General Instructions:

*   All questions are compulsory.
*   This question paper consists of 33 questions.
*   Question number 1 to 3 are MCQs carrying 1 mark each.
*   Question number 4, 5 & 6 are MCQs having more than one correct answers carrying 1 mark each.
*   Question number 7 & 8 are fill in the blanks questions and carrying 1 mark each.
*   Question number 9 & 10 are TRUE & FALSE questions carrying one mark each.
*   Question number 11& 12 are MATCHING TYPE questions carrying one mark each.
*   Question number 13 & 14 are ASSERTION & REASONING TYPE question carrying one mark each.
*   Question number 15 -21 are short answer questions carrying 2-marks each.
*   Question number 22-30 are also short answer questions carrying 3-marks each.
*   Question number 31-33 are long answer questions carrying 5-marks each.
*   use log tables, if necessary. Use of calculators is not allowed.

1. Low concentration of oxygen in the blood and tissues of people living at high altitude is due to _____.

(i) low temperature

(ii) low atmospheric pressure

(iii) high atmospheric pressure

(iv) both low temperature and high atmospheric pressure

OR

The value of Henry's constant K_H is _____.

(i)greater for gases with higher solubility.

(ii)greater for gases with lower solubility.

(iii)constant for all gases.

(iv)not related to the solubility of gases.

2. An Electrochemical cell can behave like an electrolytic cell when _____

(i) $E_{cell} = 0$

(ii) $E_{cell} > E_{ext}$

(iii) $E_{ext} > E_{cell}$

(iv)) $E_{cell} = E_{ext}$

3. In the extraction of copper from its sulphide ore, the metal is formed by the reduction of Cu_2O with

(i) FeS

(ii) CO

(iii) Cu_2S

(iv) SO_2

<div align="center">OR</div>

When copper ore is mixed with silica, in a reverberatory furnace copper matte is produced. The copper matte contains _____.

(i)sulphides of copper (II) and iron (II)

(ii)sulphides of copper (II) and iron (III)

(iii)sulphides of copper (I) and iron (II)

(iv)sulphides of copper (I) and iron (III)

4. In isotonic solution _____.

(i) solute and solvent both are same.

(ii) osmotic pressure is same.

(iii) solute and solvent may or may not be same.

(iv) solute is always same solvent may be different.

5. For the given cell, $Mg|Mg^{2+}|\,|\,Cu^{2+}|Cu$

(i)Mg is cathode

(ii)Cu is cathode

(iii)The cell reaction is $Mg + Cu^{2+} \rightarrow Mg^{2+} + Cu$

(iv)Cu is the oxidising agent

<div align="center">OR</div>

Molar conductivity of ionic solution depends on _____.

(i) Temperature.

(ii)distance between electrodes.

(iii concentration of electrolytes in solution.

(iv) Surface area of electrodes.

6. Which of the following statements are applicable to a balanced chemical equation of an elementary reaction?

(i)Order is same as molecularity.

(ii)Order is less than the molecularity.

(iii)Order is greater than the molecularity.

(iv)Molecularity can never be zero.

7. Freshly prepared precipitate sometimes get converted to colloidal solution by_____.

8. The unit of rate constant for reactions of second order are _____ .

<center>OR</center>

The role of a catalyst is to change _____.

9. Extent of physisorption of a gas increases with Increase in temperature.

10. Halogen acid HF should have highest bond dissociation enthalpy.

11. Match the laws given in Column I with expressions given in Column II.

Column I   Column II

(i)Raoult's law   (a)$\Delta T_f = K_f m$

(ii)Henry's law   (b) $\Pi = CRT$

(iii)Elevation of boiling point   (c) $p = x_1 p_1^0 + x_2 p_2^0$

(iv)Depression in freezing point   (d) $\Delta T_b = K_b m$

(v)Osmotic pressure   (e) $p = K_H . x$

12. Match the items of Column I with the items of Column II and assign the correct code:

Column I   Column II

(A)Coloured bands.   (1) Zone refining

(B) Impure metal to volatile complex   (2) Fractional distillation

(C) Purification of Ge and Si   (3) Mond Process

(D) Purification of mercury   (4) Chromatography

                                        (5) Liquation

Code:
(i)A (1) B (2) C (4) D (5)
(ii)A (4) B (3) C (1) D (2)
(iii)A (3) B (4) C (2) D (1)
(iv)A (5) B (4) C (3) D (2)
Assertion and Reason Type

Note: In the following questions a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

(i)Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.

(ii)Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.

(iii) Assertion is correct, but reason is wrong statement.

(iv) Assertion is wrong but reason is correct statement.

(v) Both assertion and reason are wrong statements.

13. Assertion: NaCl reacts with concentrated H_2SO_4 to give colourless fumes with pungent smell. But on adding MnO_2 the fumes become greenish yellow.

Reason: MnO_2 oxidises HCl to chlorine gas which is greenish yellow.

14. Assertion: Molarity of a solution in liquid state changes with temperature.

 Reason: The volume of a solution changes with change in temperature.

15. Why Elevation in boiling point is a Colligative property?

16. The partial pressure of ethane over a solution containing 6.56×10^{-3} g of ethane is 1 bar. If the solution contains 5.00×10^{-2} g of ethane, then what shall be the partial pressure of the gas?

17. What are the units of molar conductivity? Which equation gives the relationship between molar conductivity and concentration of a strong electrolyte?

