Reg. No. : .....

Name : .....

FY 525

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

1. How many significant figures are present in,

   a) 18.42 b) 0.0004

2. Hybridisation of boron in BCl_3 is _____.

   a) sp b) sp^2 c) sp^3 d) sp^3d

3. Identify the Lewis base among the following.

   a) BF_3 b) NH_3 c) $AlCl_3$ d) H^+

4. Estimation of amount of sulfur in an organic compound is carried out in _____.

   a) Sodium fusion tube

   b) Conical flask

   c) Carius tube

   d) Kjeldahl's flask

5. Atomic number of element with symbol Uus is _____.

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

6. i) Identify the law of chemical combination illustrated by the given pair of compounds. **(1)**

   CuO and Cu_2O

   ii) State the law. **(1)**

7. i) Cu (Z = 29) and Cr (Z = 24) shows extra stability. Write their subshell electronic configuration. **(1)**

   ii) Account for the extra stability. **(1)**

Score

8. i) Number of protons, electrons and neutrons in a species are equal to 11, 10 and 12 respectively. Write the proper symbol of the species. (1)

   ii) Which among the following is isoelectronic with the above species ?

   F^{2-}, Ca^{2+}, Mg^{2+}, O^{-} (1)

9. What is a hydrogen bond ? Name the two types of hydrogen bonding. (1+1)

10. Classify the following into extensive properties and intensive properties.

    1) Internal energy

    2) Density

    3) Refractive index

    4) Mass (2)

11. i) State Le-Chatelier principle. (1)

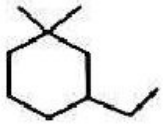
    ii) What is the effect of pressure on the reaction ?

    $N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$ (1)

12. i) Explain disproportionation redox reaction with example. (1)

    ii) Identify the oxidation number of Mn in MnO_2 and $KMnO_4$. (1)

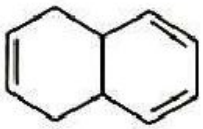
13. Give the IUPAC name of the following compounds.

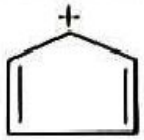
    a) 

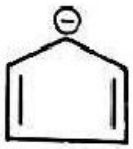
    b) $CH_3 - \overset{\overset{O}{\|}}{C} - CH_2 - \overset{\overset{O}{\|}}{C} - CH_3$ (1+1)

Score

14. Identify the aromatic compounds among the following.

a) 

b) 

c) 

d)  **(2)**

15. Draw the New Mann's projections for the conformations of ethane and name them. **(2)**

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

16. i) $C_6H_{12}O_6$ is the Molecular Formula (MF) of glucose and CH_2O is its Empirical Formula (EF). Give the relation between MF and EF. **(1)**

ii) Calculate number of glucose molecules present in 36g of glucose.
(Atomic mass of C, H and O are 12u, 1u and 16u respectively) **(1)**

iii) Calculate molarity of solution made by dissolving 36g glucose in one litre water. **(1)**

17. i) State Heisenberg uncertainty principle. **(1)**

ii) Calculate the uncertainty in velocity of a moving particle with mass 0.25g, if the uncertainty in its position is 3.313 nm. ($h = 6.626 \times 10^{-34} kgm^2s^{-2}$) **(2)**

18. Account for the following.

i) First ionisation enthalpy of Nitrogen is greater than that of oxygen. **(1)**

ii) PCl_5 is a stable compound of phosphorous but NCl_5 do not exist. **(1)**

iii) Boron show differences from other members of its group. **(1)**

Score

19. i) State modern periodic law. (1)

ii) Write the general outer electronic configuration of d block elements. (1)

iii) Name the most electronegative element. (1)

20. i) Write the molecular electronic configuration of O_2^{2+} species. (1)

ii) Based on bond order and electronic configuration, predict the stability and magnetism of O_2^{2+} species. (2)

21. i) Define a spontaneous process. (1)

ii) Identify the condition of temperature for a process to be spontaneous where ΔH and ΔS are positive.

