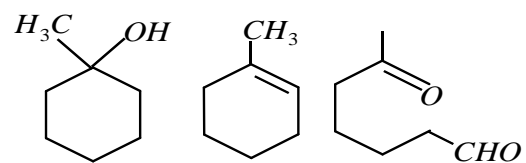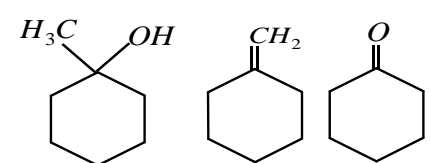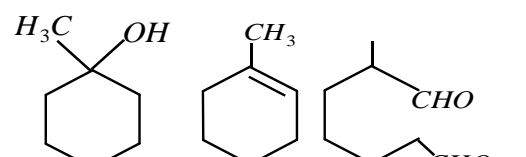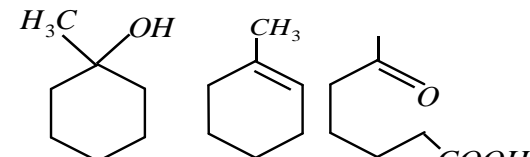42. A p–n photodiode is made of a material with a band gap of 2.0 eV. The minimum frequency of the radiation that can be absorbed by the material is nearly
   1) $1 \times 10^{14} Hz$ 2) $20 \times 10^{14} Hz$ 3) $10 \times 10^{14} Hz$ 4) $5 \times 10^{14} Hz$

43. The apparent depth of water in cylindrical water tank of diameter 2R cm is reducing at the rate of x cm/minute when water is being drained out at a constant rate. The amount of water drained in cc per minute is :
   (n_1 = refractive index of air, n_2 = refractive index of water)

   1) $\dfrac{x \pi R^2 n_1}{n_2}$ 2) $\dfrac{x \pi R^2 n_2}{n_1}$ 3) $\dfrac{2 \pi R n_1}{n_2}$ 4) $\pi R^2 x$

44. A thin prism P_1 with angle 4° made from glass of refractive index 1.54 is combined with another thin prism P_2 made from glass of refractive index 1.72 to produce dispersion without deviation. The angle of the prism P_2 is

   1) 5.33° 2) 4° 3) 3° 4) 2.6°

45. A closely wound solenoid of 2000 turns and are of cross-section $1.5 \times 10^{-4} m^2$ carries a current of 2.0 A. It is suspended through its centre and perpendicular to its length, allowing it to turn in a horizontal plane in a uniform magnetic field 5×10^{-2} tesla making an angle of 30^0 with the axis of the solenoid. The torque on the solenoid will be
   1) $3 \times 10^{-3} Nm$ 2) $1.5 \times 10^{-3} Nm$ 3) $1.5 \times 10^{-2} Nm$ 4) $3 \times 10^{-2} Nm$

CHEMISTRY

46. Which of the following statements about open chain structure of glucose are correct?
   A) It contains one –CHO group   B) It contains one primary –OH group
   C) It contains four secondary –OH groups   D) It contains six –OH groups
   1) A,B,D only   2) A,B,C,D   3) B,C,D only   4) A,B,C only
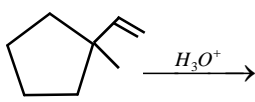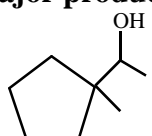
47. A,B and C in the following reaction are
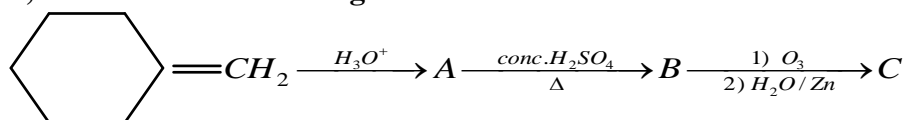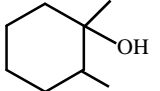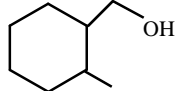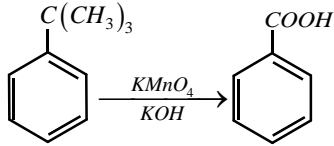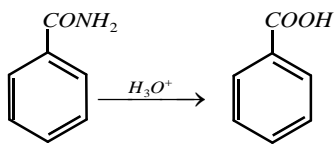
48. Which of the following is false about Lithium?
   1) It can directly react with Nitrogen   2) It cannot react with Ethyne
   3) It is a very weak reducing agent   4) It cannot form Alums

