Answer Sheet No._____

Sign. of Candidate _____

Sign. of Invigilator _____

# CHEMISTRY SSC–I
## SECTION – A (Marks 12)
### Time allowed: 20 Minutes

Section – A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. **Do not use lead pencil.**

**Q.1** **Fill the relevant bubble for each part. Each part carries one mark.**

(1) Which one of the following charged ions will be formed by an element of group IIA having electronic configuration $1s^2\ 2s^2\ 2p^6\ 3s^2$?
A. $A^{+3}$ ◯ B. $A^{+2}$ ◯
C. $A^{+1}$ ◯ D. $A^{-2}$ ◯

(2) Which one of the following pairs of subshell has the lowest energy as compared to other pairs of subshells?
A. 1s,2s ◯ B. 2s,2p ◯
C. 3s, 3p ◯ D. 3s, 4s ◯

(3) Which one of the following Isotopes is used in nuclear reactors?
A. U-234 ◯ B. U-238 ◯
C. U-235 ◯ D. U-233 ◯

(4) How many molecules of oxygen gas contains one mole of oxygen gas?
A. $8 \times 6.022 \times 10^{23}$ ◯
B. $6.022 \times 10^{23}$ ◯
C. $32 \times 6.022 \times 10^{23}$ ◯
D. $16 \times 6.022 \times 10^{23}$ ◯

(5) The variable that is kept constant in Charles' Law is:
A. Temperature ◯ B. Volume ◯
C. Pressure ◯ D. Volume & Temperature ◯

(6) The most dilute solution amongst the following is:
A. 1M ◯ B. 0.5 M ◯
C. 0.02M ◯ D. 0.0005M ◯

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(7) Pressure Cooker works on the principle of relationship of boiling point with:
   A. External Pressure ◯   B. Evaporation ◯
   C. Boyle's law ◯   D. Volume ◯

(8) 17g of $NH_3$ is dissolved in 1 $dm^3$ of solution, its molarity will be:
   A. 1 ◯   B. 2 ◯
   C. 3 ◯   D. 4 ◯

(9) In $H_2S$, the oxidation state of Sulphur is:
   A. +1 ◯   B. +2 ◯
   C. -1 ◯   D. -2 ◯

(10) The compound having Hydrogen bonding among its molecule is:
   A. $C_6H_6$ ◯   B. MgO ◯
   C. $CH_4$ ◯   D. $H_2O$ ◯

(11) Metallic Character increases down the group, which one of the following is the most metallic:
   A. Rb ◯   B. Cs ◯
   C. Na ◯   D. K ◯

(12) The most electronegative element in the group VIIA is:
   A. F ◯   B. Cl ◯
   C. Br ◯   D. I ◯

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Time allowed: 2.40 hours                              Total Marks: 53

Note: Answer any eleven parts from Section 'B' and attempt any two questions from Section 'C' on the separately provided answer book. Write your answers neatly and legibly.

## SECTION – B (Marks 33)

**Q.2** Attempt any **ELEVEN** parts from the following. All parts carry equal marks.

$(11 \times 3 = 33)$

i. Calculate the number of molecules in 4.5 moles of Carbon dioxide.

ii. Draw Bohr's Atomic Model for Potassium $_{19}K^{39}$ indicating the location of electrons, protons and neutrons.

iii. Calculate the mass of one Hydrogen atom in gram.

iv. Why is an atom always electrically neutral? Give reason.

v. Write electronic configuration of Aluminum $_{13}Al^{27}$. Identify its group and period.

vi. Define ionic bond. Give one example of two elements forming an ionic bond between them.

vii. Write two similarities and two differences between isotopes.

viii. Elements are unstable in free state except noble gases. Explain how elements attain stability?

ix. State Charles's Law. Derive its mathematical expression.

x. How does the change in temperature affect the Vapour Pressure of a liquid? Show with the help of graph.

xi. How will you prepare 250 cm$^3$ of 0.025M $Na_2SO_4$ solution from a stock solution of 2M $Na_2SO_4$?

xii. Identify the oxidizing and reducing agents in the following reaction with reason:
a.     $H_2S + Cl_2 \longrightarrow 2HCl + S$
b.     $Mg + 2HCl \longrightarrow MgCl_2 + H_2$

xiii. Define corrosion. How is corrosion prevented by cathodic protection?

xiv. What is the composition of Aqua Regia? Write its importance.

xv. Discuss why is sugar soluble in water but petrol is not?

