PART B – CHEMISTRY

31. 2 - Hexyne gives trans - 2 - Hexene on treatment with :

(1) Li/NH_3

(2) $Pd/BaSO_4$

(3) $Li\,AlH_4$

(4) Pt/H_2

32. Which of the following on thermal-decomposition yields a basic as well as an acidic oxide ?

(1) $KClO_3$

(2) $CaCO_3$

(3) NH_4NO_3

(4) $NaNO_3$

33. Which one of the following statements is **correct** ?

(1) All amino acids are optically active.

(2) All amino acids except glycine are optically active.

(3) All amino acids except glutamic acid are optically active.

(4) All amino acids except lysine are optically active.

34. The density of a solution prepared by dissolving 120 g of urea (mol. mass = 60 u) in 1000 g of water is 1.15 g/mL. The molarity of this solution is :

(1) 1.78 M

(2) 1.02 M

(3) 2.05 M

(4) 0.50 M

35. The **incorrect** expression among the following is :

(1) In isothermal process,

$$w_{reversible} = -nRT \ln \frac{V_f}{V_i}$$

(2) $\ln K = \frac{\Delta H^\circ - T\Delta S^\circ}{RT}$

(3) $K = e^{-\Delta G^\circ/RT}$

(4) $\frac{\Delta G_{system}}{\Delta S_{total}} = -T$

36. Which branched chain isomer of the hydrocarbon with molecular mass 72u gives only one isomer of mono substituted alkyl halide ?

(1) Neopentane

(2) Isohexane

(3) Neohexane

(4) Tertiary butyl chloride

37. According to Freundlich adsorption isotherm, which of the following is **correct** ?

(1) $\frac{x}{m} \propto p^1$

(2) $\frac{x}{m} \propto p^{1/n}$

(3) $\frac{x}{m} \propto p^0$

(4) All the above are correct for different ranges of pressure.

SPACE FOR ROUGH WORK

38. In which of the following pairs the two species are **not** isostructural ?

(1) PCl_4^+ and $SiCl_4$

(2) PF_5 and BrF_5

(3) AlF_6^{3-} and SF_6

(4) CO_3^{2-} and NO_3^-

39. How many chiral compounds are possible on monochlorination of 2 – methyl butane ?

(1) 2

(2) 4

(3) 6

(4) 8

40. The increasing order of the ionic radii of the given isoelectronic species is :

(1) $S^{2-}, Cl^-, Ca^{2+}, K^+$

(2) $Ca^{2+}, K^+, Cl^-, S^{2-}$

(3) $K^+, S^{2-}, Ca^{2+}, Cl^-$

(4) $Cl^-, Ca^{2+}, K^+, S^{2-}$

41. The compressibility factor for a real gas at high pressure is :

(1) 1

(2) $1 + pb/RT$

(3) $1 - pb/RT$

(4) $1 + RT/pb$

42. Which among the following will be named as dibromidobis(ethylene diamine) chromium (III) bromide ?

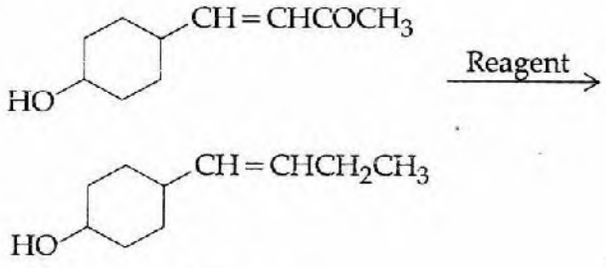
(1) $[Cr\ (en)_2\ Br_2]\ Br$

(2) $[Cr\ (en)\ Br_4]^-$

(3) $[Cr\ (en)\ Br_2]\ Br$

(4) $[Cr\ (en)_3]\ Br_3$

43. In the given transformation, which of the following is the most appropriate reagent ?



(1) Zn - Hg/HCl

(2) Na, Liq. NH_3

(3) $NaBH_4$

(4) $NH_2\ NH_2, \overset{\ominus}{O}H$

44. Lithium forms body centred cubic structure. The length of the side of its unit cell is 351 pm. Atomic radius of the lithium will be :

(1) 300 pm

(2) 240 pm

(3) 152 pm

(4) 75 pm

45. K_f for water is 1.86 K kg mol^{-1}. If your automobile radiator holds 1.0 kg of water, how many grams of ethylene glycol ($C_2H_6O_2$) must you add to get the freezing point of the solution lowered to $-2.8°C$?

