Class No. : .....

Name : .....

FY 25

FIRST YEAR HIGHER SECONDARY SECOND TERMINAL EXAMINATION, DECEMBER 2023

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. Who discovered Proton ?

2. The I.U.P.A.C. name of an element with atomic number 123 is

3. Structure of sp^3 hybridization is

4. Hot coffee in a thermoflask is an example of _____ system.

5. The oxidation state of oxygen in H_2O_2 is

   a) –2 b) +2 c) –1 d) +1

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

6. Calculate the volume occupied by 8.8 g of CO_2 at S.T.P.

7. What are the limitations of Bohr atom model ?

8. State Mendeleev's and modern periodic law.

9. How many σ and π bonds are there in the following molecules ?

   a) Ethane

   b) Ethene

Score

10. Sketch Lewis dot formula of

a) H_2O

b) C_2H_4.

11. Define extensive and intensive properties.

12. State Lewis concept of acids and bases. Give one example each.

13. What are buffer solutions ? Give one example.

14. Write the chemical formula of following compounds :

a) Tin (IV) oxide

b) Iron (III) sulphate

15. Name four different types of redox reaction.

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

16. a) Define limiting reagent. **(1)**

b) 4 g of hydrogen react with 64 g of oxygen to give water. Identify the limiting reagent. **(2)**

17. a) Write the orbitalwise electronic configuration of (i) Cu (Z = 29), (ii) Cr (Z = 24). **(2)**

b) Give the reason for their extra stability. **(1)**

Score

18. a) Which is the visible spectrum of hydrogen ? **(1)**

b) Calculate the de-Broglie wavelength associated with an electron of velocity 1.6×10^6 m/s (mass of $\bar{e} = 9.1 \times 10^{-31}$ kg). **(2)**

19. a) Chlorine has more electron gain enthalpy than fluorine. Why ? **(1)**

b) What is meant by isoelectronic species ? **(1)**

c) Select the isoelectronic species from the following : **(1)**

N^-, O^{2-}, Al^{2+}, Mg^{2+}, Cl^-, Na^+, F^-

20. a) Define bond order. **(1)**

b) Calculate the bond order of He^{2+}, Li_2^-. **(2)**

21. a) Define hybridization. **(1)**

b) Match the following : **(2)**

A	B
1) sp	a) Trigonal bipyramidal
2) sp^2	b) Tetrahedral
3) sp^3	c) Linear
4) sp^3d	d) Octahedral
	e) Trigonal planar

22. The standard enthalpy of formation of CH_4, CO_2 and H_2O are –74.85, –393.5 and –286 KJ/mol respectively. Calculate the standard enthalpy of combustion of methane. **(3)**

Score

23. a) State first law of thermodynamics. (1)

b) Write its mathematical expression. (1)

c) Define standard enthalpy of formation. (1)

24. a) Give the criteria for the spontaneity of a process in terms of Gibb's free energy change. (1)

b) Find the temperature above which the following reaction become spontaneous (2)

$MgO_{(s)} + C_{(s)} \rightarrow Mg_{(s)} + CO_{(g)}$

($\Delta H° = 490$ KJ/mol, $\Delta S° = 198$ JK/mol)

25. a) Define the pH of a solution. (1)

b) Calculate the pH of 0.01 M HCl. (2)

26. If K is the equilibrium constant for the reaction $A + B \rightleftharpoons C + D$, calculate the equilibrium constant for the following reactions :

a) $C + D \rightleftharpoons A + B$ (1½)

b) $\frac{1}{2}A + \frac{1}{2}B \rightleftharpoons \frac{1}{2}C + \frac{1}{2}D$ (1½)

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

27. a) Write the relationship between molecular formula and empirical formula. (1)

b) A compound contains 4.07% of hydrogen, 24.27% of carbon and 71.65% of chlorine. The molar mass is 98.96 g. Calculate molecular formula. (3)

Score

28. Explain the following :

a) Photoelectric effect. **(1)**

b) Pauli's exclusion principle. **(1)**

c) Heisenberg's uncertainty principle **(1)**

d) Hund's rule of maximum multiplicity. **(1)**

29. a) Ionisation enthalpy of nitrogen is greater than oxygen. Explain. **(2)**

b) The elements in the second period of periodic table show anomalous behaviour. Why ? **(2)**

30. a) Draw the molecular orbital diagram of O_2. **(2)**

b) H_2O exists as liquid while H_2S is a gas. Explain. **(2)**

31. a) Write the relationship between K_p and K_c. **(1)**

b) State Le Chatelier's principle. **(1)**

c) Predict the conditions to be applied for the maximum production of ammonia from the following reaction : **(2)**

$$N_2 + 3H_2 \xrightleftharpoons{Fe} 2NH_3$$

($\Delta H = -92$ KJ/mol.)