Q1. A cylindrical wire of mass (0.4 ± 0.01) g has length (8 ± 0.04) cm and radius (6 ± 0.03) mm. The maximum error in its density will be

(1) 3.5% (2) 5%

(3) 1% (4) 4%

Q2. Two forces having magnitude A and $\frac{A}{2}$ are perpendicular to each other. The magnitude of their resultant is:

(1) $\frac{\sqrt{5}A}{4}$ (2) $\frac{\sqrt{5}A}{2}$

(3) $\frac{5A}{2}$ (4) $\frac{\sqrt{5}A^2}{2}$

Q3. Dimension of $\frac{1}{\mu_0 \varepsilon_0}$ should be equal to

(1) $L\ T^{-1}$ (2) $T^2\ L^{-2}$

(3) $L^2\ T^{-2}$ (4) $T\ L^{-1}$

Q4. Two projectiles A and B are thrown with initial velocities of 40 m s^{-1} and 60 m s^{-1} at angles 30° and 60° with the horizontal respectively. The ratio of their ranges respectively is $(g = 10\ m\ s^{-2})$

(1) $4 : 9$ (2) $2 : \sqrt{3}$

(3) $\sqrt{3} : 2$ (4) $1 : 1$

Q5. At any instant the velocity of a particle of mass 500 g is $\left(2t\,\hat{i} + 3t^2\,\hat{j}\right)$ m s^{-1}. If the force acting on the particle at $t = 1$ s is $\left(\hat{i} + x\,\hat{j}\right)$ N. Then the value of x will be:

(1) 3 (2) 4

(3) 2 (4) 6

Q6. The momentum of a body is increased by 50%. The percentage increase in the kinetic energy of the body is_ _____%.

Q7. The moment of inertia of a semicircular ring about an axis, passing through the center and perpendicular to the plane of ring, is $\frac{1}{x}$ MR^2, where R is the radius and M is the mass of the semicircular ring. The value of x will be _____.

Q8. Given below are two statements:

Statement I: If E be the total energy of a satellite moving around the earth, then its potential energy will be $\frac{E}{2}$.

Statement II: The kinetic energy of a satellite revolving in an orbit is equal to the half the magnitude of total energy E.

In the light of the above statements, choose the most appropriate answer from the options given below.

(1) Statement I is correct but Statement II is incorrect (2) Statement I is incorrect but Statement II is correct

(3) Both Statement I and Statement II are correct (4) Both Statement I and Statement II are incorrect

Q9. The weight of a body on the earth is 400 N. Then weight of the body when taken to a depth half of the radius of the earth will be:

(1) 200 N (2) Zero

(3) 100 N (4) 300 N

Q10. An aluminium rod with Young's modulus $Y = 7.0 \times 10^{10}$ N m^{-2} undergoes elastic strain of 0.04%. The energy per unit volume stored in the rod in SI unit

(1) 2800 (2) 11200
(3) 5600 (4) 8400

Q11. An air bubble of volume 1 cm^3 rises from the bottom of a lake 40 m deep to the surface at a temperature of 12°C. The atmospheric pressure is 1×10^5 Pa, the density of water is 1000 kg m^{-3} and g = 10 m s^{-2}. There is no difference of the temperature of water at the depth of 40 m and on the surface. The volume of air bubble when it reaches the surface will be

(1) 2 cm^3 (2) 3 cm^3
(3) 4 cm^3 (4) 5 cm^3

Q12. An air bubble of diameter 6 mm rises steadily through a solution of density 1750 kg m^{-3} at the rate of 0.35 cm s^{-1}. The co-efficient of viscosity of the solution (neglect density of air) is _____ Pas (given, g = 10 m s^{-2}).

Q13. Given below are two statements:

Statement I: If heat is added to a system, its temperature must increase.

Statement II: If positive work is done by a system in a thermodynamic process, its volume must increase.

In the light of the above statements, choose the correct answer from the options given below

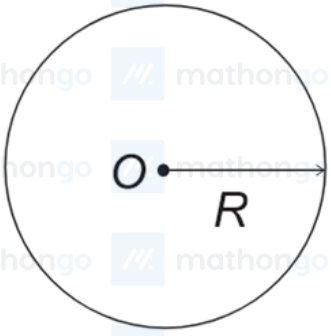
(1) Statement I is true but Statement II is false (2) Both Statement I and Statement II are false
(3) Both Statement I and Statement II are true (4) Statement I is false but Statement II is true

Q14. The engine of a train moving with speed 10 m s^{-1} towards a platform sounds a whistle at frequency 400 Hz. The frequency heard by a passenger inside the train is: (Neglect air speed. Speed of sound in air = 330 m s^{-1})

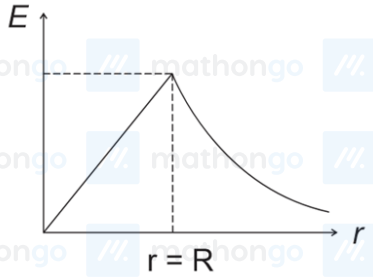
(1) 400 Hz (2) 200 Hz
(3) 412 Hz (4) 388 Hz

Q15. An organ pipe 40 cm long is open at both ends. The speed of sound in air is 360 m s^{-1}. The frequency of the second harmonic is _____ Hz.