(1) 93 g

(2) 39 g

(3) 27 g

(4) 72 g

SPACE FOR ROUGH WORK

46. The molecule having smallest bond angle is :

(1) $AsCl_3$

(2) $SbCl_3$

(3) PCl_3

(4) NCl_3

47. What is DDT among the following :

(1) A fertilizer

(2) Biodegradable pollutant

(3) Non - biodegradable pollutant

(4) Greenhouse gas

48. The pH of a 0.1 molar solution of the acid HQ is 3. The value of the ionization constant, Ka of this acid is :

(1) 1×10^{-3}

(2) 1×10^{-5}

(3) 1×10^{-7}

(4) 3×10^{-1}

49. Very pure hydrogen (99.9%) can be made by which of the following processes ?

(1) Mixing natural hydrocarbons of high molecular weight

(2) Electrolysis of water

(3) Reaction of salt like hydrides with water

(4) Reaction of methane with steam

50. Aspirin is known as :

(1) Phenyl salicylate

(2) Acetyl salicylate

(3) Methyl salicylic acid

(4) Acetyl salicylic acid

51. Which of the following compounds can be detected by Molisch's test ?

(1) Sugars

(2) Amines

(3) Primary alcohols

(4) Nitro compounds

52. The standard reduction potentials for Zn^{2+}/Zn, Ni^{2+}/Ni, and Fe^{2+}/Fe are -0.76, -0.23 and -0.44 V respectively. The reaction $X + Y^{2+} \rightarrow X^{2+} + Y$ will be spontaneous when :

(1) X = Ni, Y = Zn

(2) X = Fe, Y = Zn

(3) X = Zn, Y = Ni

(4) X = Ni, Y = Fe

53. Ortho - Nitrophenol is less soluble in water than p - and m - Nitrophenols because :

(1) o - Nitrophenol shows Intramolecular H - bonding

(2) o - Nitrophenol shows Intermolecular H - bonding

(3) Melting point of o - Nitrophenol is lower than those of m - and p - isomers.

(4) o - Nitrophenol is more volatile in steam than those of m - and p - isomers.

54. Iodoform can be prepared from all except :

(1) Isopropyl alcohol

(2) 3 - Methyl - 2 - butanone

(3) Isobutyl alcohol

(4) Ethyl methyl ketone

SPACE FOR ROUGH WORK

55. The species which can best serve as an initiator for the cationic polymerization is :

(1) HNO_3

(2) $AlCl_3$

(3) BuLi

(4) $LiAlH_4$

56. The equilibrium constant (K_c) for the reaction $N_2(g) + O_2(g) \rightarrow 2NO(g)$ at temperature T is 4×10^{-4}. The value of K_c for the reaction, $NO(g) \rightarrow \frac{1}{2} N_2(g) + \frac{1}{2} O_2(g)$ at the same temperature is :

(1) 2.5×10^{2}

(2) 4×10^{-4}

(3) 50.0

(4) 0.02

57. For a first order reaction, (A)→products, the concentration of A changes from 0.1 M to 0.025 M in 40 minutes. The rate of reaction when the concentration of A is 0.01M, is :

(1) 3.47×10^{-4} M/min

(2) 3.47×10^{-5} M/min

(3) 1.73×10^{-4} M/min

(4) 1.73×10^{-5} M/min

58. Which method of purification is represented by the following equation :

$$Ti(s) + 2I_2(g) \xrightarrow{523\ K} TiI_4(g) \xrightarrow{1700\ K} Ti(s) + 2I_2(g)$$

(1) Cupellation

(2) Poling

(3) Van Arkel

(4) Zone refining

59. Iron exhibits +2 and +3 oxidation states. Which of the following statements about iron is **incorrect** ?

(1) Ferrous compounds are relatively more ionic than the corresponding ferric compounds.

(2) Ferrous compounds are less volatile than the corresponding ferric compounds.

(3) Ferrous compounds are more easily hydrolysed than the corresponding ferric compounds.

(4) Ferrous oxide is more basic in nature than the ferric oxide.

