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08-April-2023 (Morning Batch) : JEE Main Paper

MATHEMATICS **Section - A (Single Correct Answer)**

1. 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

(A) $\frac{e+1}{e+2}-\log_e(e+1)$ (B) $\frac{e+1}{e+2}+\log_e(e+1)$

(C) $\frac{e+2}{e+1}+\log_e(e+1)$ (D) $\frac{e+2}{e+1}-\log_e(e+1)$

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

(A) 20 (B) 24 (C) 22 (D) 18

3. 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 point G(10, 10) be the centroid of the triangle PQR. If c-m = 6, then $(PQ)^2$ is

(A) 325 (B) 317 (C) 296 (D) 346

4. Let C(α, β) be the circumcenter 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

(A) 18 (B) 17 (C) 16 (D) 15

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

(A) 2007 (B) 2005 (C) 2006 (D) 2004

6. Let α, β, γ 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

(A) 21 (B) $\frac{169}{8}$ (C) 19 (D) $\frac{155}{8}$

7. 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

(A) $126(5!)^2$ (B) $7(360)^2$ (C) 720 (D) $7(720)^2$

8. 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 to be defective, then the probability that it is manufactured by the machine C is

(A) $\frac{2}{7}$ (B) $\frac{9}{28}$ (C) $\frac{5}{14}$ (D) $\frac{3}{7}$

9. The number of arrangements of the letter of the word "INDEPENDENCE" in which all the vowels always occur together is

(A) 16800 (B) 14800 (C) 18000 (D) 33600

10. Let $f(x)=\frac{\sin x+\cos x-\sqrt{2}}{\sin x-\cos x}$, $x\in[0,\ \pi]-\left\{\frac{\pi}{4}\right\}$. Then $f\left(\frac{7\pi}{12}\right)f''\left(\frac{7\pi}{12}\right)$ is equal to

(A) $\frac{-2}{3}$ (B) $\frac{2}{9}$ (C) $-\frac{1}{3\sqrt{3}}$ (D) $\frac{-2}{3\sqrt{3}}$

11. If the points with vectors $\alpha\hat{i}+10\hat{j}+13\hat{k}$, $6\hat{i}+11\hat{j}+11\hat{k}$, $\frac{9}{2}\hat{i}+\beta\hat{j}-8\hat{k}$ are collinear, then $(19\alpha - 6\beta)^2$ is equal to

(A) 36 (B) 16 (C) 25 (D) 49

12. If the coefficients of the three consecutive terms in the expansion of $(1 + x)^n$ are in the ratio 1 : 5 : 20, then the coefficient of the fourth term is

(A) 3654 (B) 1827 (C) 5481 (D) 2436

13. Let $S_k=\frac{1+2+....+K}{K}$ and $\sum_{j=1}^{n}S_j^2=\frac{n}{A}(Bn^2+Cn+D)$, where A, B, C, $D\in N$ and A has least value. Then

(A) A + B is divisible by D (B) A + B = 5 (D-C)

(C) A + C + D is not divisible by B (D) A + B + C + D is divisible by 5

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

(A) 10 (B) 9 (C) 12 (D) 8

15. Negation of $(p\Rightarrow q)\Rightarrow(q\Rightarrow p)$ is

(A) $(\sim p)\vee q$ (B) $(\sim q)\wedge p$ (C) $q\wedge(\sim p)$ (D) $p\vee(\sim q)$

16. 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

(A) $3\sqrt{6}$ (B) $6\sqrt{3}$ (C) $6\sqrt{2}$ (D) $2\sqrt{6}$

17. The area of the region $\{(x, y): x^2\le y\le 8-x^2,\ y\le 7\}$ is

(A) 21 (B) 18 (C) 24 (D) 20

18. Let the number of elements in sets A and B be five and two respectively. Then the number of subsets of A × B each having at least 3 and at most 6 elements is :