49. $MSO_4 \xrightarrow[excess]{BaCl_2} MCl_2 + BaSO_4 \downarrow$;

   $MCO_3 \xrightarrow[excess]{BaCl_2} MCl_2 + BaCO_3 \downarrow$;

   These are the conformation tests of sulphate salts and carbonate salts respectively. If $BaSO_4$ is insoluble in Conc. HCl then $BaCO_3$ will be
   1) Soluble in dilute HCl   2) Insoluble in dilute HCl
   3) does not react with HCl   4) Cannot be predicted

50. The half life time of zero order reaction is 1 hr, when the initial concentration of the reactant is 2 mole/lit. How much time (in hr) does it take for its concentration to decrease from 0.5 to 0.25 mole/ lit?

    1) 0.25   2) 0.5   3) 4   4) 1

51. Statement-A : I_3^- ion is linear.

    Statement-B : I_3^- ion, iodine is in 'sp' hybridised state.

    1) Both A and B are true   2) Both A and B are false
    3) A is true and B is false   4) A is false and B is true

52. The ultimate product formed on methylation of diborane is:

    1) $B_2(CH_3)_6$ 2) $B_2H_4(CH_3)_2$ 3) $B_2H_3(CH_3)_3$ 4) $B_2H_2(CH_3)_4$

53. Statement-I : Phosphinic acid has more reducing behavior than phosphonic acid
    Statement-II : Phosphinic acid has two P- H bonds where as phosphonic acid has one P-H bond

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

54. Which among the following is incorrect?

    1) Orbital angular momentum of 2p electron is $\sqrt{2}h/2\pi$
    2) 3p-orbital has '2' nodal plane
    3) Radial probability $= 4\pi r^2 dr.\Psi^2$
    4) Energy of electron in terms of Rydberg's constant : $E = -R_H.h.c$

55. $CH_3-CH=CH-CH_3 \xrightarrow[\Delta]{H\oplus/KMnO_4} A \xrightarrow[2)H\oplus]{1)LiAlH_4} B$ The compound 'B' will be

    1) CH_3-COOH 2) CH_3-CH_2-OH 3) CH_3-CHO 4) $CH_3-\underset{O}{\overset{\parallel}{C}}-\underset{O}{\overset{\parallel}{C}}-CH_3$

56. Because of lanthanoid contraction, which of the following pairs of elements have nearly same atomic radii? (number in the parenthesis are atomic number)

    1) Zr (40) and Ta (73)   2) Ti (22) and Zr (40)
    3) Zr (40) and Nb (41)   4) Zr(40) and Hf (72)

57. Which among the following is incorrect?

    1) If the Kelvin temperature of a gas is doubled the velocity of the gas also doubles
    2) The Kinetic energy of 16 g of oxygen at 27^0C is 450 cal
    3) The compressibility factor (Z) of ideal gases is 1
    4) The relative rates of diffusion of hydrogen and Helium respectively is $\sqrt{2}:1$

58. Which of the following compounds do not undergo either aldol condensation or Cannizzaro's reaction ?

    1) Methanal   2) Cyclohexanone   3) Benzophenone   4) Phenylacetaldehyde

59. 13 grams of a metal 'M' is deposited at cathode by passing 0.4F electricity. If the cathodic reaction is $M^{n+} + ne^- \rightarrow M$ the formula of the metallic chloride is (Atomic weight of M= 65).

    1) MCl_4 2) MCl_3 3) MCl 4) MCl_2

60. Major product of the following reaction is $\xrightarrow{H_3O^+}$

61. The correct order of magnetic moments (spin only values in B.M) among is

    1) $[MnCl_4]^{2-} > [CoCl_4]^{-2} > [Fe(CN)_6]^{4-}$ 2) $[Fe(CN)_6]^{4-} > [CoCl_4]^{-2} > [MnCl_4]^{2-}$

    3) $[Fe(CN)_6]^{4-} > [MnCl_4]^{2-} > [CoCl_4]^{-2}$ 4) $[MnCl_4]^{2-} > [Fe(CN)_6]^{4-} > [CoCl_4]^{-2}$