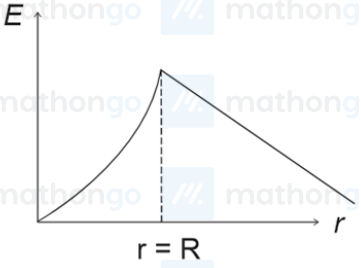
Q16. Graphical variation of electric field due to a uniformly charged insulating solid sphere of radius R, with distance r from the centre O is represented by:



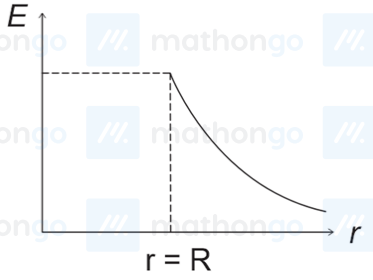
(1) Dig



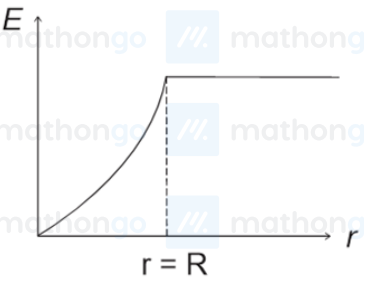
(2)



(3)

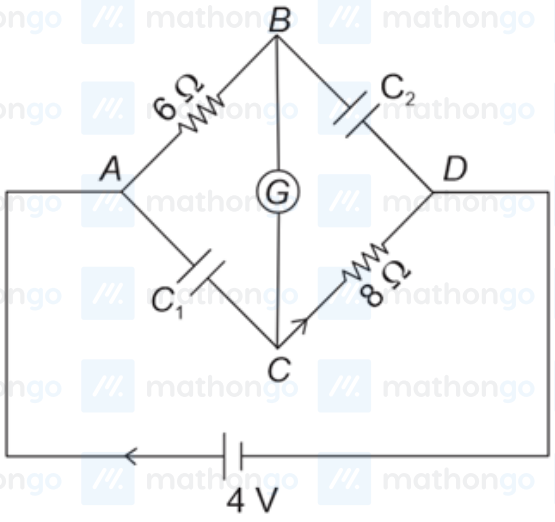


(4)



Q17. An electric dipole of dipole moment is 6.0×10^{-6} C m placed in a uniform electric field of 1.5×10^{3} N C^{-1} in such a way that dipole moment is along electric field. The work done in rotating dipole by 180° in this field will be_____mJ.

Q18. In this figure the resistance of the coil of galvanometer G is $2\,\Omega$. The emf of the cell is 4 V. The ratio of potential difference across C_1 and C_2 is



(1) 1
(2) $\frac{4}{5}$
(3) $\frac{5}{4}$
(4) $\frac{3}{4}$

Q19. A current of 2 A flows through a wire of cross-sectional area $25.0\ mm^2$. The number of free electrons in a cubic meter are 2.0×10^{28}. The drift velocity of the electrons is _____ $\times 10^{-6}$ ms^{-1} (given, charge on electron $= 1.6 \times 10^{-19}$C).

Q20. Certain galvanometers have a fixed core made of non magnetic metallic material. The function of this metallic material is

(1) to oscillate the coil in magnetic field for longer period of time
(2) to bring the coil to rest quickly
(3) to produce large deflecting torque on the coil
(4) to make the magnetic field radial

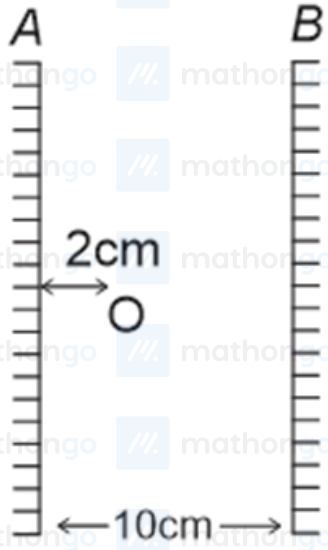
Q21. A charge particle moving in magnetic field B, has the components of velocity along B as well as perpendicular to B. The path of the charge particle will be
(1) helical path with the axis perpendicular to the direction of magnetic field B
(2) helical path with the axis along magnetic field B
(3) circular path
(4) straight along the direction of magnetic field B

Q22. The magnetic intensity at the centre of a long current carrying solenoid is found to be 1.6×10^3 A m^{-1}. If the number of turns is 8 per cm, then the current flowing through the solenoid is _____A.

Q23. An oscillating LC circuit consists of a 75 mH inductor and a 1.2 μF capacitor. If the maximum charge to the capacitor is 2.7 μC. The maximum current in the circuit will be _____ mA.

Q24. In a reflecting telescope, a secondary mirror is used to:
(1) reduce the problem of mechanical support
(2) make chromatic aberration zero
(3) move the eyepiece outside the telescopic tube
(4) remove spherical aberration

Q25. Two vertical parallel mirrors A and B are separated by 10 cm. A point object O is placed at a distance of 2 cm from mirror A. The distance of the second nearest image behind mirror A from the mirror A is _____ cm.



Q26. Proton (P) and electron (e) will have same de-Broglie wavelength when the ratio of their momentum is (assume, $m_p = 1849\ m_e$)
(1) 1 : 1
(2) 1 : 1849
(3) 1 : 43
(4) 43 : 1

Q27. For a nucleus ${}^{A}_{Z}X$ having mass number A and atomic number Z
A. The surface energy per nucleon $\left(b_s\right) = -a_1 A^{\frac{2}{3}}$.
B. The Coulomb contribution to the binding energy $b_c = -a_2 \frac{Z(Z-1)}{A^{\frac{4}{3}}}$.