(A) 792 (B) 752 (C) 782 (D) 772

19. $\lim_{x\to 0}\left(\left(\frac{1-\cos^2(3x)}{\cos^3(4x)}\right)\left(\frac{\sin^3(4x)}{(\log_e(2x+1))^5}\right)\right)$ is equal to ____

(A) 9 (B) 18 (C) 15 (D) 24

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

SECTION - B

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

22. Let [t] denotes the greatest integer $\le t$. If the constant term in the expansionof $\left(3x^2 - \frac{1}{2x^5}\right)^7$ is α, then $[\alpha]$ is equal to _____

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

24. The largest natural number 'n' such that 3^n divides 66! is _____

25. If a_n is the greatest term in the sequence $a_n = \frac{n^3}{n^4 + 147}$, $n = 1, 2, 3.....$, then 'n' is equal to ____

26. 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 × 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_____

27. 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 α + r is equal to ___

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

29. Let λ_1, λ_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 = 0. 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 _____

30. 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 _____

PHYSICS Section - A (Single Correct Answer)

31. 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
(A) helical path with the axis perpendicular to the direction of magnetic field B
(B) straight along the direction of magnetic field B
(C) helical path with the axis along magnetic field B
(D) circular path

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

(A) 3 : 2 (B) 2 : 3 (C) 1 : 1 (D) 4 : 9

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

(A) to oscillate the coil in magnetic field for longer period of time

(B) to bring the coil to rest quickly

(C) to produce large deflecting torque on the coil

(D) to make the magnetic field radial

34. 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:

(A) 1240 km^2 (B) 3942 km^2 (C) 4868 km^2 (D) 1549 km^2

35. In a reflecting telescope, a secondary mirror is used to:

(A) reduce the problem of mechanical support (B) remove spherical aberration

(C) make chromatic aberration zero (D) move the eyepiece outside the telescopic tube

36. 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

(A) Statement I is true but Statement II is false (B) Both Statement I and Statement II are true

(C) Both Statement I and Statement II are false (D) Statement I is false but Statement II is true

37. 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:

(A) Zero (B) 300 N (C) 100 N (D) 200 N

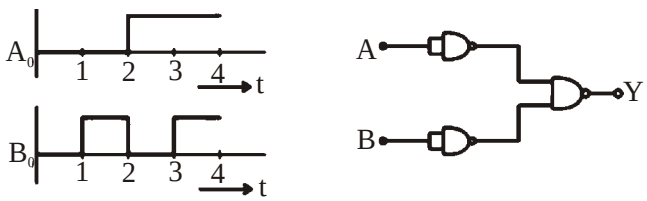
38. An aluminium rod with Young's modulus $Y = 7.0 \times 10^{10}\ N/m^2$ undergoes elastic strain of 0.04%. The energy per unit volume stored in the rod in SI unit is:

(A) 5600 (B) 8400 (C) 2800 (D) 11200

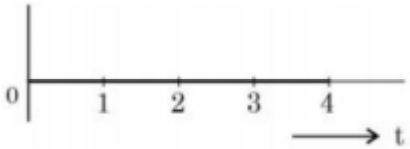
39. At any instant the velocity of a particle of mass 500 g is $\left(2t\hat{i}+3t^2\hat{j}\right)\ ms^{-1}$. If the force acting on the particle at t = 1s is $\left(\hat{i}+x\hat{j}\right)N$. Then the value of x will be:

(A) 3 (B) 4 (C) 6 (D) 2

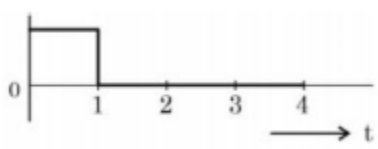
40. For the logic circuit shown, the output waveform at Y is:



(A)



(B)



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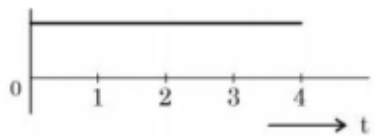
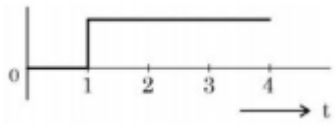
(C) 