62. The volume (in ml) of " 50 vol" H_2O_2 required, which on decomposition gives sufficient oxygen for complete combustion of 100 ml of ethane at STP is

    1) 14   2) 7   3) 70   4) 140

63. $CH_4 + O_2 \xrightarrow[\Delta]{Mo_2O_3} X$

$C_2H_6 + O_2 \xrightarrow{(CH_3COO)_2 Mn} Y$ **Which of the following is correct?**

1) X and Y have same functional group   2) X and Y are functional isomers

3) X and Y have same percentage composition of elements   4) X and Y are homologues

64. **Which of the element given below doesnot undergo disproportionation on reaction with aq. NaOH solution ?**

1) N_2 2) Cl_2 3) S   4) P

65. **Which of the following reaction does not take place**

1)

2) HVZ reaction of 2 – Methylpropanoic acid

3)

4) Nitration of benzoic acid

66. K_p **has the value of** 10^{-6} atm^3 **and** 10^{-4} atm^3 **at 298K and 323K respectively for the reaction :**

$CuSO_4.3H_2O(s) \leftrightarrow CuSO_4(s) + 3H_2O(g), then \; \Delta H$ **for the reaction is:**

1) $85 \, kJ/mol$ 2) $-125 \, kJ/mol$ 3) $147.41 \, kJ/mole$ 4) $325 \, kJ/mol$

67. **Impurities in** PH_3 **make it inflammable The impurities are**

1) P_2H_4 2) P_4 3) Both 1 and 2   4) H_3PO_4

68. **In which case of mixing of HCl and NaOH the heat released is maximum**

1) 10ml of 0.1 M HCl + 40 ml of 0.1 M NaOH   2) 20ml of 0.1 M HCl +20 ml of 0.1 M NaOH

3) 25ml of 0.1 M HCl + 25 ml of 0.1 M NaOH   4) 35ml of 0.1 M HCl +15 ml of 0.1 M NaOH

69. **Which among the following is incorrect set?**

1) Number of Bravais lattices possible for ortho rhombic crystal system : 4

2) CrO_2 is diamagnetic substance   3) Covalent solid : SiO_2

4) CaF_2 has 8 : 4 coordination structure

70. **A high spin complex of** d^6 **-cation in an octahedral field will have the following energy**

1) $\dfrac{-12}{5}\Delta_0 + P$ 2) $\dfrac{-12}{5}\Delta_0 + 3P$ 3) $\dfrac{-2}{5}\Delta_0 + 2P$ 4) $\dfrac{-2}{5}\Delta_0 + P$

71 **IUPAC name of given compound is :**

1) Deca-2,6-dien-9-yne   2) Deca-4,9-dien-1-yne

3) Nona-1,6-dien-8-yne   4) Nona-2,8-dien-1-yne

72. **Which among the following is incorrect?**

1) O_2 molecule is diamagnetic   2) Order of ionic radius : $Al^{+3} < Mg^{+2} < F^{-1}$

3) Lone pair in SF_4 is present at equatorial position

4) Ionic compounds donot exhibit isomerism beacause ionic bond is non directional

73. **Match the following**

    List –I **List – II**
    A) Dil. Aq. Boric acid **1) Antibiotic**
    B) Chloramphenicol 2) Analgesic
    C) Rantadine 3) Antiseptic
    D) Morphine 4) Antihistamine
      5) Antacid

	A	B	C	D			A	B	C	D
1)	4	1	5	3		2)	3	1	4	2
3)	3	4	2	5		4)	4	2	3	1

74. **Polymer**   **Monomers**
    1) Nylon -2, nylon -6   a) 2- chlorobut -1,3 – diene
    2) Teflon   b) Ethylene glycol and terphthalic acid
    3) Neoprene   c) Amino caproic acid and glycine
    4) Terylene   d) Tera fluoro ethylene
                                    e) Butadiene and vinyl cyanide

    The correct match is
    1) 1 – c, 2 – d, 3 – e, 4 – c   2) 1 – c, 2 – e, 3 –a, 4 – b
    3) 1 – c, 2 – d, 3 – a, 4 – b   4) 1 – e, 2 – d, 3 – a, 4 – c

