

Roll No.-----

Paper Code

4 1 8

(To be filled in the
OMR Sheet)

प्रश्नपुस्तिका क्रमांक
Question Booklet No.

O.M.R. Serial No.

--	--	--	--	--	--	--	--

प्रश्नपुस्तिका सीरीज
Question Booklet Series

B

M.Sc Industrial Chemistry (First Semester)

Examination, February/March-2022

MSIC-104

Physical Chemistry

Time : 1:30 Hours

Maximum Marks-100

जब तक कहा न जाय, इस प्रश्नपुस्तिका को न खोलें

- निर्देश : —
1. परीक्षार्थी अपने अनुक्रमांक, विषय एवं प्रश्नपुस्तिका की सीरीज का विवरण यथास्थान सही- सही भरें, अन्यथा मूल्यांकन में किसी भी प्रकार की विसंगति की दशा में उसकी जिम्मेदारी स्वयं परीक्षार्थी की होगी।
 2. इस प्रश्नपुस्तिका में 100 प्रश्न हैं, जिनमें से केवल 75 प्रश्नों के उत्तर परीक्षार्थियों द्वारा दिये जाने हैं। प्रत्येक प्रश्न के चार वैकल्पिक उत्तर प्रश्न के नीचे दिये गये हैं। इन चारों में से केवल एक ही उत्तर सही है। जिस उत्तर को आप सही या सबसे उचित समझते हैं, अपने उत्तर पत्रक (O.M.R. ANSWER SHEET) में उसके अक्षर वाले वृत्त को काले या नीले बाल प्वाइंट पेन से पूरा भर दें। यदि किसी परीक्षार्थी द्वारा निर्धारित प्रश्नों से अधिक प्रश्नों के उत्तर दिये जाते हैं तो उसके द्वारा हल किये गये प्रथमतः यथा निर्दिष्ट प्रश्नोत्तरों का ही मूल्यांकन किया जायेगा।
 3. प्रत्येक प्रश्न के अंक समान हैं। आप के जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
 4. सभी उत्तर केवल ओ०एम०आर० उत्तर पत्रक (O.M.R. ANSWER SHEET) पर ही दिये जाने हैं। उत्तर पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
 5. ओ०एम०आर० उत्तर पत्रक (O.M.R. ANSWER SHEET) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाय।
 6. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी प्रश्नपुस्तिका बुकलेट एवं ओ०एम०आर० शीट पृथक-पृथक उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें।
 7. निगेटिव मार्किंग नहीं है।
- महत्वपूर्ण : — प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्नपुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्ष निरीक्षक को दिखाकर उसी सीरीज की दूसरी प्रश्नपुस्तिका प्राप्त कर लें।

Rough Work / रफ कार्य

1. During titration of a weak acid against a weak base, there is a sharp increase in _____ at the end point :
 - (A) Specific conductance
 - (B) Equivalent conductance
 - (C) Conductivity
 - (D) None of these
2. If λ_{∞} is the equivalent conductance at infinite dilution and λ_v is the equivalent conductance of the electrolyte at given dilution, the degree of dissociation is given by :
 - (A) $\alpha = \lambda_v - \lambda_{\infty}$
 - (B) $\alpha = \lambda_{\infty} - \lambda_v$
 - (C) $\alpha = \frac{\lambda_v}{\lambda_{\infty}}$
 - (D) $\alpha = \frac{\lambda_{\infty}}{\lambda_v}$
3. On titrating strong acid against a strong base, the end point is the point of :
 - (A) Zero conductance
 - (B) Minimum conductance
 - (C) Maximum conductance
 - (D) Conductance
4. At OK, the cell potential is :
 - (A) Less than E^0
 - (B) Equal to 1 V
 - (C) E^0
 - (D) Equal to zero