60. The electrons identified by quantum numbers n and l :

(a) n = 4, l = 1

(b) n = 4, l = 0

(c) n = 3, l = 2

(d) n = 3, l = 1

can be placed in order of increasing energy as :

(1) (d) < (b) < (c) < (a)

(2) (b) < (d) < (a) < (c)

(3) (a) < (c) < (b) < (d)

(4) (c) < (d) < (b) < (a)

SPACE FOR ROUGH WORK

PART C – MATHEMATICS

61. Let $X=\{1, 2, 3, 4, 5\}$. The number of different ordered pairs (Y, Z) that can be formed such that $Y \subseteq X$, $Z \subseteq X$ and $Y \cap Z$ is empty, is :

(1) 3^5

(2) 2^5

(3) 5^3

(4) 5^2

62. The population p(t) at time t of a certain mouse species satisfies the differential equation $\frac{dp(t)}{dt} = 0.5\,p(t) - 450$. If $p(0)=850$, then the time at which the population becomes zero is :

(1) ln 9

(2) $\frac{1}{2}$ ln 18

(3) ln 18

(4) 2 ln 18

63. If $f : R \to R$ is a function defined by $f(x)=[x]\cos\left(\frac{2x-1}{2}\right)\pi$, where $[x]$ denotes the greatest integer function, then f is :

(1) discontinuous only at $x=0$.

(2) discontinuous only at non-zero integral values of x.

(3) continuous only at $x=0$.

(4) continuous for every real x.

64. Let P and Q be 3×3 matrices with $P \neq Q$. If $P^3=Q^3$ and $P^2Q=Q^2P$, then determinant of (P^2+Q^2) is equal to :

(1) 1

(2) 0

(3) -1

(4) -2

65. If the integral

$$\int \frac{5\tan x}{\tan x-2}\,dx = x + a\ln|\sin x-2\cos x|+k$$

then a is equal to :

(1) -2

(2) 1

(3) 2

(4) -1

66. If $g(x)=\int_0^x \cos 4t\,dt$, then $g(x+\pi)$ equals :

(1) $g(x) + g(\pi)$

(2) $g(x) - g(\pi)$

(3) $g(x).g(\pi)$

(4) $\frac{g(x)}{g(\pi)}$

67. An equation of a plane parallel to the plane $x-2y+2z-5=0$ and at a unit distance from the origin is :

(1) $x-2y+2z+1=0$

(2) $x-2y+2z-1=0$

(3) $x-2y+2z+5=0$

(4) $x-2y+2z-3=0$

SPACE FOR ROUGH WORK

68. A spherical balloon is filled with 4500 π cubic meters of helium gas. If a leak in the balloon causes the gas to escape at the rate of 72 π cubic meters per minute, then the rate (in meters per minute) at which the radius of the balloon decreases 49 minutes after the leakage began is :

(1) 7/9

(2) 2/9

(3) 9/2

(4) 9/7

69. If the line $2x+y=k$ passes through the point which divides the line segment joining the points (1, 1) and (2, 4) in the ratio 3 : 2, then k equals :

(1) 5

(2) 6

(3) 11/5

(4) 29/5

70. Let $\hat{a}$ and $\hat{b}$ be two unit vectors. If the vectors $\vec{c} = \hat{a} + 2\hat{b}$ and $\vec{d} = 5\hat{a} - 4\hat{b}$ are perpendicular to each other, then the angle between $\hat{a}$ and $\hat{b}$ is :

(1) $\frac{\pi}{2}$

(2) $\frac{\pi}{3}$

(3) $\frac{\pi}{4}$

(4) $\frac{\pi}{6}$

71. **Statement 1 :** An equation of a common tangent to the parabola $y^2=16\sqrt{3}\,x$ and the ellipse $2x^2+y^2=4$ is $y=2x+2\sqrt{3}$.

Statement 2 : If the line $y=mx+\frac{4\sqrt{3}}{m}$, $(m \neq 0)$ is a common tangent to the parabola $y^2=16\sqrt{3}\,x$ and the ellipse $2x^2+y^2=4$, then m satisfies $m^4+2m^2=24$.

(1) Statement 1 is true, Statement 2 is true, Statement 2 is a correct explanation for Statement 1.