(D) 

41. For a nucleus ${}^{A}_{Z}X$ having mass number A and atomic number Z

A. The surface energy per nucleon (b_s) = $a_1 A^{2/3}$

B. The Coulomb contribution to the binding energy $b_c = -a_2 \frac{Z(Z-1)}{A^{4/3}}$

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:

(A) C, D only (B) B, C, E only

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

42. 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 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

(A) Both Statement I and Statement II are correct

(B) Both Statement I and Statement II are incorrect

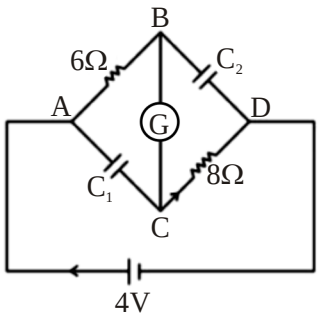
(C) Statement I is incorrect but Statement II is correct

(D) Statement I is correct but Statement II is incorrect

43. Dimension of $\frac{1}{\mu_0 \in_0}$ should be equal to

(A) T^2/L^2 (B) L/T (C) L^2/T^2 (D) T/L

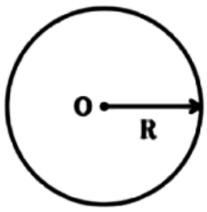
44. In this figure the resistance of the coil of galvanometer G is 2 Ω. The emf of the cell is 4 V. The ratio of potential difference across C_1 and C_2 is:

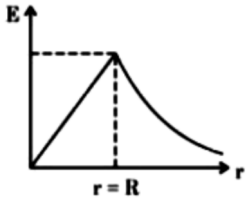


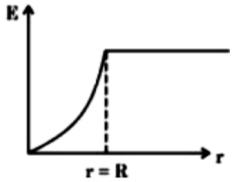
(A) 1 (B) 4/5

(C) 3/4 (D) 5/4

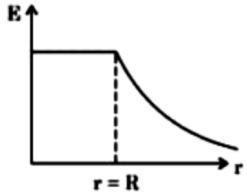
45. Graphical variation of electric field due to a uniformly charged insulating solid sphere of radius R, with distance r from the centre O is represented by:



(A) 

(B) 

(C) 

(D) 

46. Two forces having magnitude A and A/2 are perpendicular to each other. The magnitude of their resultant is

(A) $\frac{\sqrt{5}A}{4}$ (B) $\frac{5A}{2}$ (C) $\frac{\sqrt{5}A^2}{2}$ (D) $\frac{\sqrt{5}A}{2}$

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

(A) 200Hz (B) 400Hz (C) 412 Hz (D) 388 Hz

48. An air bubble of volume 1 cm^3 rises from the bottom of a lake 40m 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

(A) 5 cm^3 (B) 2 cm^3 (C) 4 cm^3 (D) 3 cm^3

49. 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

(A) 1% (B) 3.5 % (C) 4% (D) 5%

50. Proton (P) and electron (e) will have same de-Broglie wavelength when the ratio of their momentum is (assume, $m_p = 1849m_e$)

(A) 1 : 43 (B) 43 : 1 (C) 1 : 1849 (D) 1 : 1

SECTION - B

51. An electric dipole of dipole moment is 6.0×10^{-6} Cm placed in a uniform electric field of 1.5×10^3 NC^{-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

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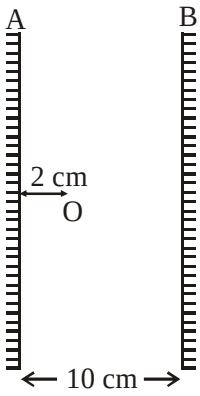
52. Two vertical parallel mirrors A and B are separated by 10 cm. A point object O is placed at a distance of 2 cm from mirror A. The distance of the second nearest image behind mirror A from the mirror A is ____cm.



