Reg. No. : .....

Name : .....

SY 625

SECOND YEAR HIGHER SECONDARY MODEL EXAMINATION, FEBRUARY 2025

Part – III

CHEMISTRY

Maximum : 60 Scores

Time : 2 Hours

Cool-off Time : 15 Minutes

General Instructions to Candidates :

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

വിദ്യാർത്ഥികൾക്കുള്ള പൊതുനിർദ്ദേശങ്ങൾ :

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

Score

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

1. Which of the following is the reason for low concentration of oxygen in the blood and tissues of people living at high altitude ?
   a) Low temperature
   b) Low atmospheric pressure
   c) High atmospheric pressure
   d) Both low temperature and high atmospheric pressure

2. For the reaction $CHCl_3 + Cl_2 \rightarrow CCl_4 + HCl$, the rate law is given by $r = k [CHCl_3] [Cl_2]^{½}$. What is the order of reaction ?

3. Identify the configuration of the transition element, which shows the highest spin only magnetic moment.
   a) $3d^7$ b) $3d^5$ c) $3d^8$ d) $3d^2$

4. Analyse the following statements and choose the correct option.
   Statement I : Boiling points of alcohols are high.
   Statement II : Alcohols can form intermolecular hydrogen bonding.
   a) Both Statement I and Statement II are true and Statement II is the correct explanation of Statement I
   b) Both Statement I and Statement II are true but Statement II is not the correct explanation of Statement I
   c) Statement I is true but Statement II is false
   d) Both Statement I and Statement II are false

5. How many monosaccharide units are present in the sugar present in milk ?

Score

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

6. When raisins are kept in water, they swell in size. Name the phenomenon responsible for it and give any one application of the phenomenon.

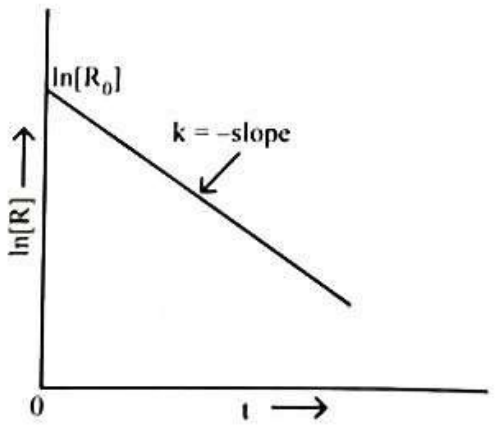
7. A galvanic cell has a cell potential of 1.1 V. If an opposing potential of 1.1 V is applied to this cell, what will happen to the cell reaction and current flowing through the cell ?

8. For a general reaction R → P, the plot of ln[R] vs time t is given.

   Answer the following questions based on this graph.

   i) What is the order of the reaction ? **(1)**

   ii) What is the unit of rate constant ? **(1)**



9. With the help of an example explain pseudo first order reaction.

10. Why are aryl halides less reactive towards nucleophilic substitution reactions than alkyl halides ? (any two reactions)

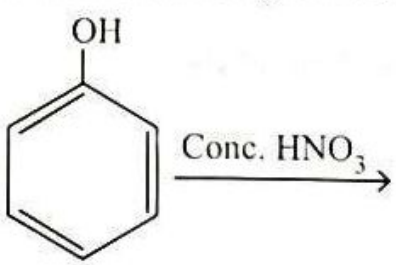
Score

11. Explain the manufacture of ethanol from molasses.

12. Match the following.

Column – I	Column – II
i) Conversion of phenol to salicylic acid	a) Grignard reagents
ii) Reaction of alkyl halide with sodium alkoxide	b) Kolbe's reaction
iii) Manufacture of phenol	c) Williamson's synthesis
iv) Conversion of ketone to 2° alcohol	d) Cumene

13. Identify the product obtained in the following reaction :



14. Explain Rosenmund reduction for the preparation of an aldehyde.

15. $CH_3CH_2NH_2$ is more basic than $C_6H_5NH_2$. Give reason.

