Time: **3hrs;**   Total Marks: **70**

General Instruction:

There are total **26** questions and five sections in the question paper.
All questions are compulsory
1. Section A contains questions number **1 to 5**; very short answer type questions of 1 mark each.
2. Section B contains questions number **6 to 10**, short-answer type I questions of 2 marks each.
3. Section C contains questions number **11 to 22**, short answer type II questions of 3 marks each.
4. Section D contains question number **23**, value based question of 4 marks.
5. Section E contains questions number **24 to 26**, long-answer type questions of 5 marks each.
6. There is no overall choice in the question paper; however, an internal choice is provided in one question of 2 marks, one question of 3 marks and all the three questions of 5 marks. In these questions, an examinee is to attempt any of the two given alternatives.

SECTION – A

1. Write the formula of an oxoanion of Manganese (Mn) in which it shows the oxidation state equal to its group number.

2. Write IUPAC name of the following compound-: $(CH_3CH_2)_2NCH_3$

3. For a reaction R→P, half-life ($t_{1/2}$) is observed to be independent of the initial concentration of reactants. What is the order of reaction?

4. Write the structure of 1-Brome-4chlorobut-2-ene.

5. Write one similarity between Phys sorption and Chemisorption's.

SECTION – B

6. Complete the following reactions:
   (i) $NH_3 + 3CL_2$ (excess) →
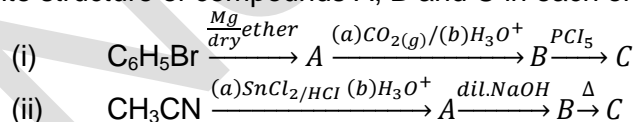   (ii) $XeF_6 + 2H_2O$ →
                       Or
   What happens when?
   (i) $(NH_4)_2Cr_2O_7$ is heated?
   (ii) H_3PO_3 is heated?
   Write the equations.

7. Define the following terms:
   (i)   Colligative properties
   (ii)   Molality (m)

8. Draw the structures of the following:
   (i) $H_2S_2O_7$
   (ii) XeF_6

9. Calculate the degree of dissociation (α) of acetic acid if its molar conductivity (Λ_m) is 39.05 S cm2 mol.$_{-1.}$ Given $\lambda°$ (H^+) = 349.6 S cm^2 mol^{-1} and $\lambda°$ (CH_3COO^-) = 40.9 S cm^2 mol^{-1}

10. Write the equations involved in the following reactions:
    (i)   Wolff-Kishner reduction
    (ii)   Etard reaction

SECTION – C

11. A 10% solution (by mass) of sucrose in water in has freezing point of 269.15 K Calculate the freezing point of 10% glucose in water, if freezing point of pure water is 273.15 K.
    Given: (Molar mass of sucrose = 342 g mol^{-1})   (Molar mass of glucose = 180 g mol^{-1})

12. (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.
    (Given: Molar mass of Ag = 108 g mol^{-1} 1F = 96500C mol^{-1})
    (b) Define fuel cell.

13. i. What type of isomerism is shown by the complex $[Co(NH_3)_6] [Cr(CN)_6]$?
    ii. Why a solution of $[Ni(H_2O)_6]^{2+}$ is green while a solution of $[Ni(CN)_4]^{2-}$ is colourless? (At. No. of Ni = 28)
    iii. Write the IUPAC name of the following complex: $[Co(NH_3)_S(CO_3)]Cl$

14. Write one difference in each of the following:
    (i)   Lyophobic sol and lyophilic sol
    (ii)   Solution and Colloid
    (iii)   Homogeneous catalysis and Heterogeneous catalysis

15. Following data are obtained for the reaction:
    $N_2O_5 \rightarrow 2NO_2 + \frac{1}{2} O_2$

t/s	0	300	600
$[N_2O_5]$/mol L^{-1}	1.6×10^{-2}	0.8×10^{-2}	0.4×10^{-2}

    (a) Show that it follows first order reaction.
    (b) Calculate the half-life.
    (Given log 2 = 0.3010, log 4 = 0.6021)

16. Following compounds are given to you:
    2 – Bromopentane, 2-Bmmo-2-methylbutane, 1-Bromopentane
    (i)   Write the compound which is most reactive towards S_N2 reaction.
    (ii)   Write the compound which is optically active.
    (iii)   Write the compound which is most reactive towards β-elimination reaction.

17. (a) Write the principle of method used for the refining of germanium.
    (b) Out of PbS and $PbCO_3$ (ores of lead), which one is concentrated by forth floatation process preferably?
    (c) What is the significance of leaching in the extraction of aluminium?

