SECTION I (40 Marks)

Attempt all questions from this section.

Question 1

(a) Fill in the blanks:

i. Dalton used symbol _____ for oxygen and symbol _____ for hydrogen.

ii. Symbol represents _____ atom(s) of an element.

iii. Symbolic expression for a molecule is called ____.

iv. Sodium chloride has two radicals. Sodium is a ____ radical, while chloride is ____ radical.

v. Valency of carbon in CH4 is ____ , in C2H6 is ____ , in C2H4 is ____ and in C2H2 is ____.

(b) State the type of reaction.

i. NaOH + HCl → NaCl + H2O

ii. BaCl2 + H2SO4 → BaSO4 + 2HCl

iii. 2Fe + 3Cl2 → 2FeCl3

iv. 2PbO2 → 2PbO + O2

v. PbCl5 → PCl3 + Cl2

[5]
(c) Write the formula and balance the following chemical equations:
   i. Manganese (IV) oxide + Concentrated hydrochloric acid → Manganese (II) chloride + Water + Chlorine
   ii. Potassium dichromate + Concentrated hydrochloric acid → Potassium chloride + Chromium chloride + Water + Chlorine
   iii. Sulphur dioxide + Oxygen → Sulphur trioxide
   iv. Zinc + Water → Zinc oxide + Hydrogen
   v. Aluminium + Dilute hydrochloric acid → Aluminium chloride + Hydrogen

(d) Identify the cationic (basic radical) and anionic (acidic radical) parts in the following compounds and then write their chemical formulae.
   i. Nickel sulphate
   ii. Sodium silicate
   iii. Ferrous sulphate
   iv. Calcium fluoride
   v. Sodium nitrate

(e) State the valency and formula of the following ions:
   i. Ammonium ion
   ii. Cupric ion
   iii. Ferric ion
   iv. Plumbous ion
   v. Nitrate ion

(f) Name the following:
   i. Gas liberated when ammonium nitrate is heated.
   ii. Two stable metallic hydroxides.
   iii. Two metals which do not react with oxygen.
   iv. Two metals which directly combine with sulphur on heating.
   v. Two metals which directly combine with nitrogen on heating.

(g) Compare:
   i. Sodium atom and sodium ion
   ii. Chlorine atom and chloride ion, with respect to
      a) Atomic structure
      b) Electrical state
      c) Chemical action
      d) Toxicity
Elements of the periodic table with atomic numbers from 3 to 18 are shown in the table below. Some elements are shown by letters even though the letters are not the usual symbols of the elements.

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Which of these is

i. A noble gas
ii. A halogen
iii. An alkali metal
iv. An element with valency 4

SECTION II (40 Marks)
*Attempt any four questions from this section.*

Question 2

(a) Correct the following statements:
   i. Hydrogen is used as a fuel for rocket propulsion.
   ii. All metals react with acids to give hydrogen.
   iii. Metals adsorb hydrogen.
   iv. The reaction between hydrogen and oxygen is exothermic.
   v. Conc. $\text{H}_2\text{SO}_4$ reacts with zinc to liberate hydrogen.

(b) How will you incorporate the following information into an equation?
   i. Presence of catalyst
   ii. Temperature and pressure conditions
   iii. Evolution of a gas
   iv. Formation of precipitate
   v. Evolution of heat
   vi. Physical state of the reactants and products

(c) Give reason.
   i. An atom is electrically neutral.
   ii. The mass of an atom is concentrated in the nucleus of an atom.
   iii. The Rutherford model of an atom could not provide stability to the nucleus.
Question 3
(a) Two neutral gases 'A' and 'B' undergo a synthesis reaction to form a gas 'C'.
   i. Identify 'A', 'B' and 'C'.
   ii. Name the process by which gas 'C' is manufactured. Give the balanced chemical
equation along with the conditions.
   iii. What do you observe when gas 'C' comes in contact with
       1. Moist red litmus paper; 2. Concentrated hydrochloric acid
   [5]

(b) What do you understand by the combining capacity of atoms? Explain with examples. [3]

(c) What is meant by (i) electronic configuration, (ii) atomic number and atomic mass
    number? [2]

Question 4
(a) How do fish and aquatic animals survive when a pond is covered with thick ice? [2]

(b) Classify solutions on the basis of solubility. [3]

(c) Name two elements whose properties were correctly predicted by Mendeleev. Mention
    their present-day name. [2]

(d) Explain endothermic and exothermic reactions with the help of an example. [3]

Question 5
(a) Define group and period.
   i. How many elements are present in the first, second and third periods?
   ii. Name all the elements present in Groups 1 and 17. [5]

(b) What is the significance of the word 'latent' in latent heat? Define the two types of
    latent heat. [5]
Question 6

(a)

i. Name the process in which water gas is used for the manufacture of hydrogen.

ii. Give the balanced chemical equation for the large-scale preparation of hydrogen from water gas.

iii. How are carbon dioxide and carbon monoxide removed from hydrogen produced?

(b)

i. What is a redox reaction? Explain with the help of an example.

ii. In the equations given below, state whether the substance underlined is oxidised or reduced?

1. \( S_\text{2} + O_2 \rightarrow SO_2 \)
2. \( C + H_2O \rightarrow CO + H_2 \)
3. \( H_2S + Cl_2 \rightarrow 2HCl + S \)
4. \( PbO + C \rightarrow Pb + CO \)
5. \( Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2 \)

Question 7

(a) 20 dm\(^3\) of oxygen is contained in a vessel at a pressure of 200 atmosphere. Another empty vessel of similar capacity is connected to it. Calculate the common pressure of gas in both vessels.

(b) A gas occupies 200 cm\(^3\) at a temperature of 27°C and 720 mm of Hg. Find its volume at 3°C and 740 mm of Hg.

(c) Explain the terms:

i. Solution

ii. Solute

iii. Solvent