75. **Most stable free radical is**



   1)   2)   3)   4)
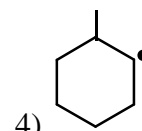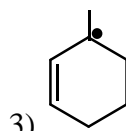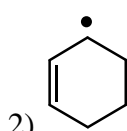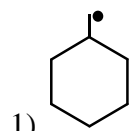
76. A saturated solution prepared by dissolving Ag_2CO_3 in water has $\left[Ag^+ \right] = 2.56 \times 10^{-4} M$ Its K_{SP} **is**
    1) $8.4 \times 10^{-12} M^3$ 2) $6.7 \times 10^{-11} M^3$
    3) $6.6 \times 10^{-12} M^3$ 4) $1.6 \times 10^{-8} M^3$

77. **When 2 moles of** HCl **is added to acetylene, the product is 'X'. When 1 mole of** Cl_2 **is added to ethylene, the product is 'Y'. Here 'X' and 'Y' are a pair of :**
    1) Chain isomers   2) Position isomers
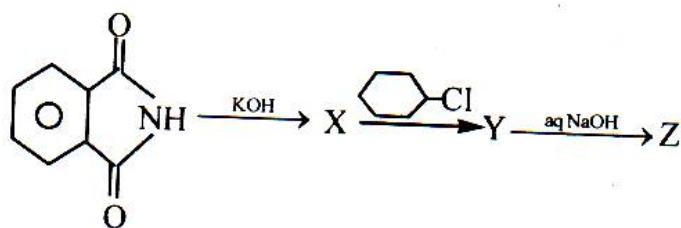   3) Homologues   4) Functional isomers

78. **The product obtained in the following reaction is**

    1)   2)   3)   4)
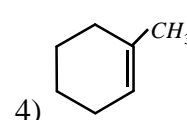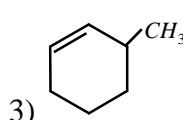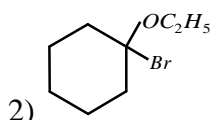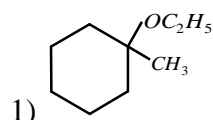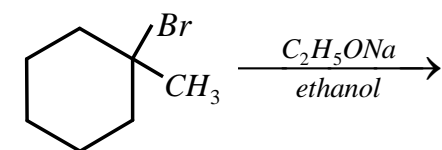
79. **Two hydrogen electrodes 'A' and 'B' are prepared at** $25^0 C$**. The** p^H **of electrolyte in electrode 'A' is 3 and in electrode 'B' is 2 . If a Galvanic cell is constructed by these two electrodes then the EMF of cell is:**
    1) +0.12V   2) +0.059V   3) -0.12V   4) +0.18B

80.

Z in the above reaction is

1)   2)   3)   4)

81. The limiting equivalent conductivity of NaCl, KCl and KBr are 126.5,150 and 151.5 $S.cm^2.eq^{-1}$ respectively. The limiting equivalent ionic conductance for Br^{-1} is $78\ S.cm^2 eq^{-1}$. The limiting equivalent ionic conductance of Na^+ ion is :
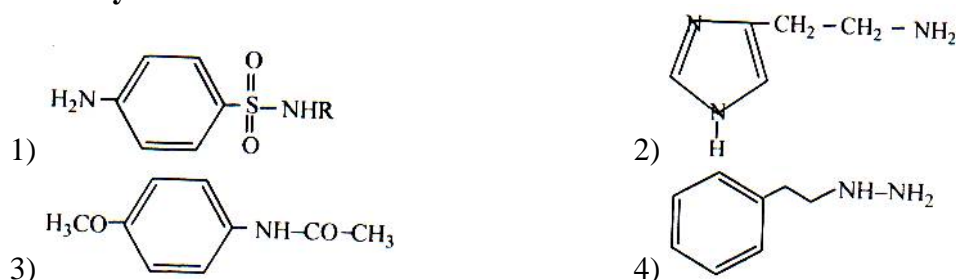
1) 128   2) 75   3) 50   4) 49

82. The standard entropies of CO, O_2 and CO_2 are 197,205 and 213 $J.K^{-1}\ mole^{-1}$ respectively. The standard entropy change for the reaction, $2CO_{(g)} + O_{2(g)} \rightarrow 2CO_{2(g)}$ is $\left(in\ JK^{-1}\right)$

