Class No. : .....

Name : .....

FY 125

FIRST YEAR HIGHER SECONDARY SECOND TERMINAL EXAMINATION, DECEMBER 2024

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 represents the symbol of the species that contain 18 electrons, 16 protons and 16 neutrons respectively ?

   a) O^{2-} b) Cl^{-}

   c) S^{2-} d) Br^{-}

2. Which of the following has the highest value of electronegativity ?

   a) P b) F

   c) S d) Cl

3. The hybridized state of carbon in C_2H_4 is _____

4. In the following question a statement of Assertion (A) followed by a statement of Reason (R) is given.

   Assertion (A) : A liquid crystallises into a solid and is accompanied by decrease in entropy.

   Reason (R) : In crystals, molecules organise in an ordered manner.

   Choose the correct option out of the choices given below :

   i) Both A and R are true and R is the correct explanation of A

   ii) Both A and R are true but R is not the correct explanation of A

   iii) A is true but R is false

   iv) A is false but R is true

5. What will be the conjugate base for the Bronsted acid : HF ?

Score

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

6. The following data are obtained when dinitrogen and dioxygen react together to form different compounds :

	Mass of dinitrogen	Mass of dioxygen
(i)	14 g	16 g
(ii)	14 g	32 g

Which law of chemical combination is obeyed by the above experimental data ? Write its statement.

7. The threshold frequency ν_0 for a metal is $7.0 \times 10^{14}\ s^{-1}$. Calculate the kinetic energy of an electron emitted when radiation of frequency $\nu = 1.0 \times 10^{15}\ s^{-1}$ hits the metal.

8. i) State modern periodic law. **(1)**

ii) Write the IUPAC name of the element with Z = 109. **(1)**

9. Write any two differences between sigma and pi bonds.

10. Explain intermolecular hydrogen bonding with the help of suitable examples.

Score

11. Match the following :

A	B
i) Adiabatic process	a) Specific heat capacity
ii) Free expansion	b) At constant pressure
iii) $\Delta H = q$	c) Entropy
iv) Intensive property	d) No transfer of heat
	e) $p_{ext} = 0$

12. For the following equilibrium, $Kc = 6.3 \times 10^{14}$ at 1000 K.

$NO(g) + O_3(g) \rightleftharpoons NO_2(g) + O_2(g)$

Both the forward and reverse reactions in the equilibrium are elementary bimolecular reactions. What is Kc, for the reverse reaction ?

13. The concentration of hydrogen ion in a sample of soft drink is 3.8×10^{-3} M.

What is its pH ?

14. Identify the oxidant and reductant in the following reaction.

$2Na(s) + H_2(g) \rightarrow 2\,NaH(s)$

15. What are disproportionation reactions ? Justify that the following reaction is a disproportionation reaction.

$2H_2O_2(aq) \rightarrow 2H_2O(l) + O_2(g)$

Score

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

16. 2 mol $H_2(g)$ mixed with 1 mol $O_2(g)$ and allowed to react as given below :

$2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$

i) How many molecules of H_2 and O_2 were initially present ? **(1)**

ii) How many atoms of H and O will be there in the product ? **(1)**

iii) How many molecules of H_2O were formed ? **(1)**

17. Define photoelectric effect. Write any two results observed in the Photoelectric effect experiment.

18. i) Calculate the radius of Bohr orbit for Hydrogen atom. **(1)**

ii) Write any two limitations of Bohr model for Hydrogen atom. **(2)**

19. Define electron gain enthalpy. Which among O and S has more negative electron gain enthalpy ? Give reason.

20. Draw the Lewis structure of O_3 and assign formal charge on each atom.

21. Write the Molecular orbital configuration of N_2. Calculate its bond order and also predict magnetic behavior.

Score

22. i) State First Law of Thermodynamics. (1)

ii) Express the change in internal energy (ΔU) of a system when no heat is absorbed by a system from the surroundings, but work(w) is done on the system. What type of wall does the system have ? (2)

23. Calculate the standard enthalpy of formation of $CH_3OH(l)$ from the following data :

$CH_3OH(l) + \frac{3}{2} O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$; $\Delta_r H = -726$ kJ mol^{-1}

$C(graphite) + O_2(g) \rightarrow CO_2(g)$; $\Delta_c H = -393$ kJ mol^{-1}

$H_2(g) + \frac{1}{2} O_2(g) \rightarrow H_2O(l)$; $\Delta_f H = -286$ kJ mol^{-1}

24. i) Define :

a) entropy (1)

b) free energy (1)

ii) Which among the following is correct for a spontaneous process ? (1)

a) $\Delta S > 0, \Delta G < 0$

b) $\Delta S > 0, \Delta G > 0$

c) $\Delta S = 0, \Delta G = 0$

d) $\Delta S = 0, \Delta G > 0$