18. Write structure of compounds A, B and C in each of the following reactions :
    (i) $C_6H_5Br \xrightarrow{\frac{Mg}{dry}ether} A \xrightarrow{(a)CO_{2(g)}/(b)H_3O^+} B \xrightarrow{PCI_5} C$
    (ii) $CH_3CN \xrightarrow[]{(a)SnCl_2/HCI\ (b)H_3O^+} A \xrightarrow{dil.NaOH} B \xrightarrow{\Delta} C$
                 Or
    Do the following conversions in not more than two steps:
    (i)   Benzoic acid to Benzaldehyde
    (ii)   Ethyl benzene to Benzoic acid
    (iii)   Propanone to Propene

19. Write the structures of the monomers used for getting the following polymers:
    (i)   Dacron
    (ii)   Melamine-formaldehyde polymer
    (iii) Buna-N

20. Define the following:
    (i)   Anionic detergents
    (ii)   Broad spectrum antibiotics
    (iii) Antiseptic

21. Give reasons:
    (i)   Thermal stability decreases from H_2O to H_2Te.
    (ii)   Fluoride ion has higher hydration enthalpy than chloride ion.
    (iii) Nitrogen does not from pentahalides

22. Given reasons:
    (i)   Acetylation of aniline reduces its activation effect.
    (ii) CH_3NH_2 is more basic than $C_6H_5NH_2$.
    (iii) Although $-NH_2$ is o/p directing group, yet aniline on nitration gives a significant amount of m-nitro aniline.

SECTION – D

23. After watching a Programme on TV about the presence of carcinogens (cancer causing agents) Potassium bromate and Potassium iodate in bread and other bakery product, Ritu a class XII student decided to aware others about the adverse effects of these carcinogens in foods. She consulted the school principal and requested him to instruct canteen contractor to stop selling sandwiches, pizza, burgers and other bakery products to the students. Principal took an immediate action and instructed the canteen contractor to replace the bakery products with some proteins and vitamins rich food like fruits, salads, sprouts etc. The decision was welcomed by the parents and students.
    After reading the above passage, answer the following questions:
    (i)   What are the values (at least two) displayed by Ritu?
    (ii)   Which polysaccharide component of carbohydrates is commonly present in bread?
    (iii) Give two examples of water soluble vitamins.

SECTION – E

24. (a) Account for the following:
    (i)   Transition metals form large number of complex compounds.
    (ii)   The lowest oxide of transition metal is basic whereas the highest oxide is amphoteric or acidic.
    (iii) E° value for the Mn^{3+}/Mn^{2+} couple is highly positive (+ 1.57 V) as compare to Cr^{3+}/Cr^{2+}.

    (b) (i)   Write one similarity and one difference between the chemistry of lanthanoids and actinoids elements.

                                    Or
    (a) (i)   How is the variability in oxidation states of transition metals different from that of p-block elements?
    (ii)   Out of Cu^+ and Cu^{2+}, which ion is unstable in aqueous solution and why?
    (iii) Orange colour of $Cr_2O_7^{2-}$ ion change to yellow when treated with an alkali. Why?

   (b) Chemistry of actinoids is complicated as compared to lanthanoids. Give two reasons.

25. (a) An element has atomic mass 93 g mol^{-1} and density 11.5 g cm^{-1}. If the edge length of its units cell is 300 pm, Identify the type of unit cell

(b) Write any two differences between amorphous solids and crystalline solids.

Or

(a) Calculate the number of units cells in 8.1 g of aluminium if it crystallizes in a f.c.c. structure. (Atomic mass of Al = 27 g mol^{-1})

(b) Give reasons:
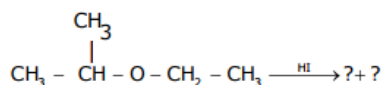   (i)   In stoichiometric defects, NaCl exhibits Schottky defect and not Frenkel defect.
   (ii)   Silicon on doping with phosphorus forms n-type semiconductor.
   (iii)   Ferromagnetic substances show better magnetism than antiferromagnetic substances.

26. (a) Write the product (s) in the following reactions:
   (i)

   (ii)

   (iii)
$$CH_3 - CH = CH - CH_2 - OH \xrightarrow{PCC} ?$$
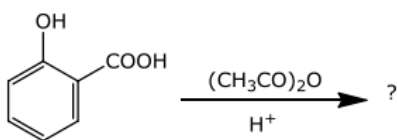
(b) Given simple chemical tests to distinguish between the following pairs of compounds:
   (i)   Ethanol and Phenol
   (ii)   Propanol and 2-methylpropan-2-ol

Or

(a) Write the formula of reagents used in the following reactions:
   (i)   Bromination of phenol to 2, 4, 6-tribromophenol
   (ii)   Hydroboration's of propene and then oxidation to propanol

(b) Arrange the following compound groups in the increasing order of their property indicated:
   (i)   p-nitrophenol,ethanol,phenol (acidic character)
   (ii)   Propanol, Propane, Propanol (boiling point)

(c) Write the mechanism (using curved arrow notation) of the following reaction:

$$CH_3 - CH_2 - \overset{+}{O}H_2 \xrightarrow{CH_3CH_2OH} CH_3 - CH_2 - \overset{+}{\underset{H}{O}} - CH_2 - CH_3 + H_2O$$