Class No. : .....

Name : .....

2025

SECOND YEAR HIGHER SECONDARY
SECOND TERMINAL EXAMINATION, DECEMBER-2022

Part – III

Time : 2 Hours

CHEMISTRY

Cool-off time : 15 Minutes

Maximum : 60 Scores

General Instructions to Candidates :

- There is a 'Cool-off time' of 15 minutes in addition to the writing time.
- Use the 'Cool-off time' to get familiar with questions and to plan your answers.
- Read questions carefully before answering.
- Read the instructions carefully.
- Calculations, figures and graphs should be shown in the answer sheet itself.
- Malayalam version of the questions is also provided.
- Give equations wherever necessary.
- Electronic devices except non-programmable calculators are not allowed in the Examination Hall.

വിദ്യാർത്ഥികൾക്കുള്ള പൊതുനിർദ്ദേശങ്ങൾ :

- നിർദ്ദിഷ്ട സമയത്തിന് പുറമെ 15 മിനിറ്റ് 'കൂൾ ഓഫ് ടൈം' ഉണ്ടായിരിക്കും.
- 'കൂൾ ഓഫ് ടൈം' ചോദ്യങ്ങൾ പരിചയപ്പെടാനും ഉത്തരങ്ങൾ ആസൂത്രണം ചെയ്യാനും ഉപയോഗിക്കുക.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- നിർദ്ദേശങ്ങൾ മുഴുവനും ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ, എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നല്കിയിട്ടുണ്ട്.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

Answer any 4 questions from 1 to 5. Each carries 1 score. **(4 × 1 = 4)**

1. Number of moles of solute present per litre of the solution is called _____.

2. The potential assigned to standard hydrogen electrode at all temperature is :
   (a) 1 V (b) –0.76 V
   (c) 0.34 V (d) 0.0 V

3. Order of reaction having rate constant $k = 3 \times 10^{-4}\ s^{-1}$ is :
   (a) 0 (b) 1
   (c) 2 (d) $\frac{1}{2}$

4. Which of the following is a didentate ligand ?
   (a) H_2O (b) CO_3^{2-}
   (c) $C_2O_4^{2-}$ (d) SO_4^{2-}

5. Name the poisonous gas formed when chloroform is slowly oxidised by air in the presence of light.

Answer any 8 questions from 6 to 15. Each carries 2 scores. **(8 × 2 = 16)**

6. State Henry's law and write any one of its applications.

7. What are Isotonic Solutions ? Give one example.

8. What is Van't Hoff's factor and how is it related to molar mass of the solute ?

9. Define rate of a chemical reaction and write any two factors influencing rate of chemical reactions.

10. What are pseudo first order reactions ? Give example.

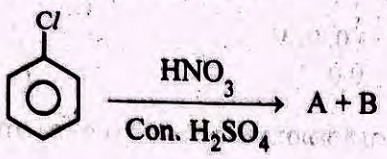
11. Identify the molecularity of following elementary reactions :
   (i) $NH_4NO_2 \longrightarrow N_2 + 2H_2O$ (1)
   (ii) $2HI \longrightarrow H_2 + I_2$ (1)

12. (i) Write the general outer electronic configuration of d-block elements. (1)
   (ii) Why zinc is not regarded as transition element ? (1)

13. Write any two applications of d & f-block elements.

14. Distinguish homoleptic complex from heteroleptic complex by citing examples.

15. Identify the products A & B.



Answer any 8 questions from 16 to 25. Each carries 3 scores. **(8 × 3 = 24)**

16. (i) What are ideal solutions ? Give one example. **(1½)**

    (ii) Sketch the vapour pressure-composition graph for a non-ideal solution showing negative deviation from Raoult's law. **(1½)**

17. Represent the cell in which the following reaction takes place :

    $Mg(s) + 2\,Ag^{+}_{(0.001\,M)} \longrightarrow Mg^{2+}_{(0.130\,M)} + 2\,Ag(s)$

    Calculate its $E_{(cell)}$ if $E^{\circ}_{(cell)} = 3.17$ V.

18. (i) What do you mean by limiting molar conductivity ? **(1)**

    (ii) Name the law which helps to determine the limiting molar conductivity of an electrolyte. **(1)**

    (iii) State the above law. **(1)**

19. (i) Explain the electrochemical reactions behind rusting of iron. **(2)**

    (ii) Suggest any two methods for the prevention of corrosion. **(1)**

20. (i) Write the integrated rate equation for a first order reaction. **(1)**

    (ii) Derive an expression for half life of a first order reaction from the first order integrated rate equation. **(2)**

21. Give reason for the following properties of transition elements :

    (i) Formation of coloured ions **(1)**

    (ii) Formation of complex compounds **(1)**

    (iii) Alloy formation **(1)**

22. What is Lanthanoid Contraction ? Give any two of its consequences.

23. (i) Identify the oxidation state and co-ordination number of central metal ion in the following complex : (1)

$[Co(NH_3)_6]Cl_3$

(ii) Write the formulas for the following co-ordination compounds :

(a) Tetra-amine aquachloridocobalt (III) chloride (1)

(b) Potassiumtetrahydroxidozincate (II) (1)

24. (i) Draw the figure to show splitting of 'd' orbitals in octahedral field. (2)

(ii) What is Spectrochemical series ? (1)

25. Write any three differences between S_N1, S_N2 mechanisms.

Answer any 4 questions from 26 to 30. Each carries 4 scores. **(4 × 4 = 16)**

26. (i) What are Colligative properties ? Give examples. (2)

(ii) 200 cm^3 of an aqueous solution of a protein contains 1.26 g of the protein. The osmotic pressure of such a solution at 300 K is found to be 2.57×10^{-3} bar. Calculate the molar mass of the protein. (2)

27. (i) Write the electrode reactions and overall reaction taking place in H_2-O_2 fuel cell. (3)

(ii) Give any two advantages of fuel cell. (1)

28. (i) Write the expression for temperature dependence of rate of reaction. (1)

(ii) The rate constants of a reaction at 500 K and 700 K are 0.02 s^{-1} and 0.07 s^{-1} respectively. Calculate the value of E_a. (3)

29. Explain structural isomerism in co-ordination compounds with suitable examples.

30. Write the structures of major products in each of the following reactions :

(i) $CH_3 - CH_2 - OH + SOCl_2 \longrightarrow$ (1)

(ii) $CH_3 - CH = CH_2 + HBr \xrightarrow{\text{Peroxide}}$ (2)

(iii) $CH_3 - CH_2 - CH_2 - Cl + NaI \xrightarrow[\text{heat}]{\text{acetone}}$ (1)