Answer any eight questions from 16 to 26. Each carries 3 scores. **(8×3=24)**

16. i) When 1.00 g of a nonelectrolyte solute is dissolved in 50 g of benzene, the freezing point of benzene is lowered by 0.40 K. Give reason. **(1)**

ii) Find the molar mass of the above solute, if the freezing point depression constant of benzene is 5.12 K kg mol^{-1}. **(2)**

Score

17. i) Classify the following as primary and secondary batteries. (2)

Lead storage battery, Mercury cell, Nickel-Cadmium cell, Dry cell

ii) What advantage do the fuel cells have over primary and secondary batteries ? (1)

18. i) What is the effect of a catalyst on the activation energy of a reaction ? (1)

ii) The rate constants of a reaction at 500K and 700K are 0.02 s^{-1} and 0.07 s^{-1} respectively. Calculate the value of activation energy. (2)

19. When a chromite ore is fused with sodium carbonate in excess of air and the product is dissolved in water, a yellow solution of compound (A) is obtained. After treatment of this yellow solution with sulphuric acid, compound (B) can be crystallised from the solution. When compound (B) is treated with KCl, orange crystals of compound (C) crystallise out. Identify A to C and write their formulae.

20. Give reason for the following.

i) The enthalpies of atomisation of the transition metals are high. (1)

ii) The transition metals generally form coloured compounds. (1)

iii) Although Zr belongs to 4d and Hf belongs to 5d transition series, it is quite difficult to separate them. (1)

Score

21. The compound $CoSO_4Cl.5NH_3$ reacts with $AgNO_3$ to give white precipitate, but does not react with $BaCl_2$. Answer the following questions.

i) Write the structural formula and IUPAC name of the compound. (2)

ii) What is the coordination number of central metal ion in the compound ? (1)

22. Using valence bond theory, predict the following in relation to the complex $[Co(NH_3)_6]^{3+}$ given below :

i) Type of hybridisation. (1)

ii) Whether inner or outer orbital complex. (1)

iii) Magnetic behaviour. (1)

23. Write the structure of the major organic product in each of the following reactions :

i) $CH_3CH_2CH_2Cl + NaI \xrightarrow[\text{heat}]{\text{acetone}}$ (1)

ii) $CH_3CH_2CH_2OH + SOCl_2 \rightarrow$ (1)

iii) $CH_3CH_2CH = CH_2 + HBr \xrightarrow{\text{peroxide}}$ (1)

24. Choose the correct reagents from box given below for following conversion reactions :

$Zn\text{-}Hg/HCl$, $DIBAL\text{-}H/H_2O$, $Br_2/redP$, $KMnO_4/OH^-$

i) A carboxylic acid to α-halocarboxylic acid. (1)

ii) An unsaturated ester to aldehyde. (1)

iii) A ketone to hydrocarbon. (1)

Score

25. i) Write the name and one of the uses of azo compound obtained when benzene diazonium chloride reacts with phenol. (2)

ii) Write the name of above reaction. (1)

26. Write any three differences between RNA and DNA.

Answer any four questions from 27 to 31. Each carries 4 scores. (4×4=16)

27. i) What general name is given to binary mixtures which show deviation from Raoult's law ? How many types of such mixtures are there ? (1)

ii) What type of deviation is shown by a mixture of chloroform and acetone ? Explain the reason for the deviation and draw a graph representing it. (3)

28. i) What is meant by limiting molar conductivity of an electrolyte ? (1)

ii) Write the name and statement of the law used to determine the limiting molar conductivity of an electrolyte. (2)

iii) Calculate limiting molar conductivity for $CaCl_2$. λ^0 values for Ca^{2+} and Cl^- are 119.0 S cm^2 mol^{-1} and 76.3 S cm^2 mol^{-1} respectively. (1)

29. i) Explain linkage isomerism in coordination complexes with the help of suitable examples. (2)

ii) Draw the geometrical isomers of $[Pt(NH_3)_2Cl_2]$. (2)

Score

30. i) Write any two differences between S_N1 and S_N2 reaction mechanisms in alkyl halides. **(2)**

ii) Write the equation for the dehydrohalogenation reaction of 2-Bromobutane using alcoholic KOH and predict the major product. **(2)**

31. Explain the following reactions :

i) Aldol condensation. **(2)**

ii) Cannizzaro reaction. **(2)**