(Hint : $\Delta G = \Delta H - T\Delta S$). (1)

iii) Which of the following is a process taking place with increase in entropy ?

a) Condensation of steam

b) Freezing of water

c) Melting of ice. (1)

22. i) HSO_4^- can act as both Bronsted acid and base. Write the corresponding conjugate acid and conjugate base of HSO_4^-. (1)

ii) Calculate pH of a 0.04M solution of H_2SO_4 in water. (2)

23. i) Identify the redox reaction among the following and justify.

a) $H_2S + Cl_2 \rightarrow 2HCl + S$

b) $CaCO_3 \rightarrow CaO + CO_2$ (1)

ii) Which is the oxidant and reductant in the above identified redox reaction ? (1)

iii) Write the stock notation for $HAuCl_4$ and MnO_2. (1)

Score

24. Write three pairs of different structural isomers that may have the molecular formula $C_4H_{10}O$. Mention the type of isomerism shown by each pair. (3)

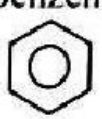
25. i) Predict the major product in the following reactions.

a) $CH_3 - CH_2 - CH = CH_2 + HBr \longrightarrow A$

b) $CH_3 - CH_2 - CH = CH_2 + HBr \xrightarrow{\text{Peroxide}} B$ (1)

ii) Write the name of the rule/effect behind the formation of product A and B. (2)

26. Match the following. (3)

Reactant	Process	Reagent and Condition	Product
Benzene 	Acetylation	H_2/Pd	BHC
	Reduction	$3Cl_2$/hv 500K	Acetophenone
	Chlorination	CH_3COCl, Anhyd. $AlCl_3$	Cyclohexane

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

27. Fill in the blanks. **(8×½=4)**

BF_3	120°	Trigonal planar
CH_4	——	——
PCl_5	120°, ——	——
$BeCl_2$	——	——
SF_6	——	——

Score

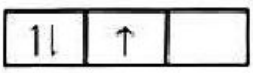
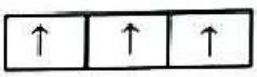
28. i) Write the names of four quantum numbers. (1)

ii) Which among them explain the average distance of electron from the nucleus ? (1)

iii) Represent the orbital with quantum numbers. (1)

a) $n = 2,\ l = 0$ b) $n = 3,\ l = 1$

iv) Which among the following is correct representation of electron arrangement in a p orbital ?

a)  b)  (1)

29. i) State Hess's law of constant heat summation. (1)

ii) Calculate enthalpy of reaction for the formation of N_2O and CO_2 as per the reaction,

$N_2O_{4(g)} + 3CO_{(g)} \rightarrow N_2O_{(g)} + 3CO_{2(g)}$

if $\Delta_f H^\circ$ of CO, CO_2, N_2O and N_2O_4 are -110.0 kJ mol^{-1}, -393.0 kJ mol^{-1}, 81.0 kJ mol^{-1}, 9.4 kJ mol^{-1}. (2)

iii) Draw the enthalpy diagram for exothermic reaction. (1)

30. i) Match the following. (1½)

Acidic solution	NaCl	pH > 7
Basic solution	NH_4Cl	pH = 7
Neutral solution	CH_3COONa	pH < 7

ii) Explain common ion effect with an example. (1½)

iii) Give an example for acidic buffer solution. (1)

Score

31. i) Differentiate the following.

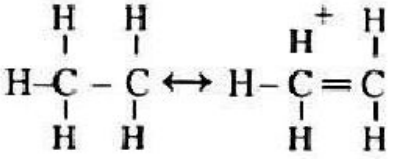
a) Homolysis and Heterolysis.

b) Nucleophile and electrophile. (2)

ii) Write the increasing order of stability of the given carbocations.

CH_3^+, $(CH_3)_3C^+$, $(CH_3)_2CH^+$, $CH_3CH_2^+$ (1)

iii) Name the electron displacement effect.



(1)