Class No. : .....

Name : .....

FY 3025

FIRST YEAR HIGHER SECONDARY SECOND TERMINAL EXAMINATION, DECEMBER 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. The mass of 1.2 moles of H_2O is _____ g.

2. The number of electron present in a metal M^{2+} ion is 28, its atomic number is _____

   a) 28

   b) 26

   c) 30

   d) 56

3. The most electronegative element in the periodic table is _____

4. Which of the following molecules has the highest dipole moment ?

   a) H_2S

   b) CO_2

   c) CCl_4

   d) BF_3

5. The conjugate acid of NH_3 is _____

Score

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

6. State and explain the law of Conservation of Mass.

7. Why do we prefer molality than molarity ?

8. Draw the boundary surface diagram of 2s and 2p orbitals.

9. Write the values of n, l, m and s for the valence electron of sodium atom (atomic number of Na = 11).

10. i) The IUPAC symbol of an element with atomic number 119 is (1)

    ii) How does the metallic character vary along a group and period in periodic table ? (1)

11. i) Define Isoelectronic species. (1)

    ii) Which one is bigger F or F^- ? Why ? (1)

12. $2Cl(g) \rightarrow Cl_2$ what are the sign of ΔH and ΔS ?

Score

13. ΔH and ΔS of a reactions are 45.84 and 0.999 kilo joules per mol respectively at 1 atmosphere pressure. Calculate the temperature at which this the reaction is in equilibrium.

14. i) Write the equation for a equilibrium constant K_c for the reaction. (1)

ii) $4\ NH_3(g) + 5\ O_2(g) \rightleftharpoons 4\ NO(g) + 6\ H_2O(l)$.

What happens to the value of the equilibrium constant (K_c) when the above reaction is reversed ? (1)

15. Calculate the solubility (S) of $MgSO_4$ at 298 K, if its solubility product constant (K_{sp}) at this temperature is 9×10^{-6}.

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

16. i) Define one mole. (1)

ii) How much copper can be obtained from 79.5 g of $CuSO_4$? (Given atomic mass of Cu, S and O are 63.5, 64 and 32 g respectively) ? (2)

Score

17. i) Write any two postulates of Bohr model of atom. (1)

ii) Calculate the radius of second orbit of lithium. (2)

18. i) State dual behaviour of matter. (1)

ii) A moving electron has a de Broglie wavelength of 7×10^{-7} metres, calculate its kinetic energy. [$m_e = 9.1 \times 10^{-31}$ Kg]. (2)

19. i) State Modern Periodic law. (1)

ii) Write any two merits of Mendeleev's periodic table. (2)

20. The first ionization enthalpy of sodium is lower than that of magnesium but the second ionisation enthalpy is higher than that of magnesium, explain.

21. Explain any three important postulates of VSEPR theory.

22. The oxygen atom in water molecule is sp^3 hybridized but the water molecule has no tetrahedral shape. Why ?

Score

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

ii) Calculate the standard enthalpy of formation of methanol (CH_3OH) from the following data. The enthalpy of combustion of methane, enthalpy of formation of water and carbon dioxide are $-726 kJmol^{-1}$, $-286 kJmol^{-1}$, $-393 kJmol^{-1}$ respectively. (2)

24. i) What is enthalpy of solution ? (1½)

ii) What is enthalpy of dilution ? (1½)

25. $2NO_2(g) \rightarrow N_2O_4$ $H = -52.7 kJmol^{-1}$. What change will happen if we

i) Increase the temperature (1)

ii) Increase the pressure (1)

iii) Remove N_2O_4 (1)

26. Justify that the following reactions are redox reactions.

i) $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$ (1½)

ii) $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$ (1½)

Score

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

27. i) What is mass percent ? **(1)**

ii) A compound contains 4.07% of hydrogen 24.27% of carbon and 71.65% of chlorine its molar mass is 96.96, what is the empirical and molecular formula ? **(3)**

28. i) State :

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

b) Hund's rule. **(1)**

ii) Electrons are emitted with zero velocity from a metal surface when it is exposed to radiation of wavelength 6800 Å. Calculate the threshold frequency and work function of the metal. **(2)**

29. Write the molecular orbital electronic configuration and calculate the bond order of N_2 and F_2.

Score

30. i) What is meant by spontaneous processes ? **(1)**

ii) Give the criterion of spontaneity in terms of ΔG for a process taking place at constant temperature and pressure. **(2)**

iii) Write the mathematical expression of First Law of Thermodynamics. **(1)**

31. i) What are buffer solutions ? Give an example for a buffer solution. **(2)**

ii) Write the Henderson – Hasselbalch equation for an acidic buffer. Calculate the pH of an acidic buffer containing 0.1 M CH_3COOH and 0.5 M CH_3COONa. [Ka for CH_3COOH is 1.8×10^{-6}]. **(2)**