C. The volume energy $b_v = a_3 A$

D. Decrease in the binding energy is proportional to surface area.

E. While estimating the surface energy, it is assumed that each nucleon interacts with 12 nucleons. (a_1, a_2 and a_3 are constants)

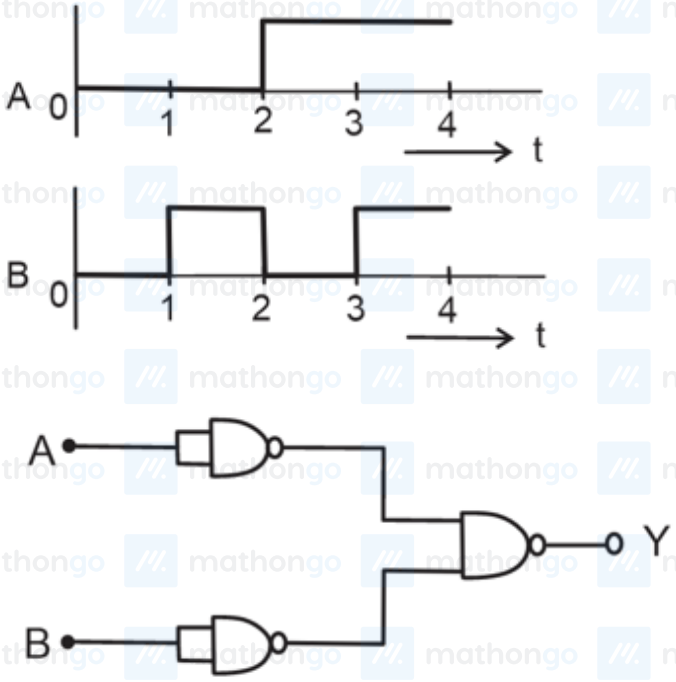
Choose the most appropriate answer from the options given below:

(1) B, C, E only (2) C, D only

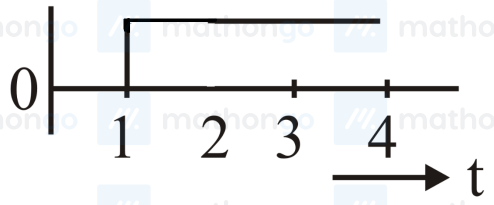
(3) A, B, C, D only (4) B, C only

Q28. A nucleus with mass number 242 and binding energy per nucleon as 7.6 MeV breaks into two fragment each with mass number 121. If each fragment nucleus has binding energy per nucleon as 8.1 MeV, the total gain in binding energy is _____ MeV.

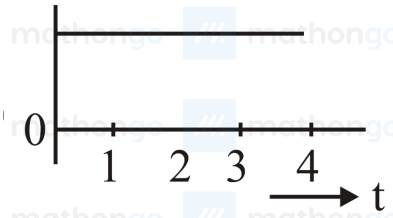
Q29. For the logic circuit shown, the output waveform at Y is



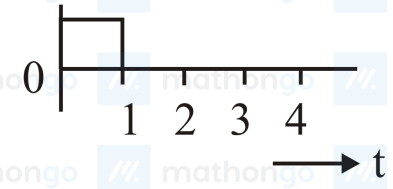
(1)



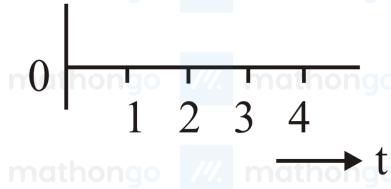
(2)



(3)



(4)



Q30. A TV transmitting antenna is 98 m high and the receiving antenna is at the ground level. If the radius of the earth is 6400 km, the surface area covered by the transmitting antenna is approximately:

(1) 1240 km^2 (2) 3942 km^2
(3) 4868 km^2 (4) 1549 km^2

Q31. 0.5 g of an organic compound (X) with 60% carbon will produce $\times 10^{-1}$ g of CO_2 on complete combustion.

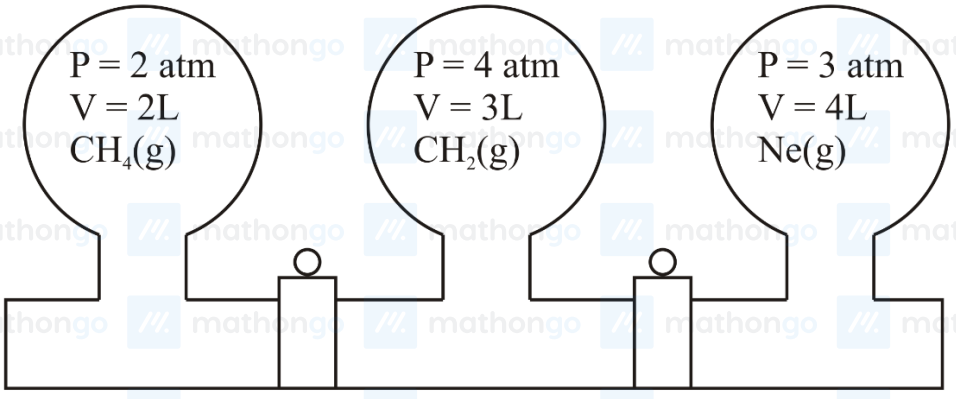
Q32. The number of following statement/s which is/are incorrect is _____
A) Line emission spectra are used to study the electronic structure
B) The emission spectra of atoms in the gas phase show a continuous spread of wavelength from red to violet.
C) An absorption spectrum is like the photographic negative of an emission spectrum
D) The element helium was discovered in the sun by spectroscopic method

Q33. The correct order of electronegativity for given elements is
(1) P > Br > C > At (2) Br > P > At > C
(3) Br > C > At > P (4) C > P > At > Br

Q34. Given below are two statements : One is labelled as Assertion A and the other is labelled as Reason R.
Assertion A : Butan–1–ol has higher boiling point than ethoxyethane.
Reason R : Extensive hydrogen bonding leads to stronger association of molecules.
In the light of the above statements, choose the correct answer from the options given below :
(1) A is true but R is false (2) Both A and R are true and R is the correct explanation of A
(3) Both A and R are true but R is not the correct explanation of A (4) A is false but R is true

Q35. The number of following factors which affect the percent covalent character of the ionic bond is_____
A) Polarising power of cation
B) Extent of distortion of anion
C) Polarisability of the anion
D) Polarising power of anion

Q36.