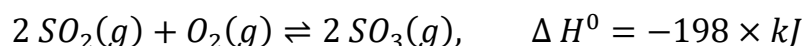
5. In an electrochemical cell :
- (A) Potential energy changes into electrical energy
 - (B) Kinetic energy decreases
 - (C) Chemical energy changes into electrical energy
 - (D) Potential energy decreases
6. Cell reaction is spontaneous when :
- (A) E°_{red} is +ve
 - (B) ΔG° is +ve
 - (C) E°_{red} is -ve
 - (D) ΔG° is -ve
7. Saturated solution of KNO_3 is used to make a 'salt bridge' because :
- (A) Velocity of K^+ and NO_3^- both are nearly the same
 - (B) Velocity of NO_3^- is greater than that of K^+
 - (C) Velocity of K^+ is greater than that of NO_3^+
 - (D) All of the above
8. The electrochemical cell stops working after sometime because :
- (A) The cell reaction gets reversed
 - (B) Electrode potential of both the electrodes becomes zero
 - (C) One of the electrode is eaten away
 - (D) Electrode potential of both the electrode becomes equal
9. Which equilibrium is reached inside the two half cells of the electrochemical cells, what is the net voltage across the electrodes ?
- (A) < 1
 - (B) $= 0$
 - (C) > 1
 - (D) Not defined

10. Which of the following statements is correct regarding electrochemical cells ?
- (A) Cell potential is an intensive property
 - (B) Gibbs free energy is undefined for an electrochemical cell
 - (C) Cell potential is an extensive property
 - (D) Gibbs free energy of an electrochemical cell is an intensive property
11. In an electrolytic cell, the electrode at which the electron enter the solution is called the _____ ; the chemical change that occurs at this electrode is called _____ :
- (A) Cathode, oxidation
 - (B) Cathode, reduction
 - (C) Anode, oxidation
 - (D) Anode, reduction
12. The cell constant of a conductivity cell :
- (A) Changes with a change of electrolyte
 - (B) Changes with a change of concentration of electrolyte
 - (C) Remain constant for a cell
 - (D) Changes with change in temperature.
13. Iron undergoes corrosion to produce _____ coloured hydrated ferric oxide :
- (A) Green
 - (B) Red
 - (C) Brown
 - (D) Blue
14. The corrosion is the reverse process of _____
- (A) Metal production
 - (B) Metal moulding
 - (C) Metal heating
 - (D) Metal extraction

15. The pH of a 0.1 M aqueous solution of NH_4OH ($K_b = 1.0 \times 10^{-5}$) is :
- (A) 11
 - (B) 10.5
 - (C) 10
 - (D) 5
16. According to the law of mass action; for the reaction, $2A+B \rightarrow$ products, which equation holds goods ?
- (A) $\text{Rate} = k [A] [B]^2$
 - (B) $\text{Rate} = k [A] [B]$
 - (C) $\text{Rate} = k [A] [B]^{1/2}$
 - (D) $\text{Rate} = k [A]^2 [B]$
17. Which of the following equilibria will shift to the right side on increasing the temperature ?
- (A) $H_2O(g) \rightleftharpoons H_2(g) + \frac{1}{2}O_2(g)$
 - (B) $4HCl(g) + O_2(g) \rightleftharpoons 2H_2O(g) + 2Cl_2(g)$
 - (C) $CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g)$
 - (D) $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$
18. With increase in temperature, the equilibrium constant of a reaction :
- (A) Always increases
 - (B) Decreases
 - (C) Does not change
 - (D) None of these
19. On increasing the concentration of reactants in a reversible reaction, then equilibrium constant will :
- (A) Unchanged
 - (B) Depend on the concentration
 - (C) Decrease
 - (D) Increase