(2) Statement 1 is true, Statement 2 is true, Statement 2 is **not** a correct explanation for Statement 1.

(3) Statement 1 is true, Statement 2 is false.

(4) Statement 1 is false, Statement 2 is true.

72. Three numbers are chosen at random without replacement from {1, 2, 3, ..., 8}. The probability that their minimum is 3, given that their maximum is 6, is :

(1) $\frac{1}{5}$

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

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

(4) $\frac{3}{8}$

SPACE FOR ROUGH WORK

73. A line is drawn through the point (1, 2) to meet the coordinate axes at P and Q such that it forms a triangle OPQ, where O is the origin. If the area of the triangle OPQ is least, then the slope of the line PQ is :

(1) -4

(2) -2

(3) $-\frac{1}{2}$

(4) $-\frac{1}{4}$

74. Assuming the balls to be identical except for difference in colours, the number of ways in which one or more balls can be selected from 10 white, 9 green and 7 black balls is :

(1) 629

(2) 630

(3) 879

(4) 880

75. **Statement 1 :** The sum of the series $1+(1+2+4)+(4+6+9)+(9+12+16)+\ldots+(361+380+400)$ is 8000.

Statement 2 : $\sum_{k=1}^{n}\left(k^3-(k-1)^3\right)=n^3$, for any natural number n.

(1) Statement 1 is true, Statement 2 is true; Statement 2 is a correct explanation for Statement 1.

(2) Statement 1 is true, Statement 2 is true; Statement 2 is **not** a correct explanation for Statement 1.

(3) Statement 1 is true, Statement 2 is false.

(4) Statement 1 is false, Statement 2 is true.

76. Let $A=\begin{pmatrix}1 & 0 & 0\\ 2 & 1 & 0\\ 3 & 2 & 1\end{pmatrix}$. If u_1 and u_2 are column matrices such that $Au_1=\begin{pmatrix}1\\0\\0\end{pmatrix}$ and $Au_2=\begin{pmatrix}0\\1\\0\end{pmatrix}$, then u_1+u_2 is equal to :

(1) $\begin{pmatrix}-1\\1\\-1\end{pmatrix}$

(2) $\begin{pmatrix}-1\\-1\\0\end{pmatrix}$

(3) $\begin{pmatrix}1\\-1\\-1\end{pmatrix}$

(4) $\begin{pmatrix}-1\\1\\0\end{pmatrix}$

77. The area bounded between the parabolas $x^2=\frac{y}{4}$ and $x^2=9y$, and the straight line $y=2$ is :

(1) $\frac{10\sqrt{2}}{3}$

(2) $\frac{20\sqrt{2}}{3}$

(3) $10\sqrt{2}$

(4) $20\sqrt{2}$

SPACE FOR ROUGH WORK

78. Let $x_1, x_2, \ldots, x_n$ be n observations, and let $\bar{x}$ be their arithmetic mean and σ^2 be their variance.

Statement 1 : Variance of $2x_1, 2x_2, \ldots, 2x_n$ is $4\sigma^2$.

Statement 2 : Arithmetic mean of $2x_1, 2x_2, \ldots, 2x_n$ is $4\bar{x}$.

(1) Statement 1 is true, Statement 2 is true, Statement 2 is a correct explanation for Statement 1.

(2) Statement 1 is true, Statement 2 is true, Statement 2 is **not** a correct explanation for Statement 1.

(3) Statement 1 is true, Statement 2 is false.

(4) Statement 1 is false, Statement 2 is true.

79. If n is a positive integer, then $\left(\sqrt{3}+1\right)^{2n} - \left(\sqrt{3}-1\right)^{2n}$ is :

(1) an odd positive integer

(2) an even positive integer

(3) a rational number other than positive integers

(4) an irrational number

80. If 100 times the 100^{th} term of an AP with non zero common difference equals the 50 times its 50^{th} term, then the 150^{th} term of this AP is :

(1) 150 times its 50^{th} term

(2) 150

(3) zero

(4) -150

81. The length of the diameter of the circle which touches the x-axis at the point (1, 0) and passes through the point (2, 3) is :

(1) 3/5

(2) 6/5

(3) 5/3

(4) 10/3

82. Let $a, b \in R$ be such that the function f given by $f(x) = \ln|x| + bx^2 + ax$, $x \neq 0$ has extreme values at $x = -1$ and $x = 2$.