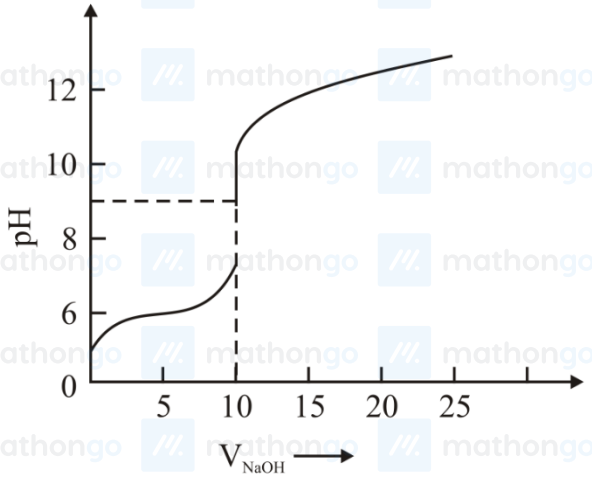


Three bulbs are filled with CH_4, CO_2 and Ne as shown in the picture. The bulbs are connected through pipes of zero volume. When the stopcocks are opened and the temperature is kept constant throughout, the pressure of the system is found to be_____ atm. (Nearest integer).

Q37. When a 60 W electric heater is immersed in a gas for 100 s in a constant volume container with adiabatic walls, the temperature of the gas rises by 5°C. The heat capacity of the given gas is JK^{-1} (Nearest integer)

Q38. The titration curve of weak acid vs. strong base with phenolphthalein as indicator is shown below. The $K_{phenolphthalein} = 4 \times 10^{-10}$

Given: $\log 2 = 0.3$



The number of following statement/s which is/are correct about phenolphthalein is _____

A. It can be used as an indicator for the titration of weak acid with weak base.

B. It begins to change colour at pH $= 8.4$

C. It is a weak organic base

D. It is colourless in acidic medium

Q39. $2IO_3^- + xI^- + 12H^+ \rightarrow 6I_2 + 6H_2$ What is the value of x?

(1) 2 (2) 12

(3) 10 (4) 6

Q40. Given below are two statements :

Statement I : Lithium and Magnesium do not form superoxide

Statement II : The ionic radius of Li^+ is larger than ionic radius of Mg^{2+} In the light of the above statements, choose the most appropriate answer from the questions given below :

In the light of the above statements, choose the most appropriate answer from the questions given below :

(1) Statement I is incorrect but Statement II is correct (2) Statement I is correct but Statement II is incorrect

(3) Both statement I and Statement II are incorrect (4) Both Statement I and Statement II are correct

Q41. What is the purpose of adding gypsum to cement?

(1) To facilitate the hydration of cement (2) To slow down the process of setting

(3) To give a hard mass (4) To speed up the process of setting

Q42. Molar mass of the hydrocarbon (X) which on ozonolysis consumes one mole of O_3 per mole of (X) and gives one mole each of ethanal and propanone is _____ g mol^{-1} (Molar mass of C : 12 g mol^{-1} , H : 1 g mol^{-1})

Q43. Match List I with List II

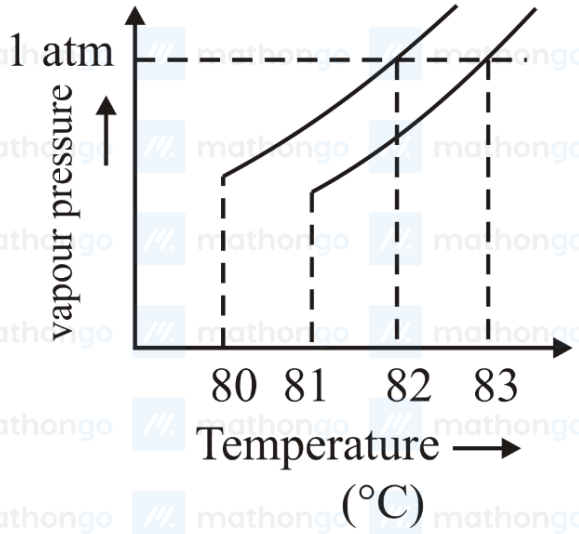
List-I	**List-2**
Species	**Maximum allowed concentration in ppm in drinking water**
A F^- I	< 50 ppm

B	SO_4^{2-}	II < 5 ppm
C	NO_3^-	III < 2 ppm
D	Zn	IV < 500 ppm

Choose the correct answer from the options given below.

(1) A-I, B-II, C-III, D-IV
(2) A-II, B-I, C-III, D-IV
(3) A-IV, B-III, C-II, D-I
(4) A-III, B-II, C-I, D-IV

Q44. The vapour pressure vs. temperature curve for a solution solvent system is shown below.



The boiling point of the solvent is _____°C.

Q45. The reaction occurs in which of the given galvanic cell?

$\frac{1}{2}H_2(g) + AgCl(s) \rightleftharpoons H^+(aq) + Cl^-(aq) + Ag(s)$

(1) $Pt\,|H_2(g)|\,HCl(sol^n)\,|\,AgCl(s)|\,Ag$
(2) $Ag\,|\,AgCl(s)|\,KCl(sol^n)\,|\,AgNO_3\,|\,Ag$
(3) $Pt\,|H_2(g)|\,HCl(sol^n)\,|\,AgNO_3(sol^n)\,|\,Ag$
(4) $Pt\,|H_2(g)|\,KCl(sol^n)\,|\,AgCl(s)|\,Ag$

Q46. The number of given statement/s which is/are correct is_____

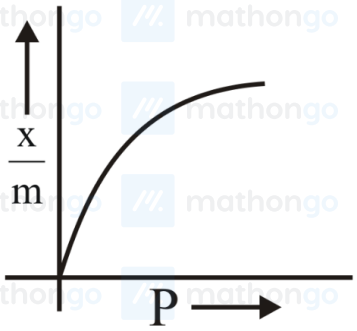
(A) The stronger the temperature dependence of the rate constant, the higher is the activation energy.
(B) If a reaction has zero activation energy, its rate is independent of temperature.
(C) The stronger the temperature dependence of the rate constant, the smaller is the activation energy.
(D) If there is no correlation between the temperature and the rate constant then it means that the reaction has negative activation energy.