20. What will be the pH of a buffer solution having an equal concentration of B^- and HB ($K_b = 10^{-10}$ for B^-)
- (A) 10
(B) 6
(C) 4
(D) 7
21. Which of the following aqueous solution will be the best conductor of electricity ?
- (A) CH_3COOH
(B) HCl
(C) $C_6H_{12}O_6$
(D) NH_3
22. When the system $A + B \rightleftharpoons C + D$ is at equilibrium :
- (A) The forward reaction has stopped
(B) The reverse reaction has stopped
(C) Neither the forward nor the reverse reaction has stopped
(D) Both the forward and reverse reaction have stopped
23. The rate of forward reaction is two times that of the backward reaction at a given temperature and identical concentration, K equilibrium is :
- (A) 2.0
(B) 1.5
(C) 2.5
(D) 0.5
24. Which one of the following oxides of nitrogen will be the most stable one ?
- (A) $2 NO_2(g) \rightleftharpoons 2 N_2(g) + O_2(g); K = 3.5 \times 10^{33} \text{ mol/L}$
(B) $2 NO_2(g) \rightleftharpoons N_2(g) + 2 O_2(g); K = 6.7 \times 10^{16} \text{ mol/L}$
(C) $2 NO(g) \rightleftharpoons N_2(g) + O_2(g); K = 2.2 \times 10^{30} \text{ mol/L}$
(D) $2 N_2O_5(g) \rightleftharpoons 2 N_2 + 5 O_2(g); K = 1.2 \times 10^{24} \text{ mol/L}$

25. Consider the following reaction equilibrium :



On the basis of Le- chatelier's principle, the condition favourable for the forward reaction is :

- (A) Lowering of temperature as well as pressure
 - (B) Any value of temperature and pressure
 - (C) Decreasing the temperature and increasing the pressure
 - (D) Increasing temperature as well as pressure
26. For a specific reaction, which of the following statement is true about equilibrium constant , K ?
- (A) It increases if the concentration of one of the reactant is increased
 - (B) It increases if the concentration of one of the products is increased
 - (C) It changes with change in the temperature
 - (D) It always remains the same at different reaction conditions
27. Calculate the pH of a mixture containing 0.01 M acetic acid and 0.03 M sodium acetate solution ($\text{p}K_a=4.8$)
- (A) 8.0
 - (B) 5.27
 - (C) 6.87
 - (D) 10
28. The number of moles of the acid or base which may be added to one litre or one dm^3 of a buffer solution for changing its pH by units is called :
- (A) Buffer index
 - (B) Buffer capacity
 - (C) Buffer mixture
 - (D) Buffer solution

29. An example of basic buffer is a solution of :
- $NH_4OH + NaOH$
 - CH_3COONH_4
 - $NH_4OH + HCl$
 - $NH_4OH + NH_4Cl$
30. Choose the correct statement from the following :
- $pOH = -pk_b - \log [salt] / [Base]$
 - $pOH = pk_b + \log [salt] / [Base]$
 - $pOH = pk_b + \log [Base] / [salt]$
 - $pOH = -pk_b + \log [salt] / [Base]$
31. Both anionic and cationic hydrolysis occur in the case of :
- Salts of weak acid and strong base
 - Salts of weak acid and weak base
 - Salts of strong acid and weak base
 - Salts of strong acid and strong base
32. The pH of a solution of salt of strong acid and weak base is given by :
- $\frac{1}{2} (\log K_w + \log K_b + \log C)$
 - $\frac{1}{2} (-\log K_w - \log K_b - \log C)$
 - $\frac{1}{2} (\log K_w - \log K_b + \log C)$
 - $\frac{1}{2} (\log K_w - \log K_b - \log C)$
33. Heat of neutralization of a strong acid and weak base is less than 57.3 kJ/mol. This is because :
- The ionisation is complete but further reaction does not take place
 - Some of the heat is transferred to the surroundings
 - All the acid is not ionised
 - All the base is not ionised

34. The pH of a solution of a strong acid and weak base at the equilibrium point is :
(A) Less than 7
(B) More than 7
(C) 7
(D) None of these
35. The pH of an acidic buffer according to the Henderson equation is given by :
(A) $pk_a - \log \frac{[Salt]}{[Acid]}$
(B) $pk_a + \log \frac{[Acid]}{[Salt]}$
(C) $pk_a + \log \frac{[Salt]}{[Acid]}$
(D) $-pk_a + \log \frac{[Salt]}{[Acid]}$
36. The degree of hydrolysis of a salt of a weak acid and a strong base is :
(A) Directly proportional to the square root of its molar concentration
(B) Inversely proportional to the square root of its molar concentration
(C) Equal to the square root of its molar concentration
(D) All of these
37. The pH value of a solution obtained by mixing 5 g of acetic acid and 7.5 g of sodium acetate and making the volume to 500 ml ($K_{CH_3COOH} = 1.8 \times 10^{-5}$) is :
(A) 5.78
(B) 4.78
(C) 3.78
(D) Zero
38. Cells in which the e.m.f produced is only due to the difference in the concentrations of the electrodes or that of the solutions of the electrolytes with which they are in contact are called :
(A) Electrochemical cell
(B) Concentration cell
(C) Electrolytic cell
(D) None of these