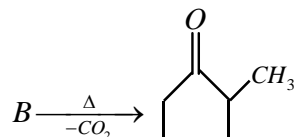1) -173   2) -185   3) 197   4) 152

83. Which among the following indicates structure of Histamine, which causes inflammation in the body?

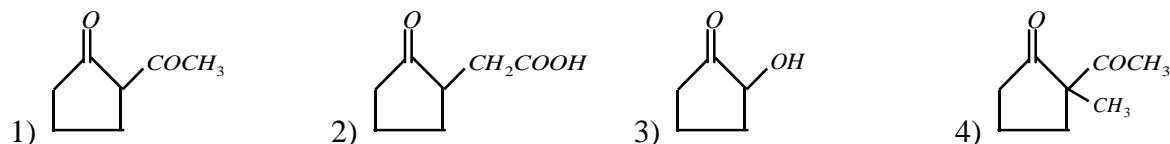**84.** The best electrolyte for coagulate As_2S_3 sol is

1) $NaCl$ 2) $Al(NO_3)_2$ 3) $CuSO_4$ 4) $BaCl_2$

85. Number of stereo isomers possible for $\left[Co(ONO)_3(NH_3)_3\right]$ is

1) 3   2) 4   3) 2   4) 5

86. $A \xrightarrow[b)\ H^+]{a)\ NaOH+I_2} CHI_3 + B$;

'A' in the following reaction is

1)   2)   3)   4)

87. 18g of 'Mg' metal was strongly heated in presence of excess N_2 and the product was treated with water, then the volume of ammonia liberated at STP is

1) 22.4 lit   2) 11.2 lit   3) 16.8 lit   4) 44.8 lit

88. **Energy profile diagram for a reaction is given below. The heat of reaction is**
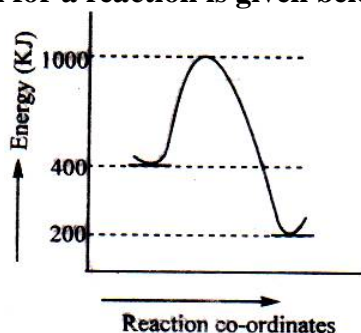
    1) – 200 KJ   2) 200 KJ   3) 800 KJ   4) 600 KJ

89. **Which of the following statements are correct?**
    A) Eutrophication is mainly caused by phosphates
    B) Ozone layer is destroyed by C.F.C
    C) M.I.C. is a contaminent
    D) Benzopyrene is not carcinogenic
    1) A, B, D   2) B, C, D   3) A, B, C   4) A, B, D

90. **In the balancing of the reaction, $Cr_2O_7^{2-} + NO_2^- + H^+ \rightarrow Cr^{+3} + NO_3^- + H_2O$ the stoichiometric coefficients of $Cr_2O_7^{2-}, NO_2^-$ and H^+ respectively are**
    1) 1, 3, 8   2) 1, 4, 8   3) 1, 3, 12   4) 1, 5, 12

BIOLOGY

91. **Botanical gardens:**
    1) Have collections of living plants for reference
    2) Is an ex-situ conservation strategy
    3) Contains labeled plants indicating its botanical/ scientific name and family
    4) All of the above

92. **Alveoli of the lungs are lined by which epithelium:-**
    1) Stratified epithelium   2) Simple cuboidal epithelium
    3) Stratified cuboidal epithelium   4) Simple squamous epithelium

93. **Read the following table carefully and select the correct option for W, X, Y, Z**

Common Name	Biological Name	Family	Order
Wheat	Triticum aestivum	X	Y
Mango	W	Z	Sapindales

    1) W = Oryza sativa, X = Poaceae, Y = Poales, Z = Anacardiaceae
    2) W = Mangifera indica, X = Anacardiaceae, Y= Sapindales, Z = Poaceae
    3) W = Oryza sativa, X= Sapindales, Y = Poaceae, Z = Poales
    4) W = Mangifera indica, X= Poaceae, Y = Poales, Z = Anacardiaceae

94. **In the given list how many animals have complete double circulation:**
    Fish, Alligator, Frog, lung fish , Prawn, Crocodile, birds, mammals
    1) Five   2) Four   3) Three   4) Six

95. **Dinoflagellates have two flagella:**
    1) Both lying longitudinally between the wall plates
    2) One lying longitudinally and the other transversely in a furrow between the wall plates
    3) Both lying transversely between the wall plates
    4) But do not help in their movement