Q47. The water gas on reacting with cobalt as a catalyst forms

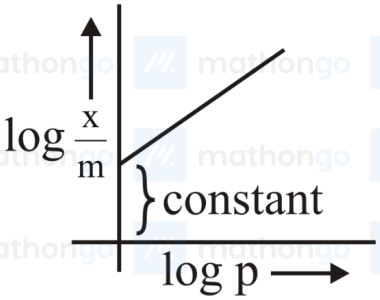
(1) Methanal
(2) Methanoic acid
(3) Ethanol
(4) Methanol

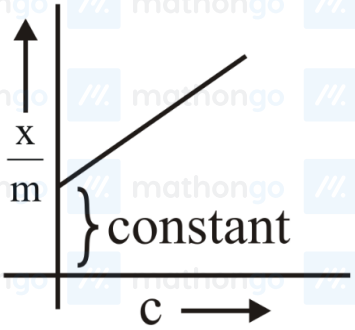
Q48. Which of the following represents the Freundlich adsorption isotherms?

(A)

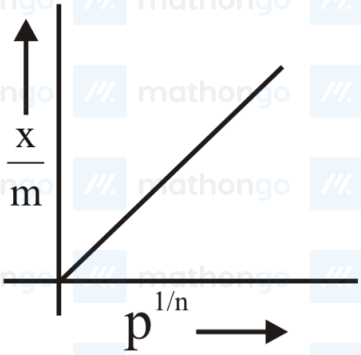


(B)





(C)



(D)

Choose the correct answer from the options given below:

(1) A, C, D only
(2) A, B only
(3) B, C, D only
(4) A, B, D only

Q49. Which of the following metals can be extracted through alkali leaching technique?

(1) Sn
(2) Pb
(3) Au
(4) Cu

Q50. XeF_4 reacts with SbF_5 to form $[XeF_m]^{n+}[SbF_y]^{2-}$ $m+n+y+z=$?.

Q51. In chromyl chloride, the number of d-electrons present on chromium is same as in (Given at no. of $Ti : 22, V : 23, Cr : 24, Mn : 25, Fe : 26$)

(1) V (IV) (2) Mn (VII)

(3) Fe (III) (4) Ti (III)

Q52. Which halogen is known to cause the reaction given below?

(1) All halogens (2) Only Bromine

(3) Only Iodine (4) Only Chlorine

Q53. Which of the following complex is octahedral, diamagnetic and the most stable?

(1) $Na_3[CoCl_6]$ (2) $[Ni(NH_3)_6]Cl_2$

(3) $K_3[Co(CN)_6]$ (4) $[Co(H_2O)_6]Cl_2$

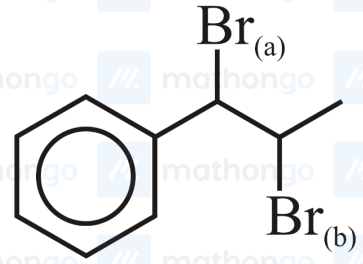
Q54. The correct order of spin only magnetic moments for the following complex ions is

(1) $[Fe(CN)_6]^{3-} < [CoF_6]^{3-} < [MnBr_4]^{2-} < [Mn(CN)_6]^{3-}$ (2) $[CoF_6]^{3-} < [MnBr_4]^{2-} < [Fe(CN)_6]^{3-} < [Mn(CN)_6]^{3-}$

(3) $[Fe(CN)_6]^{3-} < [Mn(CN)_6]^{3-} < [CoF_6]^{3-} < [MnBr_4]^{2-}$ (4) $[MnBr_4]^{2-} < [CoF_6]^{3-} < [Fe(CN)_6]^{3-} < [Mn(CN)_6]^{3-}$

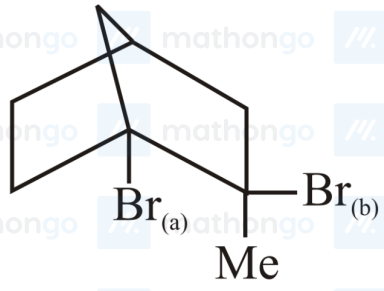
Q55. Choose the halogen which is most reactive towards SN1 reaction in the given compounds (A, B, C & D)

A.

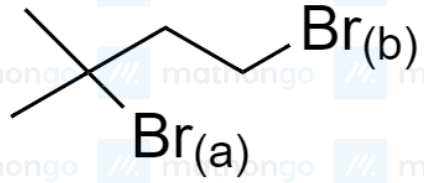


B.

C.



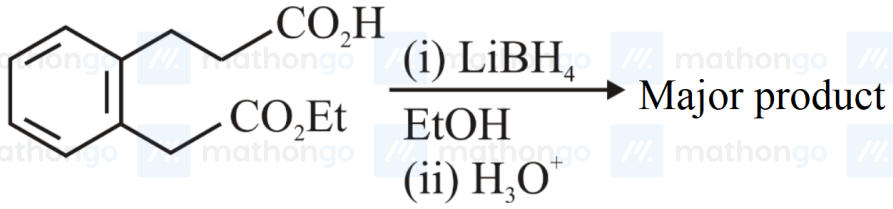
D.