39. The products of the corrosion are :
- (A) Oxides of metals
 - (B) Sulphides of metals
 - (C) Carbonates of metals
 - (D) All of these
40. For the overall reaction
- $$Cu^{2+}(C_1aq) + Zn(s) \rightarrow Zn^{2+}(C_2aq) + Cu(s)$$
- of an electrochemical cell, the change in the free energy ΔG at a given temperature is a function of :
- (A) $\ln C_2$
 - (B) $\ln (C_1 + C_2)$
 - (C) $\ln C_1$
 - (D) $\ln \left(\frac{C_2}{C_1} \right)$
41. If all the substances taking part in a reversible reaction are not in the same phase or state, then the equilibrium is termed as :
- (A) Homogeneous equilibrium
 - (B) Heterogeneous equilibrium
 - (C) Irreversible reaction
 - (D) None of these
42. If the temperature of a system in equilibrium is increased, then the equilibrium will adjust itself :
- (A) In the direction which releases the heat
 - (B) In the direction which absorbs the heat
 - (C) In the direction which either absorbs or releases the heat
 - (D) All of these

43. Soaps essentially form a colloidal solution in water and remove the greasy matter by :
- (A) Adsorption
 - (B) Coagulation
 - (C) Absorption
 - (D) Emulsification
44. According to adsorption theory of catalysis, the speed of the reaction increases because :
- (A) Adsorption produces heat which increases the speed of the reaction
 - (B) Adsorption lowers the activation energy of the reaction
 - (C) In the process of adsorption, the activation energy of the molecules becomes large
 - (D) The concentration of the reactant molecules at the active centres of the catalyst becomes high due to adsorption
45. Identify the correct statement regarding enzymes :
- (A) Enzymes are specific biological catalysts that cannot be poisoned.
 - (B) Enzymes are normally heterogeneous catalysts that are very specific in action
 - (C) Enzymes are specific biological catalysts that possess well defined active sites
 - (D) None of these
46. For a first order reaction of the type $A \rightarrow \text{products}$, if the initial concentration of A is 'a' and at a given time 't' the concentration of the product is 'x', the rate constant for the reaction is :
- (A) $kt = \ln (a - x)$
 - (B) $\frac{k}{t} = 2.303 \log \left(\frac{a-x}{a} \right)$
 - (C) $k = \frac{1}{t} \log \left(\frac{a}{a-x} \right)$
 - (D) $k = \frac{2.303}{t} \log \left(\frac{a}{a-x} \right)$

47. The reaction : $A \rightarrow \text{product}$ follows first order kinetics. In 40 minutes the concentration of A changes from 0.1 to 0.025 M. Then the rate of reaction when concentration of A is .01 M is :
- (A) $1.73 \times 10^{-5} M \text{ min}^{-1}$
 (B) $3.47 \times 10^{-4} M \text{ min}^{-1}$
 (C) $1.73 \times 10^{-4} M \text{ min}^{-1}$
 (D) $3.47 \times 10^{-6} M \text{ min}^{-1}$
48. The e.m.f of the cell in which the reaction
- $$2 Ag^+(aq) + H_2(g) \rightarrow 2 Ag(s) + 2 H^+(aq)$$
- Occurs is 0.80V. The standard reduction of Ag^+/Ag electrode is :
- (A) -0.40V
 (B) 0.40V
 (C) 0.80V
 (D) -0.80V
49. Four alkali metals A,B,C and D are having standard electrode potentials as - 3.05, - 1.66, -0.40 and 0.80V respectively. Which one will be the most reducing ?
- (A) C
 (B) B
 (C) D
 (D) A
50. An enzyme and a reactant molecule maintain relationship as :
- (A) An association stabilized by a covalent bond
 (B) Non complementary binding
 (C) A temporary association
 (D) One in which the enzyme is changed permanently