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

54. The moment of inertia of 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 semicircular ring. The value of x will be

55. An organ pipe 40cm long is open at both ends. The speed of sound in air is 360 ms^{-1}. The frequency of the second harmonic is ____Hz.

56. 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. The co-efficient of viscosity of the solution (neglect density of air) is ____Pas (given, g = 10 ms^{-2})

57. 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.

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

59. A current of 2 A flows through a wire of crosssectional area 25.0 2 mm . 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 = 1.6×10^{-19} C)

60. A nucleus with mass number 242 and binding energy per nucleon as 7.6 MeV breaks into 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.

CHEMISTRY Section - A (Single Correct Answer)

61. $2IO_3^- + xI^- + 12H^+ \rightarrow 6I_2 + 6H_2O$

What is the value of 'x' ?

(A) 12 (B) 2 (C) 6 (D) 10

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

(A) Cu (B) Sn

(C) Pb (D) Au

63. Match List I with List II.

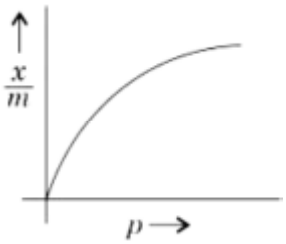
A.	Saccharin	I.	High potency sweetener
B.	Aspartame	II.	First artificial sweetening agent
C.	Alitame	III.	Stable at cooking temperature
D.	Sucralose	IV.	Unstable at cooking temperature

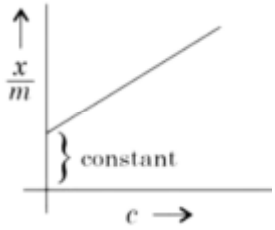
Choose the **correct** answer from the options given below :

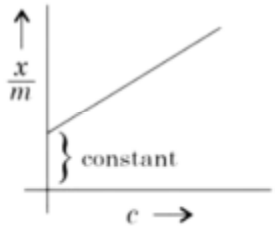
(A) A-II, B-III, C-IV, D-I (B) A-II, B-IV, C-III, D-I

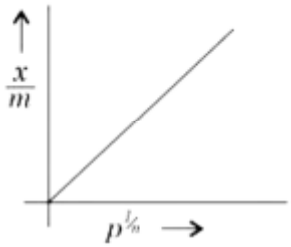
(C) A-IV, B-III, C-I, D-II (D) A-II, B-IV, C-I, D-III

64. Which of the following represent the Freundlich adsorption isotherms ?

(A) 

(B) 

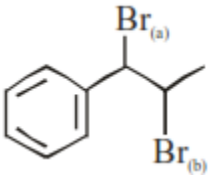
(C) 

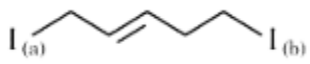
(D) 

Choose the correct answer from the options given below :

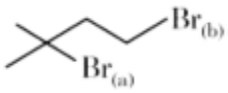
(A) B, C, D only (B) A, B, D only (C) A, B only (D) A, C, D only

65. Choose the halogen which is most reactive towards S_N1 reaction in the given compounds (A, B, C & D).

A. 

B. 

C. 

D. 

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

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

66. Sulphur (S) containing amino acids from the following are :

(a) isoleucine **(b)** cysteine **(c)** lysine **(d)** methionine

(e) glutamic acid

(A) a, d (B) b, d (C) b, c, e (D) a, b, c

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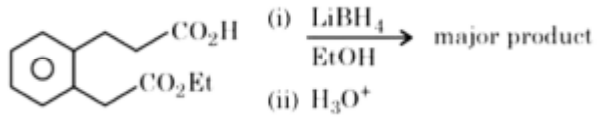
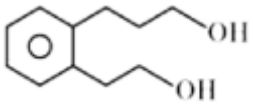
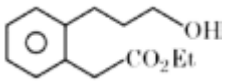
67. The water gas on reacting with cobalt as a catalyst forms.

