4) (1,2)

Q59. The negation of the Boolean expression $p \vee (\sim p \wedge q)$ is equivalent to :
(1) $p \wedge \sim q$
(2) $\sim p \wedge \sim q$
(3) $\sim p \vee \sim q$
(4) $\sim p \vee q$

Q60. If $\sum_{i=1}^{n} (x_i - a) = n$ and $\sum_{i=1}^{n} (x_i - a)^2 = na, (n, a > 1)$, then the standard deviation of n observations $x_1, x_2, \ldots, x_n$ is
(1) $a - 1$
(2) $n\sqrt{(a-1)}$
(3) $\sqrt{n(a-1)}$
(4) $\sqrt{(a-1)}$

Q61.
Let m and M be respectively the minimum and maximum value values of

$$\begin{vmatrix} \cos^2 x & 1+\sin^2 x & \sin 2x \\ 1+\cos^2 x & \sin^2 x & \sin 2x \\ \cos^2 x & \sin^2 x & 1+\sin 2x \end{vmatrix}$$

Then the ordered pair (m, M) is equal to:
(1) (3,3)
(2) $(-3, -1)$
(3) (4,1)
(4) (1,3)

Q62. The values of λ and μ for which the system of linear equations $x + y + z = 2, x + 2y + 3z = 5, x + 3y + \lambda z = \mu$ has infinitely many solutions, are respectively
(1) 6 and 8
(2) 5 and 7
(3) 5 and 8
(4) 4 and 9

Q63. If $f(x+y) = f(x)f(y)$ and $\sum_{x=1}^{\infty} f(x) = 2, x, y \in N$, where N is the set of all natural numbers, then the value of $\frac{f(4)}{f(2)}$ is
(1) $\frac{2}{3}$
(2) $\frac{1}{9}$

(3) $\frac{1}{3}$
(4) $\frac{4}{9}$

Q64. The position of a moving car at time t is given by $f(t) = at^2 + bt + c, t > 0$, where a, b and c are real numbers greater than 1 . Then the average speed of the car over the time interval $[t_1, t_2]$ is attained at the point:
(1) $\frac{(t_2 - t_1)}{2}$
(2) $a(t_2 - t_1) + b$
(3) $\frac{(t_1 + t_2)}{2}$
(4) $2a(t_1 + t_2) + b$

Q65. If $I_1 = \int_0^1 (1 - x^{50})^{100} dx$ and $I_2 = \int_0^1 (1 - x^{50})^{101} dx$ such that $I_2 = \alpha I_1$ then α equals to :
(1) $\frac{5049}{5050}$
(2) $\frac{5050}{5049}$
(3) $\frac{5050}{5051}$
(4) $\frac{5051}{5050}$

Q66. $\lim_{x \to 1} \left(\frac{\int_0^{(x-1))^2} x \cos t^2 \, dt}{(x-1)\sin(x-1)} \right)$
(1) is equal to $\frac{1}{2}$.
(2) is equal to 1 .
(3) is equal to $-\frac{1}{2}$.
(4) is equal to 0 .

Q67. The area (in sq. units) of the region $A = \{(x, y): |x| + |y| \leq 1, 2y^2 \geq |x|\}$
(1) $\frac{1}{3}$
(2) $\frac{7}{6}$
(3) $\frac{1}{6}$
(4) $\frac{5}{6}$

Q68. The general solution of the differential equation $\sqrt{1 + x^2 + y^2 + x^2y^2} + xy\frac{dy}{dx} = 0$ (where C is a constant of integration)
(1) $\sqrt{1 + y^2} + \sqrt{1 + x^2} = \frac{1}{2} \log_e \left(\frac{\sqrt{1+x^2}-1}{\sqrt{1+x^2}+1} \right) + C$
(2) $\sqrt{1 + y^2} - \sqrt{1 + x^2} = \frac{1}{2} \log_e \left(\frac{\sqrt{1+x^2}-1}{\sqrt{1+x^2}+1} \right) + C$
(3) $\sqrt{1 + y^2} + \sqrt{1 + x^2} = \frac{1}{2} \log_e \left(\frac{\sqrt{1+x^2}+1}{\sqrt{1+x^2}-1} \right) + C$
(4) $\sqrt{1 + y^2} - \sqrt{1 + x^2} = \frac{1}{2} \log_e \left(\frac{\sqrt{1+x^2}+1}{\sqrt{1+x^2}-1} \right) + C$

Q69. The shortest distance between the lines $\frac{x-1}{0} = \frac{y+1}{-1} = \frac{z}{1}$ and $x + y + z + 1 = 0, 2x - y + z + 3 = 0$ is
(1) 1
(2) $\frac{1}{\sqrt{3}}$
(3) $\frac{1}{\sqrt{2}}$
(4) $\frac{1}{2}$

Q70. Out of 11 consecutive natural number if three numbers are selected at random (without repetition), then the probability that they are in A.P. with positive common difference is :
(1) $\frac{15}{101}$
(2) $\frac{5}{101}$
(3) $\frac{5}{33}$
(4) $\frac{10}{99}$

Q71. The angle of elevation of the top of a hill from a point on the horizontal plane passing through the foot of the hill is found to be $45°$. After walking a distance of 80 meters towards the top, up a slope inclined at angle of $30°$ to the horizontal plane the angle of elevation of the top of the hill becomes $75°$. Then the height of the hill (in meters) is $-$

Q72. Set A has melements and set B has nelements. If the total number of subsets of A is 112 more than the total number of subsets of B, then the value of $m \cdot n$ is .

Q73.
Let $f: R \to R$ be defined as $f(x) = \begin{cases} x^5 \sin\left(\frac{1}{x}\right) + 5x^2 & , x < 0 \\ 0 & , x = 0 \\ x^5 \cos\left(\frac{1}{x}\right) + \lambda x^2 & , x > 0 \end{cases}$. The value of λ for which $f''(0)$ exists, is .

Q74. Let AD and BC be two vertical poles at A and B respectively on a horizontal ground. If $AD = 8$ m, $BC = 11$ m, $AB = 10$ m; then the

distance (in meters) of a point M lying in between AB from the point A such that $MD^2 + MC^2$ is minimums, is

Q75. If $\vec{a}$ and $\vec{b}$ are unit vectors, then the greatest value of $\sqrt{3}|\vec{a} + \vec{b}| + |\vec{a} - \vec{b}|$ is

ANSWER KEYS

1. (1) hatho	2. (1)	ma 3. (3)	4. (1)	5. (3) cat	6. (1)	ma 7. (3)	8. (2)
9. (2)	10. (3)	11. (1)	12. (3)	13. (3)	14. (1)	15. (4)	16. (2)
17. (3)	18. (4)	19. (4)	20. (2)	21. (1050)	22. (120)	23. (5)	24. (275)
25. (33)	26. (3)	27. (1)	28. (3)	29. (2)	30. (3)	31. (2)	32. (4)
33. (1)	34. (4)	35. (4)	36. (4)	37. (4)	38. (4)	39. (4)	40. (4)
41. (2)	42. (3)	43. (4)	44. (2)	45. (3)	46. (750)	47. (50)	48. (5)
49. (11)	50. (3)	51. (1)	52. (2)	53. (2)	54. (3)	55. (4)	56. (3)
57. (1)	58. (3)	59. (2)	60. (4)	61. (2)	62. (3)	mo63. (4)	64. (3) a (a
65. (3)	66. (4)	67. (4)	68. (3)	69. (2)	70. (3)	71. (80)	72. (28)
73. (5)	74. (5)	75. (4)					