51. The rate of reaction usually :
- (A) Decreases with increase in temperature
 - (B) Remains unaffected with increase in temperature
 - (C) Increases with increase in temperature
 - (D) None of these
52. The half life period of a first-order reaction is 10 minutes. The time required for the concentration of the reactant to change from 0.08 M to 0.02 M is :
- (A) 40 Minutes
 - (B) 30 Minutes
 - (C) 20 Minutes
 - (D) 10 Minutes
53. According to the collision theory, the rate of a reaction depends on :
- (A) Total number of molecules
 - (B) The number of colliding molecules per ml per unit time
 - (C) The average collision of molecules
 - (D) None of these
54. The half-life period of a reaction is independent of the initial concentration of the reactants. The reaction is of :
- (A) Third order
 - (B) Second order
 - (C) Zero order
 - (D) First order
55. In a first order reaction, the concentration of reactant decreases from 1.0 M to 0.25 M in 20 minutes. The value of K is :
- (A) 6.932
 - (B) .06932
 - (C) .6932
 - (D) None of these

56. The rate at which a substance reacts is proportional to its :
(A) Concentration in g/litre
(B) Mole fraction
(C) Active mass
(D) None of these
57. According to activated complex theory, the rate of a reaction depended on :
(A) Initial velocity of molecules
(B) Energy of activation of the molecules
(C) The intensity of collision
(D) The velocity of molecules with which they cross the energy barrier
58. The unimolecular reaction is :
(A) $N_2O_5 \rightarrow 2NO_2 + \frac{1}{2}O_2$
(B) $H_2 + Cl_2 \rightarrow 2HCl$
(C) $PCl_3 + Cl_2 \rightarrow PCl_5$
(D) $2HI \rightarrow H_2 + I_2$
59. The specific rate constant of a first order reaction depends on :
(A) Temperature
(B) Concentration of the products
(C) Time
(D) Concentration of the reactants
60. For a chemical change $x \rightarrow y$, it is found that the rate of reaction doubles when the concentration is increased four times. The order in X for this reaction is :
(A) One
(B) Zero
(C) Half
(D) Two

61. The reaction : $A+B+C \rightarrow \text{Products}$ is found to obey the rate law, $r = -\frac{d[A]}{dt} = k[A]^2[B]^{1/2}[C]^{1/2}$ the overall order of reaction is :
- (A) $\frac{7}{2}$
(B) 3
(C) $\frac{5}{2}$
(D) 1
62. The E_a for the forward reaction is 40 kJ mol^{-1} and that for the reverse reaction is 60 kJ/mol . The reaction is :
- (A) Endothermic
(B) Chain reaction
(C) Spontaneous reaction
(D) Exothermic
63. The correct statement is :
- (A) Order is always equal to the molecularity of reaction
(B) The $t_{1/2}$ of a first –order reaction is independent of the initial concentration.
(C) The rate constant of a reaction decrease with temperature
(D) The unit of second-order rate constant is $\text{mol dm}^{-3}\text{s}^{-1}$
64. The $t_{1/2}$ of a reaction is doubled as the initial concentration of the reactant is doubled. The order of the reaction is :
- (A) 1
(B) 0
(C) 2
(D) $1\frac{1}{2}$