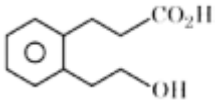
(A) Ethanol (B) Methanoic acid (C) Methanal (D) Methanol

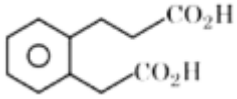
68. The major product formed in the following reaction is :



(A) 

(B) 

(C) 

(D) 

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

(A) $Na_3[CoCl_6]$ (B) $[Ni(NH_3)_6]Cl_2$ (C) $K_3[Co(CN)_6]$ (D) $[Co(H_2O)_6]Cl_2$

70. The reaction,

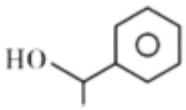
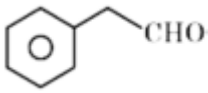
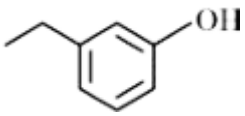
$$\frac{1}{2}H_2(g) + AgCl(s) \rightleftharpoons H^+(aq) + Cl^-(aq) + Ag(s)$$

occurs in which of the given galvanic cell.

(A) $Pt\,|\,H_2(g)\,|\,KCl(sol^n)\,|\,AgCl(s)\,|\,Ag$ (B) $Pt\,|\,H_2(g)\,|\,HCl(sol^n)\,|\,AgCl(s)\,|\,Ag$

(C) $Ag\,|\,AgCl(s)\,|\,KCl(sol^n)\,|\,AgCl(s)\,|\,Ag$ (D) $Pt\,|\,H_2(g)\,|\,HCl(sol^n)\,|\,AgNO_3(sol^n)\,|\,Ag$

71. 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 hypochlorite	IV.	

Choose the **correct** answer from the options given below –

(A) A-II, B-IV, C-III, D-I (B) A-IV, B-I, C-II, D-III

(C) A-III, B-IV, C-I, D-II (D) A-III, B-IV, C-II, D-I

72. 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:

(A) Both A and R are true and R is the correct explanation of A

(B) A is true but R is false

(C) Both A and R are true but R is not the correct explanation of A

(D) A is false but R is true

73. 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]

(A) Ti (III) (B) Fe (III) (C) V (IV) (D) Mn (VII)

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

(A) To facilitate the hydration of cement

(B) To speed up the process of setting

(C) To slow down the process of setting

(D) To give a hard mass

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

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

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

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

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

76. Which halogen is known to cause the reaction given below :

$2Cu^{2+} + 4X^- \rightarrow Cu_2X_2(s) + X_2$

(A) Only Iodine (B) Only Bromine

(C) All halogens (D) Only Chlorine

77. Match List-I with List-II :

	List-I (Species)		**List-II (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

(A) A-II, B-I, C-III, D-IV

(B) A-IV, B-III, C-II, D-I

(C) A-I, B-II, C-III, D-IV

(D) A-III, B-II, C-I, D-IV

78. The **correct** order of electronegativity for given elements is :

(A) C > P > At > Br

(B) Br > P > At > C

(C) P > Br > C > At

(D) Br > C > At > P

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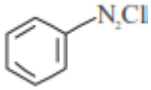
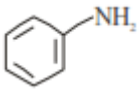
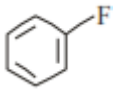
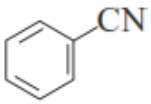
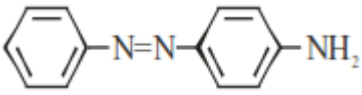
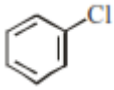
79. Match List I with List II :


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

List-I (Reagent)	List-II (Product)
A. 	I. 
B. HBF_4, Δ	II. 
C. Cu, HCl	III. 
D. CuCN/KCN	IV. 

Choose the correct answer from the options given below :

(A) A-IV, B-III, C-II, D-I

(B) A-I, B-III, C-IV, D-II

(C) A-III, B-I, C-II, D-IV

(D) A-III, B-I, C-IV, D-II

80. 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 options given below.

