General Instructions:
1. Answers to this paper must be written on the paper provided separately.
2. You will not be allowed to write during the first 15 minutes.
   This time is to be spent in reading the question paper.
3. The time given at the head of the paper is the time allotted for writing the answers.
4. Attempt all questions from Section I and any four questions from Section II.
5. The intended marks of questions or parts of questions are given in brackets [ ].

SECTION I (40 Marks)
Attempt all questions from this section.

Question 1

(a) Draw the orbit structure and electron dot diagrams of NaCl, MgCl₂ and CaO. [5]

(b) State whether the underlined substance is getting oxidised or reduced.
   i. Cu + 2H₂SO₄ → CuSO₄ + 2H₂O + SO₂
   ii. 2Mg + CO₂ → 2MgO + C
   iii. Fe₂O₃ + 3CO → 2Fe + 3CO₂
   iv. 3CuO + 2NH₃ → 3Cu + N₂ + 3H₂O
   v. 2FeCl₂ + Cl₂ → 2FeCl₃ [5]

(c) An element 'M' has three electrons more than the noble gas. Give the formula of its
   i. Chloride
   ii. Sulphate
   iii. Hydroxide
   iv. Phosphate
   v. Oxide [5]

(d) Give the valency and the formula of the following radicals:
   i. Silicate
   ii. Hydroxide
   iii. Acetate
   iv. Bispulhide
(e) Fill in the blanks.

i. Hydrogen is ______ soluble in water.

ii. Hydrogen gas when passed through molten sulphur reacts to give ______ gas.

iii. Atomic number of magnesium is 12. Thus, the electronic distribution of Mg atom is ________.

iv. According to Charles’ law, volume is _____ proportional to temperature at constant pressure.

v. Ethane molecule has ___ double bond and ___ single bond.

(f) Explain exothermic and endothermic reactions with suitable examples.

(g) Name the gas evolved in the following reactions:

i. Steam is passed over red hot iron.

ii. Hydrogen is passed through boiling sulphur.

iii. Sodium nitrate is heated.

iv. Zinc carbonate is heated.

v. Red lead is heated.

(h) Match the following:

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Carbonic acid</td>
<td>(a) 2, 8, 8</td>
</tr>
<tr>
<td>2. Argon</td>
<td>(b) Haber’s process</td>
</tr>
<tr>
<td>3. Ammonia</td>
<td>(c) Air conditioner</td>
</tr>
<tr>
<td>4. Stratosphere</td>
<td>(d) Carbon dioxide</td>
</tr>
<tr>
<td>5. CFC</td>
<td>(e) Oxygen</td>
</tr>
</tbody>
</table>
Question 2

(a) Define:
   i. Photochemical reaction
   ii. Electrochemical reaction

Give one example in each case. [2]

(b) When 8.4 g of potassium bicarbonate is added to a dilute solution of hydrochloric acid weighed as 20 g, it is observed that 4.4 g of CO$_2$ is released into the atmosphere. The residue left behind is 24 g. Show that these observations are in accordance with law of conservation of mass. [3]

(c) Give an example of each of the following chemical changes.
   i. A reaction involving
      (a) Change of state
      (b) Formation of precipitate
   ii. An exothermic and endothermic reaction involving carbon as one of the reactants.
   iii. A reaction where colour change is noticed. [3]

(d) What is decomposition? Support your answer by an example. [2]

Question 3

(a) State and explain Boyle's law with the help of graphical verification. [5]

(b) Name the following:
   i. Two metallic oxides decompose on heating.
   ii. An oxidising agent which does not contain oxygen.
   iii. A gas acting as both oxidising as well as reducing agent.
   iv. Two metals which do not react with water.
   v. A metallic carbonate which on heating forms its respective metal. [5]
Question 4

(a) Write the chemical formula of the sulphates of aluminium, ammonium and zinc. [3]

(b) Why does the salt content in cooked vegetable remain the same, irrespective of whether the cooked food is hot or cold? [2]

(c) Name the following salts:
   i. A decahydrated crystalline salt.
   ii. Anhydrous crystalline salt of potassium which is purple in colour.
   iii. A hydrated crystalline salt which is green in colour.
   iv. A pentahydrated crystalline salt which is blue in colour.
   v. A salt which is commonly called sal ammoniac. [5]

Question 5

(a) The table given below shows the mass number and atomic number of five elements A, B, C, D and E.

<table>
<thead>
<tr>
<th>Element</th>
<th>Mass number</th>
<th>Atomic number</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>35</td>
<td>17</td>
</tr>
<tr>
<td>B</td>
<td>23</td>
<td>11</td>
</tr>
<tr>
<td>C</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>D</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>E</td>
<td>40</td>
<td>18</td>
</tr>
</tbody>
</table>

i. To which group and period does element A belong?
ii. Choose from A, B, C, D and E, metal, non-metal and inert gas.

(b) Describe Bohr's atomic model of an atom. [5]
Question 6

(a) Write the electronic configuration, number of valence electrons and classify the following as metals, non-metals and inert gases.

i. \( ^{24}P \)

ii. \( ^{39}Q \)

iii. \( ^{14}R \)

iv. \( ^{40}S \)

v. \( ^{16}T \)

(b) How are chlorofluorocarbons decomposed?

Question 7

(a) The volume occupied by a certain gas was found to be 5.6 dm\(^3\) at 2 atmospheric pressure. If the pressure is increased by 20\%, find the new volume of the gas.

(b) 100 cm\(^3\) of a gas at 27°C is cooled to 20°C at constant pressure. Calculate the volume of gas at 20°C.

(c) Write the main causes of acid rain.