65. The catalytic efficiency of two distinct enzymes can be compared on the basis of :
- (A) Product formation
 - (B) Size of the enzymes
 - (C) K_m
 - (D) P^H of optimum value
66. In Michaelis- Menten Kinetics the rate-determining step is :
- (A) Complex formation step
 - (B) The complex dissociation step to produce products
 - (C) The product formation step
 - (D) All of these
67. Efficiency of a catalyst depends on :
- (A) Optimum temperature
 - (B) Absolute temperature
 - (C) Room temperature
 - (D) Molecular mass
68. Which one is not an example of homogeneous catalyst ?
- (A) Decomposition of $KClO_3$ in the presence of MnO_2
 - (B) Formation of SO_3 in chamber process
 - (C) Formation of SO_3 in contact process
 - (D) Hydrolysis of methyl acetate in the presence of an acid
69. A catalyst is a substance which :
- (A) Shortens time to reach equilibrium
 - (B) Supplies energy to the reaction
 - (C) Increases the equilibrium concentration of the products
 - (D) Changes the equilibrium constant of the reaction
70. Which of the following statement is not correct ?
- (A) A small amount of catalyst is sufficient to catalyse a reaction
 - (B) Catalyst action is specific
 - (C) The catalyst initiates the reaction
 - (D) A catalyst does not alter the equilibrium

71. A _____ remains unchanged in mass and chemical composition at the end of the reaction :
- (A) Reactant
 - (B) Product
 - (C) Catalyst
 - (D) Substrate
72. Which reaction is pseudo-unimolecular :
- (A) Base catalysed hydrolysis of an ester
 - (B) $H_2 + Cl_2 \rightarrow 2HCl$
 - (C) $PCl_3 + Cl_2 \rightarrow PCl_5$
 - (D) Acid-catalysed hydrolysis of an ester
73. Which of the following is an emulsifier ?
- (A) Detergents
 - (B) Soaps
 - (C) Both
 - (D) None
74. Tyndall phenomenon is shown by :
- (A) Suspension
 - (B) Dilute solution
 - (C) Colloidal solution
 - (D) True solution
75. The emulsifying agent in milk is :
- (A) Lactose
 - (B) Fat
 - (C) Casein
 - (D) Lactic acid

76. The minimum concentration of an electrolyte required to cause coagulation of a sol is called :
- (A) Gold number
 - (B) Coagulation number
 - (C) Flocculation
 - (D) None of the above
77. Stability of lyophilic sol is due to :
- (A) Electric charge only
 - (B) Brownian motion
 - (C) Both Brownian motion and charge
 - (D) Particle size
78. Gold number is a measure of :
- (A) Amount of gold required to break the colloid
 - (B) Amount of gold required to protect the colloid
 - (C) Amount of gold present in colloidal solution
 - (D) The protection action of the colloid
79. The sky looks blue due to :
- (A) Reflection
 - (B) Transmission
 - (C) Scattering
 - (D) Dispersion effect
80. Which method is used to destroy a sol ?
- (A) Addition of electrolyte
 - (B) Condensation
 - (C) Diffusion
 - (D) Dialysis
81. Migration of colloidal particles under the influence of electric field is called :
- (A) Cataphoresis
 - (B) Dialysis
 - (C) Brownian movement
 - (D) None of these

82. The potential difference between fixed charge layer and diffused layer with opposite charge is called :
- (A) Zeta potential
 - (B) Electrode potential
 - (C) Colloidal potential
 - (D) None
83. The process in which the charge over colloidal particles is neutralized in the precipitation of the colloidal particles is called :
- (A) Coagulation
 - (B) Diffusion
 - (C) electrolysis
 - (D) Dialysis
84. Colloidal solution in which the dispersed phase as well as the dispersion medium are liquid are called :
- (A) Aerosol
 - (B) Emulsion
 - (C) True solution
 - (D) Gel
85. Strong electrolytes which give a normal solution at low concentration but show colloidal nature at higher concentration, is known as :
- (A) Micelles
 - (B) True solution
 - (C) Sols
 - (D) None

86. The process of breaking emulsion to yield the constituent liquids is called :
- (A) Emulsification
 - (B) Demulsification
 - (C) Condensation
 - (D) Coagulation
87. Kinetic activity of colloidal particles in dispersion medium is called :
- (A) Cataphoresis
 - (B) Electro-osmosis
 - (C) Brownian movement
 - (D) None
88. The process of bringing a precipitated substance back into the colloidal state is known as :
- (A) Peptization
 - (B) Osmosis
 - (C) Diffusion
 - (D) Dialysis
89. What is the effect of enzymes on the rate of biochemical reactions ?
- (A) The rate increases
 - (B) It does not change
 - (C) The rate decreases
 - (D) Either (B) or (C)
90. At the end of the chemical reaction the catalyst remains :
- (A) Unchanged in quantity but changed in composition
 - (B) Unchanged in composition but change in quantity
 - (C) Change in quantity and composition
 - (D) Unchanged in quantity and composition