(A) Statement I is incorrect but Statement II is correct

(B) Statement I is correct but Statement II is incorrect

(C) Both Statement I and Statement II are correct

(D) Both Statement I and Statement II are incorrect

SECTION - B

81. 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})

82. 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

83. 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 _____ J K^{-1}.

(Nearest integer)

84. The number of given statement/s which is/are correct is _____.

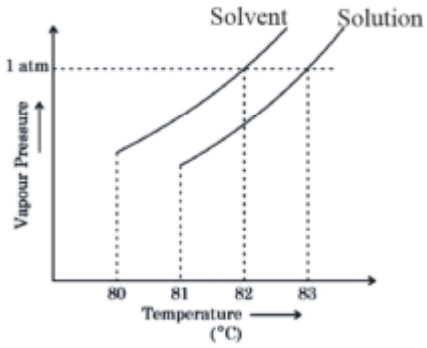
(A) The stronger the temperature dependence of the rate constant, the higher is the activation energy.

(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.

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



The boiling point of the solvent is _____°C.

86. XeF_4 reacts with SbF_5 to form

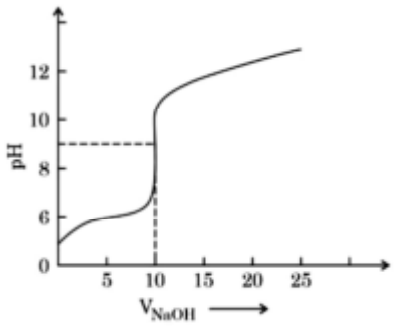
$[XeF_m]^{n+}$ $[SbF_y]^{z-}$

m + n + y + z = _____.

87. 0.5 g of an organic compound (X) with 60% carbon will produce _____ × 10^{-1} g of CO_2 on complete combustion.

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

Given : log 2 = 0.3



The number of following statements 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.

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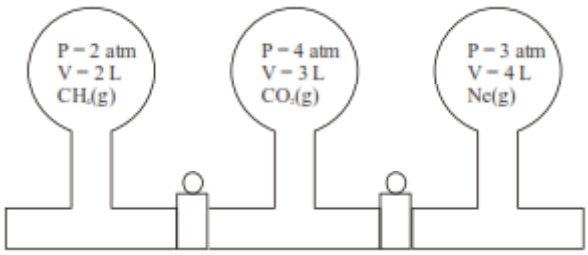
89.



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)

90. 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.

❐ ❐ ❐

08-April-2023 (Morning Batch) : JEE Main Paper

ANSWER KEY

Mathematics

Single Choice Correct

1.	D	2.	C	3.	A	4.	B	5.	B
6.	C	7.	A	8.	C	9.	A	10.	B
11.	A	12.	A	13.	A	14.	A	15.	C
16.	A	17.	D	18.	A	19.	B	20.	A

Numerical Value

21.	14	22.	1275	23.	11	24.	31	25.	5
26.	19	27.	2	28.	3	29.	9	30.	25

Physics

Single Choice Correct

31.	C	32.	D	33.	B	34.	B	35.	D
36.	D	37.	D	38.	A	39.	A	40.	D
41.	A	42.	B	43.	C	44.	B	45.	A
46.	D	47.	B	48.	A	49.	C	50.	D

Numerical Value

51.	18	52.	18	53.	125	54.	1	55.	900
56.	10	57.	9	58.	2	59.	25	60.	121

Chemistry

Single Choice Correct

61.	D	62.	B	63.	D	64.	B	65.	B
66.	B	67.	D	68.	C	69.	C	70.	B
71.	D	72.	A	73.	D	74.	C	75.	B
76.	A	77.	D	78.	D	79.	D	80.	C

Numerical Value

81.	70	82.	3	83.	1200	84.	2	85.	82
86.	11	87.	11	88.	2	89.	3	90.	1