18. Write one difference in each of the following :

(i) Lyophobic sol and Lyophilic sol

(ii)Homogeneous catalysis and Heterogeneous catalysis

19. (A) Write expression for rate of reaction in terms of each reactant and product for the reaction $N_2+3H_2 \rightarrow 2NH_3$

   (B) Calculate the overall order of a reaction which has the rate expression

   (I) Rate = k $[A]^{1/2}$ $[B]^{3/2}$

   (II) Rate = k $[A]^{3/2}$ $[B]^{-1}$

Or

What are Pseudo First Order reactions? Explain with the help of an example.

20. Write in brief the mechanism of enzyme catalysis.

Or

Define (1) Emulsion (2) Ultrafiltration

21. The value of $\Delta_f G^0$ for formation of $Cr_2 O_3$ is – 540 kJmol^{-1}and that of $Al_2 O_3$ is – 827 kJmol^{-1}. Is the reduction of $Cr_2 O_3$ possible with Al?

22. A solution of glucose in water is labelled as 10% w/w, what would be the morality and mole fraction of each component in the solution? If the density of solution is 1.2 g mL^{-1}, then what shall be the morality of the solution?

23. Write the chemistry of recharging the lead storage battery, highlighting all the materials that are involved during recharging.

24. When a certain conductivity cell was filled with 0.1 M KCl, it has a resistance of 85 Ω at 25° C. When the same cell was filled with an aqueous solution of 0.052 M unknown electrolyte, the resistance was 96 Ω. Calculate the molar conductivity of the unknown electrolyte at this concentration.

(Specific conductivity of 0.1 M KCl = 1.29 x 10^{-2} Ω^{-1} cm^{-1})

OR

(a) Calculate the mass of Ag deposited at cathode when a current of 2 amperes was passed through a solution of AgNO$_3$ for 15 minutes. 2

(Given : Molar mass of Ag = 108 g mol^{-1} 1F = 96500 C mol^{-1})

(b) Define fuel cell. 1

25. For a first order reaction, show that time required for 99% completion is twice the time required for the completion of 90% of reaction.

Or

The rate constant for the first order decomposition of H$_2$O$_2$ is given by the following equation:

log k = 14.34 − 1.25 × 10^{4}K/T

Calculate E$_a$ for this reaction and at what temperature will its half-period be 256 minutes?

26. What is an adsorption isotherm? Describe Freundlich adsorption isotherm.

27. Write down the reactions taking place in different zones in the blast furnace during the extraction of iron.

28. Draw the structures of the following:

(i) H$_2$S$_2$O$_7$

(ii) XeF$_6$

(iii)XeOF$_4$

Or

Discuss the molecular shape of BrF$_3$ on the basis of VSEPR theory.

29. 0.6 mL of acetic acid (CH$_3$COOH), having density 1.06 g mL^{-1}, is dissolved in 1 litre of water. The depression in freezing point observed for this strength of acid was 0.0205°C. Calculate the van't Hoff factor and the dissociation constant of acid.

30. (a) Write the formula of the neutral molecule which is isoelectronic with ClO$^-$.

(b) What do you mean by Interhalogen Compounds?

(c) Bleaching action of chlorine is permanent. Justify.

31. Three electrolytic cells A, B, C conta ining solutions of $ZnSO_4$, $AgNO_3$ and $CuSO_4$, respectively are connected in series. A steady current of 1.5 amperes was passed through them until 1.45 g of silver deposited at the cathode of cell B. How long did the current flow? What mass of copper and zinc were deposited?

<div align="center">or</div>

Using the standard electrode potentials given in Table 3.1, predict if the reaction between the following is feasible:

(i) Fe^{3+}(aq) and I^-(aq)

(ii) Ag^+ (aq) and Cu(s)

(iii) Fe^{3+} (aq) and Br^- (aq)

(iv) Ag(s) and Fe^{3+}(aq)

(v) Br_2 (aq) and Fe^{2+} (aq).

Given standard electrode potentials:$E^0_{1/2\ I_2,I^-}=0.541$, $E^0 Cu^{2+},Cu=0.34$,$E^0_{1/2}Br_2,Br^-=1.09V$,$E^0 Ag+,Ag=0.80V$,$E^0 Fe^{3+},Fe^{2+}=0.77V$

32.(a)first order reaction has a rate constant 1.15×10^{-3} s^{-1}. How long will 5 g of this reactant take to reduce to 3 g?

(b)Time required to decompose SO_2Cl_2 to half of its initial amount is 60 minutes. If the decomposition is a first order reaction, calculate the rate constant of the reaction.

<div align="center">or</div>

Calculate   the   half-life   of   a   first   order reaction   from   their   rate   constants given below:

(i) 200 s^{-1} (ii) 2 min^{-1}

(2) The half-life for radioactive decay of 14C is 5730 years. An archaeological artefact wood had only 80% of the 14C found in a living tree. Estimate the age of the sample.

33. (a)Write the balanced chemical equation for the reaction of Cl_2 with hot and concentrated NaOH. Is this reaction a disproportionation reaction? Justify.

(b)Name two poisonous gases which can be prepared from chlorine gas.

(c)When HCl reacts with finely powdered iron, it forms ferrous chloride and not ferric chloride. Why?

(d)Noble gases have very low boiling points. Why?

(e) Why is helium used in diving apparatus?

<div align="center">or</div>

(a)How are XeO_3 and $XeOF_4$ prepared?

(b)Complete the following reactions:-

1. $I_2 + 6H_2O + 5Cl_2 \rightarrow$

2 6 NaOH   + $3Cl_2 \rightarrow$
  (hot and conc.)

3. $Na_2SO_3 + Cl_2 + H_2O \rightarrow$