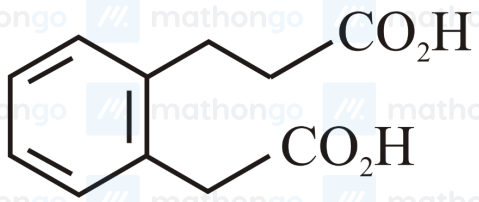


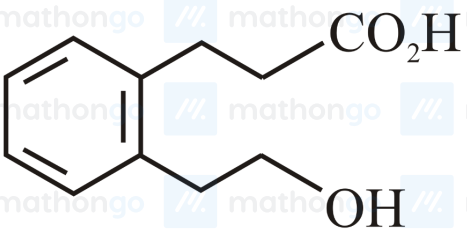
(1) $A-Br_{(b)}; B-I_{(a)}; C-Br_{(a)}; D-Br_{(a)}$ (2) $A-Br(b); B-I_{(b)}; C-Br(b); D-Br(b)$

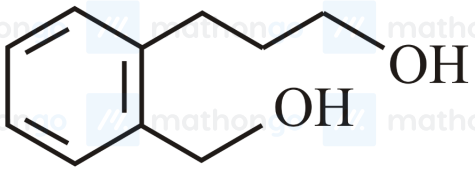
(3) $A-Br_{(a)}; B-I_{(a)}; C-Br_{(b)}; D-Br_{(a)}$ (4) $A-Br_{(a)}; B-I_{(a)}; C-Br_{(a)}; D-Br_{(a)}$

Q56. The major product formed in the following reaction is



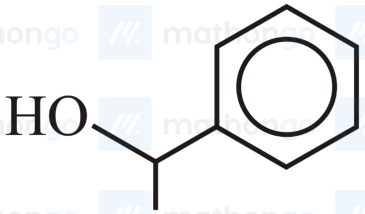
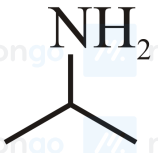
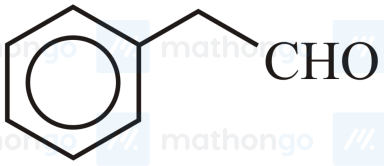
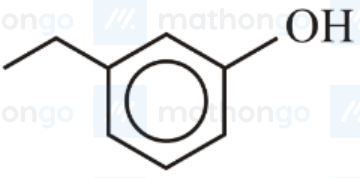
(1)


(2)


(3)


(4)

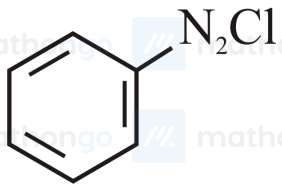

Q57. . Match List I with List II :

List I (Reagents used)	List II (Compound with Functional group detected)
A. Alkaline solution of copper sulphate and sodium citrate	I. 
B. Neutral $FeCl_3$ solution	II. 
C. Alkaline chloroform solution	III. 
D. Potassium iodide and sodium hypochloride	IV 

Choose the correct answer from the options given below :

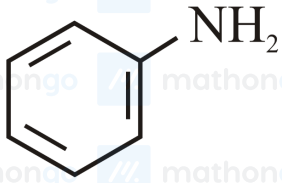
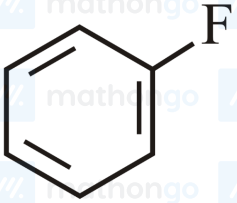
(1) A-III, B-IV, C-I, D-II (2) A-III, B-IV, C-II, D-I
(3) A-IV, B-I, C-II, D-III (4) A-II, B-IV, C-III, D–I

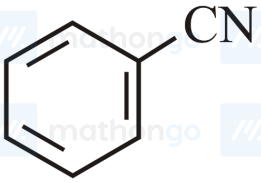
Q58. Match List I with List II :

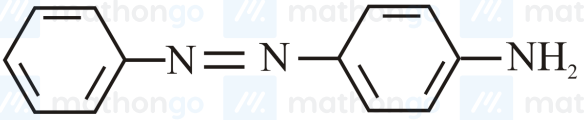


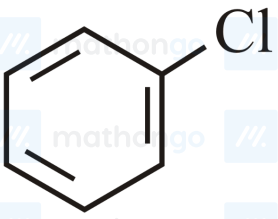
s reacted with reagents in List I to form products in List II products in List II.

List I (Reagent) List II (Product)

A.  I. 

B. $HBF_{4,\Delta}$ II. 

C. Cu, HCl III. 

D. CuCN/KCN IV. 

Choose the correct answer from the options given below:

(1) A-IV, B-III, C-II, D-I (2) A-III, B-I, C-II, D-IV
(3) A-I, B-III, C-IV, D-II (4) A-III, B-I, C-IV, D-II

Q59. Match List I with List II :

List I		List II	
A.	Saccharin	I.	High potency sweetener
B.	Aspartame	II.	First artificial sweetening agent
C	Alitame	III.	Stable at cooking temperature
D.	Sucralose	IV.	Unstable at cooking temperature

Choose the correct answer from the options given below :

(1) A-IV, B-III, C-I, D-II (2) A-II, B-III, C-IV, D-I
(3) A-II, B-IV, C-III, D-I (4) A-II, B-IV, C-I, D-III

Q60. Sulphur (S) containing amino acids from the following are:
(a) isoleucine
(b) cysteine
(c) lysine
(d) methionine
(e) glutamic acid
(1) b, c, e (2) a, b, c
(3) b, d (4) a, d

Q61. Let $\alpha,\ \beta,\ \gamma$ be the three roots of the equation $x^3+bx+c=0$ if $\beta\gamma=1=-\alpha$ then $b^3+2c^3-3\alpha^3-6\beta^3-8\gamma^3$ is equal to
(1) $\frac{155}{8}$ (2) 21
(3) $\frac{169}{8}$ (4) 19