91. Smoke is a colloidal solution of _____ carbon particles in the air (aerosol) :
- (A) Positively charged
 - (B) Negatively charged
 - (C) Neutral
 - (D) None
92. If E_a of a reaction is zero, k is equal to :
- (A) Zero
 - (B) The frequency factor
 - (C) (The frequency factor)⁻¹
 - (D) Infinity
93. The $t_{1/2}$ for a first-order reaction is 20 sec. The time required for 99.9% decomposition is :
- (A) 400 sec
 - (B) 30 min
 - (C) 40 sec
 - (D) 199.9 sec
94. The pH of an aqueous solution is 4. its $[OH^-]$ is :
- (A) 10^{-4}
 - (B) 10^{-10}
 - (C) 10^{-9}
 - (D) 10^{-12}
95. The cell potential becomes equal to E° When :
- (A) Equilibrium constant is 100
 - (B) Equilibrium constant is 10
 - (C) Equilibrium constant is 1
 - (D) Equilibrium constant is 10^{-1}

96. For the redox couple, $Zn^{2+}(aq)/Zn(s)$ and $Cu^{2+}(aq)/Cu(s)$ the reduction potentials are $-0.76V$ and $+0.34V$ respectively. if the couples are combined, as written above then :
- Zn is oxidized and Cu^{2+} is reduced
 - Zn^{2+} is reduced and Cu is oxidized
 - None of these
 - Zn^{2+} and Cu^{2+} are reduced
97. For the overall cell reaction $H_2PO_3(aq) + 7H^+(aq) + 7e^- \rightarrow PH_3(g) + 3H_2O(l)$, if pH is increased, then the cell potential :
- Remains constant
 - Increases
 - Decreases
 - None of these
98. Kohlrausch's law can be used to determine :
- Solubility of a sparingly soluble salt
 - Absolute ionic mobility
 - λ_{∞} for weak electrolyte
 - All of these
99. On passing electrical current through an electrolyte solution the cations :
- Move with different speed as compared to that of anions
 - Move towards cathode with speed equal to that of anions towards anode
 - Move with slower speed with that of anions
 - Move with faster speed with that of anions
100. The postulates of Debye-Huckel theory is/are true for :
- Decrease in equivalent conductance with increase in concentration is due to fall in mobilities of ions due to their inter ionic effect
 - The strong electrolyte is completely ionized at all dilution.
 - The oppositely charged ions are completely distributed in the solution but the cations tend to be found in the vicinity of anions and vice versa
 - All of the above

DO NOT OPEN THE QUESTION BOOKLET UNTIL ASKED TO DO SO

1. Examinee should enter his / her roll number, subject and Question Booklet Series correctly in the O.M.R. sheet, the examinee will be responsible for the error he / she has made.
2. **This Question Booklet contains 100 questions, out of which only 75 Question are to be Answered by the examinee. Every question has 4 options and only one of them is correct. The answer which seems correct to you, darken that option number in your Answer Booklet (O.M.R ANSWER SHEET) completely with black or blue ball point pen. If any examinee will mark more than one answer of a particular question, then the first most option will be considered valid.**
3. Every question has same marks. Every question you attempt correctly, marks will be given according to that.
4. Every answer should be marked only on Answer Booklet (O.M.R ANSWER SHEET). Answer marked anywhere else other than the determined place will not be considered valid.
5. Please read all the instructions carefully before attempting anything on Answer Booklet (O.M.R ANSWER SHEET).
6. After completion of examination please hand over the Answer Booklet (O.M.R ANSWER SHEET) to the Examiner before leaving the examination room.
7. There is no negative marking.

Note: On opening the question booklet, first check that all the pages of the question booklet are printed properly in case there is an issue please ask the examiner to change the booklet of same series and get another one.