**Section I: Each question carriers 1 mark: 1 x 6 = 6 marks**

1. How many number of g-atom of oxygen are present in $6.02 \times 10^{24}$ CO molecules?
2. According to Le Chatelier's principle, what is the effect of addition of heat to equilibrium between solid and liquid?
3. What is a standard solution?
4. What does equilibrium constant (K) < 1 indicates?
5. Define 'triple point' of a substance?
6. What type of stoichiometric defect is shown by ZnS?

**Section II: Each question carriers 2 marks: 2 x 5 = 10 marks**

1. Write major difference between metals and non-metals?
2. What is the shape of 3s orbital? How many nodes are there in it?
3. What happens when:
   (i) Quick lime is heated with silica
   (ii) $Na_2O_2$ reacts with water?
4. Reaction between $H_2$ and $Cl_2$ is slow but reaction between NaCl and $AgNO_3$ is very fast. Explain
5. Explain why ideal gas expands into vacuum; there is neither absorption nor evolution of heat?

**Section III: Each question carriers 3 marks: 3 x 13 = 39 marks**

1. Explain the hybridisation of 4SF?
2. Balance P + HNO3 --> H3PO4 + NO2 + H2O by oxidation number method.
3. (a) The 4f sub shell of an atom contains 12 electrons. What is the maximum number of electrons having the same spin in it?

   (b) Explain the meaning of 4p6.

   (c) Write the electronic configuration of the atom with atomic number.

4. (a) Calculate the molarity of a solution of ethanol in water in which the mole fraction of ethanol is 0.40.
   (b) What causes stomata to open and close during transpiration process?

5. Why are alkali metals not found free in nature?

   (ii)Which of the alkali metal is having least melting point? Why?

   (a) Na (b) K (c) Rb (d) Cs

6. Why is green chemistry considered as a new route to protection of environment?
7. Differentiate between inductive effect and electrometric effect with example.
8. Give a brief description of the following terms with examples

   (i) Sublimation
   (ii) Vacuum distillation
   (iii) Differential Extraction.

9. Differentiate the following

   (i) Emission spectra and Absorption spectra
   (ii) Isobar and Isotope (give example).
   (iii) Lyman series and Balmer series

10. Consider the following species; $N^{3-}$, $O^{2-}$, $Al^{3+}$, $Mg^{2+}$, $Na^{+}$, $F^{-}$

    a. What is common in them?
    b. What are they called?
    c. Arrange them on the basis of increasing ionic radii.

11. What is the total number of sigma and pi bond in the following molecules

    (i) $CH_2Cl_2$ (ii) $CH_2$=CH Cl (iii) $CH_3$-CH=CH-CH=O

12. During rusting of iron, an electrochemical cell is set up. Explain it
13. Define ionization enthalpy. Name the factors which influence its value.

**Section IV: Each question carriers 5 marks:** **3 x 5 = 15 marks**

1. (a) State the postulates of kinetic molecular theory of gases.

(b) Out of dry air and wet air, which is heavier? Explain.

OR

i. Liquid ammonia bottle is cooled before opening the seal. Explain.
ii. Drop of liquid assumes spherical shape. Why?

2. (a) What is the shape of 3s orbital? How many nodes are present in it?

(b) What is the Bohr frequency rule?

(c) What are degenerate orbitals?

(d) What is the maximum no. of emission lines when the excited e- of a hydrogen atom in n=6 drops to the ground state?

(e) Calculate the radius of Bohr's third orbit for hydrogen atom.

OR

(a) What do you mean by colligative property?

(b) Show that relative lowering of vapour pressure is a colligative property.

(c) The vapour pressure of pure benzene at a certain temperature is 0.850 bar. A non-volatile non electrolyte solid weighing 0.5gm when added to 39.0gm of benzene (molar mass 78gm/mol). Vapour pressure of the solution, then is 0.845 bar .What is the molar mass of the solid substance?

3. (a) Give reasons :

(i) Noble gases have comparatively large atomic sizes.
(ii) Halogens are coloured.
(iii) $NH_3$ forms hydrogen bond but $PH_3$ does not.

(b) Draw the structure of:

(i) $ICl_4^-$
(ii) $BrO_3^{--}$

OR

(a) Give reasons

Pentahalides are more covalent than trihalides.

(i) $NH_3$ acts as a lewis base

(ii) $H_2O$ is a liquid but $H_2S$ is a gas.

(b) Draw the structure of:

(i) $H_2SO_4$

(ii) $H_2SO_3$