Q62. If for $z=\alpha+i\beta,\ |z+2|=z+4(1+i)$, then $\alpha+\beta$ and $\alpha\beta$ are the roots of the equation
(1) $x^2+3x-4=0$ (2) $x^2+7x+12=0$
(3) $x^2+x-12=0$ (4) $x^2+2x-3=0$

Q63. The number of arrangements of the letters of the word "INDEPENDENCE" in which all the vowels always occur together is
(1) 16800 (2) 33600
(3) 18000 (4) 14800

Q64. The number of ways, in which 5 girls and 7 boys can be seated at a round table so that no two girls sit together is
(1) 720 (2) $126(5!)^2$
(3) $7(360)^2$ (4) $7(720)^2$

Q65. The largest natural number n such that $3n$ divides 66! is _____

Q66. Let $S_K=\frac{1+2+\ldots+K}{K}$ and $\sum_{j=1}^{n}{S^2}_j=\frac{n}{A}\left(Bn^2+Cn+D\right)$ where $A,\ B,\ C,\ D\in N$ and A Has least value then
(1) $A+C+D$ is not divisible by D (2) $A+B=5(D-C)$
(3) $A+B+C+D$ is divisible by 5 (4) $A+B$ is divisible by D

Q67. if the coefficients of three consecutive terms in the expansion of $(1+x)^n$ are the ratio $1\ :\ 5\ :20$ then the coefficient of the fourth term is
(1) 2436 (2) 5481
(3) 1827 (4) 3654

Q68. Let $[t]$ denote the greatest integer $\leq t$. if the constant term in the expansion of $\left(3x^2-\frac{1}{2x^5}\right)^7$ is α then $[\alpha]$ is equal to _____

Q69. Let $C(\alpha,\ \beta)$ be the circumcentre of the triangle formed by the lines $4x+3y=69$, $4y-3x=17$, and $x+7y=61$. Then $(\alpha-\beta)^2+\alpha+\beta$ is equal to

(1) 18 (2) 17

(3) 15 (4) 16

Q70. Consider a circle $C_1\ :\ x^2+y^2-4x-2y\ =\ \alpha-5$. Let its mirror image in the line $y=2x+1$ be another circle $C_2: 5x^2+5y^2-10fx-10gy+\ 36\ =\ 0$. Let r be the radius of C_2. Then $\alpha+\ r$ is equal to _____

Q71. Let R be the focus of the parabola $y^2=20x$ and the line $y=mx+c$ intersect the parabola at two points P and Q. Let the points $G(10,\ 10)$ be the centroid of the triangle PQR. If $c-m=6$, then PQ^2 is

(1) 296 (2) 325

(3) 317 (4) 346

Q72. $\lim\limits_{x\to0}\left(\left(\frac{1-\cos^2(3x)}{\cos^3(4x)}\right)\left(\frac{\sin^3(4x)}{(\log_e(2x+1))^5}\right)\right)$ is equal to

(1) 15 (2) 9

(3) 18 (4) 24

Q73. Negation of $(p\to q)\to(q\to p)$ is

(1) $(p\sim)\vee p$ (2) $q\wedge(\sim p)$

(3) $(\sim q)\wedge p$ (4) $p\vee(\sim q)$

Q74. Let the mean and variance of 8 numbers $x,\ y,\ 10,\ 12,\ 6, 12,\ 4,\ 8$ be 9 and 9.25 respectively. If $x>y$, then $3x-2y$ is equal to _____

Q75. Let the number of elements in sets A and B be five and two respectively. Then the number of subsets of $A\times B$ each having at least 3 and at most 6 elements is

(1) 752 (2) 782

(3) 792 (4) 772

Q76. Let $A=\{0,3,4,6,7,8,9,10\}$ and R be the relation defined on A such that $R\{(x,y)\in A\times A: x-y$ is odd positive integer or $x-y=2\}$. The minimum number of elements that must be added to the relation R, so that it is a symmetric relation, is equal to _____

Q77. Let $\begin{bmatrix}2&1&0\\1&2&-1\\0&-1&2\end{bmatrix}$. If $|adj(adj(adj2A))|=(16)^n$, then n is equal to

(1) 8 (2) 10

(3) 9 (4) 12

Q78. Let $P=\begin{bmatrix}\frac{\sqrt3}{2}&\frac12\\-\frac12&\frac{\sqrt3}{2}\end{bmatrix}$, $A=\begin{bmatrix}1&1\\0&1\end{bmatrix}$ and $Q=PAP^T$. If $P^TQ^{2007}\ P=\begin{bmatrix}a&b\\c&d\end{bmatrix}$ then $2a+b-3c-4d$ is equal to

(1) 2004 (2) 2005

(3) 2007 (4) 2006

Q79. Let $f(x)=\frac{\sin x+\cos-\sqrt2}{\sin\ x-\cos\ x}, x\in[0,\ \pi]-\left\{\frac{\pi}{4}\right\}$, then $f\left(\frac{7\pi}{12}\right)f''\left(\frac{7\pi}{12}\right)$ is equal to

(1) $\frac{2}{9}$ (2) $\frac{-2}{3}$
(3) $\frac{-1}{3\sqrt{3}}$ (4) $\frac{2}{3\sqrt{3}}$

Q80. If a_α is the greatest term in the sequence $a_n = \frac{n^3}{n^4+147},\ n = 1,\ 2,\ 3\ldots$, then α is equal to _____

Q81. Let $I(x) = \int \frac{x+1}{x(1+xe^x)^2}dx,\ x > 0$. If $\lim\limits_{x\to\infty} I(x) = 0$ then $I(1)$ is equal to
(1) $\frac{e+2}{e+1} - \log_e(e+1)$ (2) $\frac{e+1}{e+2} + \log_e(e+1)$
(3) $\frac{e+1}{e+2} - \log_e(e+1)$ (4) $\frac{e+2}{e+1} + \log_e(e+1)$