Statement 1 : f has local maximum at $x = -1$ and at $x = 2$.

Statement 2 : $a = \frac{1}{2}$ and $b = \frac{-1}{4}$.

(1) Statement 1 is true, Statement 2 is true; Statement 2 is a correct explanation for Statement 1.

(2) Statement 1 is true, Statement 2 is true; Statement 2 is **not** a correct explanation for Statement 1.

(3) Statement 1 is true, Statement 2 is false.

(4) Statement 1 is false, Statement 2 is true.

SPACE FOR ROUGH WORK

83. Let ABCD be a parallelogram such that $\vec{AB} = \vec{q}$, $\vec{AD} = \vec{p}$ and $\angle BAD$ be an acute angle. If $\vec{r}$ is the vector that coincides with the altitude directed from the vertex B to the side AD, then $\vec{r}$ is given by :

(1) $\vec{r} = -\vec{q} + \left(\frac{\vec{p}\cdot\vec{q}}{\vec{p}\cdot\vec{p}}\right)\vec{p}$

(2) $\vec{r} = \vec{q} - \left(\frac{\vec{p}\cdot\vec{q}}{\vec{p}\cdot\vec{p}}\right)\vec{p}$

(3) $\vec{r} = -3\vec{q} + \frac{3\left(\vec{p}\cdot\vec{q}\right)}{\left(\vec{p}\cdot\vec{p}\right)}\vec{p}$

(4) $\vec{r} = 3\vec{q} - \frac{3\left(\vec{p}\cdot\vec{q}\right)}{\left(\vec{p}\cdot\vec{p}\right)}\vec{p}$

84. If the lines $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-1}{4}$ and $\frac{x-3}{1} = \frac{y-k}{2} = \frac{z}{1}$ intersect, then k is equal to :

(1) $\frac{2}{9}$

(2) $\frac{9}{2}$

(3) 0

(4) -1

85. An ellipse is drawn by taking a diameter of the circle $(x-1)^2+y^2=1$ as its semi-minor axis and a diameter of the circle $x^2+(y-2)^2=4$ as its semi-major axis. If the centre of the ellipse is at the origin and its axes are the coordinate axes, then the equation of the ellipse is :

(1) $x^2+4y^2=8$

(2) $4x^2+y^2=8$

(3) $x^2+4y^2=16$

(4) $4x^2+y^2=4$

86. The negation of the statement

"If I become a teacher, then I will open a school", is :

(1) Either I will not become a teacher or I will not open a school.

(2) Neither I will become a teacher nor I will open a school.

(3) I will not become a teacher or I will open a school.

(4) I will become a teacher and I will not open a school.

SPACE FOR ROUGH WORK

87. Consider the function,
$f(x)=|x-2|+|x-5|$, $x \in R$.

Statement 1 : $f'(4)=0$

Statement 2 : f is continuous in [2, 5], differentiable in (2, 5) and $f(2)=f(5)$.

(1) Statement 1 is true, Statement 2 is true; Statement 2 is a correct explanation for Statement 1.

(2) Statement 1 is true, Statement 2 is true; Statement 2 is **not** a correct explanation for Statement 1.

(3) Statement 1 is true, Statement 2 is false.

(4) Statement 1 is false, Statement 2 is true.

88. If $z \neq 1$ and $\frac{z^2}{z-1}$ is real, then the point represented by the complex number z lies :

(1) on a circle with centre at the origin.

(2) either on the real axis or on a circle not passing through the origin.

(3) on the imaginary axis.

(4) either on the real axis or on a circle passing through the origin.

89. The equation $e^{\sin x}-e^{-\sin x}-4=0$ has :

(1) no real roots.

(2) exactly one real root.

(3) exactly four real roots.

(4) infinite number of real roots.

90. In a ΔPQR, if $3 \sin P+4 \cos Q=6$ an $4 \sin Q+3 \cos P=1$, then the angle R i equal to :

(1) $\frac{\pi}{6}$

(2) $\frac{\pi}{4}$

(3) $\frac{3\pi}{4}$

(4) $\frac{5\pi}{6}$

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SPACE FOR ROUGH WORK

AIEEE-2012 PAPER-I KEY

BOOKLET - CODE -A

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