Q82. Let $[t]$ denote the greatest integer $\le t$. Then $\frac{2}{\pi}\int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} (8[\operatorname{cosec} x] - 5[\cot x])dx$ is equal to _____

Q83. The area of the region $\left\{(x,y):\ x^2 \le y \le 8-x^2, y \le 7\right\}$ is
(1) 27 (2) 18
(3) 20 (4) 21

Q84. If the solution curve of the differential equation $\left(y - 2\log_e x\right)dx + \left(x\log_e x^2\right)dy = 0,\ x > 1$ passes through the points $\left(e,\ \frac{4}{3}\right)$ and $\left(e^4,\ \alpha\right)$, then α is equal to _____

Q85. If the points with position vectors $\alpha\hat{\mathrm{i}} + 10\hat{\mathrm{j}} + 13\widehat{\mathrm{k}},\ 6\hat{\mathrm{i}} + 11\hat{\mathrm{j}} + 11\widehat{\mathrm{k}},\ \frac{9}{2}\hat{\mathrm{i}} + \beta\hat{\mathrm{j}} - 8\widehat{\mathrm{k}}$ are collinear, then $(19\alpha - 6\beta)^2$ is equal to
(1) 36 (2) 25
(3) 49 (4) 16

Q86. Let $\vec{a} = 6\hat{i} + 9\hat{j} + 12\widehat{k},\ \vec{b} = \alpha\hat{i} + 11\hat{j} - 2\widehat{k}$ and $\vec{c}$ be vectors such that $\vec{a}\times\vec{c} = \vec{a}\times\vec{b}$ If $\vec{a}\cdot\vec{c} = -12$, and $\vec{c}\cdot\left(\hat{i} - 2\hat{j} + \widehat{k}\right) = 5$ then $\vec{c}\cdot\left(\hat{i} + \hat{j} + \widehat{k}\right)$ is equal to _____

Q87. The shortest distance between the lines $\frac{x-4}{4} = \frac{y+2}{5} = \frac{z+3}{3}$ and $\frac{x-1}{3} = \frac{y-3}{4} = \frac{z-4}{2}$ is
(1) $6\sqrt{3}$ (2) $2\sqrt{6}$
(3) $6\sqrt{2}$ (4) $3\sqrt{6}$

Q88. If the equation of the plane containing the line $x + 2y + 3z - 4 = 0 = 2x + y - z + 5$ and perpendicular to the plane $\vec{r} = \left(\hat{i} - \hat{j}\right) + \lambda\left(\hat{i} + \hat{j} + \widehat{k}\right) + \mu\left(\hat{i} - 2\hat{j} + 3\widehat{k}\right)$ is $ax + by + cz = 4$ then $(a - b + c)$ is equal to
(1) 18 (2) 22
(3) 20 (4) 24

Q89. Let $\lambda_1,\ \lambda_2$ be the values of λ for which the points $\left(\frac{5}{2}, 1,\ \lambda\right)$ and $(-2,\ 0,\ 1)$ are at equal distance from the plane $2x + 3y - 6z + 7$ If $\lambda_1 > \lambda_2$
then the distance of the point $(\lambda_1 - \lambda_2, \lambda_2, \lambda_1)$ from the line $\frac{x-5}{1} = \frac{y-1}{2} = \frac{z+7}{2}$ is _____

Q90. In a bolt factory, machines A, B and C manufacture respectively $20\%,\ 30\%$ and 50% of the total bolts. Of their output $3,\ 4$ and 2 percent are respectively defective bolts. A bolt is drawn at random from the product. If the bolt drawn is found the defective then the probability that it is manufactured by the machine C is
(1) $\frac{5}{14}$ (2) $\frac{9}{28}$
(3) $\frac{3}{7}$ (4) $\frac{2}{7}$

ANSWER KEYS

1. (4)	**2.** (2)	**3.** (3)	**4.** (1)	**5.** (1)	**6.** (4)	**7.** (1)	**8.** (3)
9. (4)	**10.** (4)	**11.** (1)	**12.** (1)	**13.** (2)	**14.** (2)	**15.** (2)	**16.** (3)
17. (1)	**18.** (2)	**19.** (1)	**20.** (2)	**21.** (125)	**22.** (1)	**23.** (10)	**24.** (900)
25. (18)	**26.** (25)	**27.** (2)	**28.** (9)	**29.** (18)	**30.** (121)	**31.** (3)	**32.** (2)
33. (3)	**34.** (4)	**35.** (2)	**36.** (4)	**37.** (1)	**38.** (4)	**39.** (4)	**40.** (1)
41. (2)	**42.** (3)	**43.** (3)	**44.** (3)	**45.** (3)	**46.** (2)	**47.** (2)	**48.** (4)
49. (4)	**50.** (3)	**51.** (11)	**52.** (1)	**53.** (3)	**54.** (3)	**55.** (1200)	**56.** (2)
57. (70)	**58.** (82)	**59.** (2)	**60.** (11)	**61.** (4)	**62.** (2)	**63.** (1)	**64.** (2)
65. (4)	**66.** (4)	**67.** (2)	**68.** (2)	**69.** (3)	**70.** (2)	**71.** (3)	**72.** (2)
73. (2)	**74.** (1)	**75.** (1)	**76.** (3)	**77.** (1)	**78.** (4)	**79.** (2)	**80.** (1)
81. (31)	**82.** (1275)	**83.** (2)	**84.** (25)	**85.** (19)	**86.** (5)	**87.** (14)	**88.** (3)
89. (11)	**90.** (9)						