## SECTION – C (Marks 20)

**Note:** Attempt any **TWO** questions. All questions carry equal marks.     $(2 \times 10 = 20)$

**Q.3**  a.    What are type of bonds responsible for the formation of $F_2$, $O_2$ and $N_2$?
             Explain the formation of bond with the help of structures.     **(2+2+2)**
         b.    Give importance of intermolecular forces in our life. Mention any four points.
                                                                               **(1+1+1+1)**

**Q.4**  a.    Explain the principle, working and construction of Daniel Cell with the help of a labelled diagram. **(1+2+3)**

       b.    Write down the trend of Ionization Energy in the Periodic Table. Explain with reasons. **(2+2)**

**Q.5**  a.    Describe Rutherford's Experiment and its conclusions. **(2+2+2)**

       b.    Why is the boiling point of water at the top of Mount Everest $70^{\circ}$C. **(4)**

**\* \* \* \* \***

**SUPLEMENTARY TABLE**

| Atomic No | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|-----------|---|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Symbol | H | He | Li | Be | B | C | N | O | F | Ne | Na | Mg | Al | Si | P | S | Cl | Ar | K | Ca |
| Mass no | 1 | 4 | 7 | 9 | 11 | 12 | 14 | 15 | 19 | 20 | 23 | 24 | 27 | 28 | 31 | 32 | 35 | 40 | 39 | 40 |

# CHEMISTRY SSC-I
## SLOs

## SECTION – A

1. Identify the relationship between electronic configuration and the position of an element in the periodic table.
2. Distinguish between shells and sub-shells.
3. State the importance and uses of isotopes.
4. Calculate the number of representative particles (Molecules) in a given number of moles of a substance.
5. Account for temperature-volume changes in a gas using Charles' law.
6. Describe how to prepare dilute solutions from concentrated solutions of known molarity.
7. Explain the effect of temperature and external pressure on Vapour Pressure and Boiling Point of a liquid.
8. Solve problems involving Molarity of a solution.
9. Determine the oxidation state/number of an element in a compound.
10. Recognize a given compound as either having ionic or covalent bond. (Relevant SLO is missing in the curriculum)
11. Show how cations and anions are related to the terms metals and non-metals. (Relevant SLO is missing in the curriculum)
12. Describe how electronegativity of elements changes with in a group and withing a period in the periodic table.

## SECTION –B

**Q2.**
i. Calculate the number of representative particles (Molecules) in a given number of moles of a substance.
ii. Describe the structure of an atom representing the location of protons, electrons and neutrons.
iii. Calculation of mass of an element from the given number of atoms.
iv. Describe the structure of an atom in terms of number of particles in it.
v. Identify the relationship between electronic configuration and the position of an element in the periodic table.
vi. Describe the characteristics of ionic bonds (compounds).
vii. Discuss properties of isotopes of different elements.
viii. Explain how elements attain stability?
ix. Account for temperature volume changes in a gas using Charle's Law.
x. Explain the effect of temperature on the vapour pressure of a liquid.
xi. Describe how to prepare dilute solutions from concentrated solutions of known molarity.
xii. Identify the oxidizing and reducing agents in a redox reaction.

xiii.   Summarize the methods used to prevent corrosion.
xiv.    Describe the inertness of noble metals.
xv.     Use the principle/rule "like dissolves like" to predict the solubility of one substance in another.

## Section- C

Q3.
a.      Describe the formation of covalent bond between two non-metallic elements with Cross and Dot structures.
b.      Explain the need/importance of intermolecular forces.

Q4.
a.      Sketch a Daniel cell, labelling the cathode, anode and the direction of flow of electrons. Identify the half-cell and describe (the principle of working) voltaic cell.
b.      Identify the trend of ionization energy in the periodic table.

Q5.
a.      Describe the contributions of Rutherford that caused (led) to the development of the atomic theory.
b.      Explain the effect of temperature and external pressure on the vapour pressure and boiling point of a liquid.

# CHEMISTRY SSC-I
## TABLE OF SPECIFICATION

| Topics/Subtopics | Fundamentals of chemistry | Structure of atoms | Periodic table | Structure of Molecules | Physical states of matter | Solutions | Electrochemistry | Chemical Reactivity | Total marks for each Assessment Objective | %age |
|---|---|---|---|---|---|---|---|---|---|---|
| (Knowledge based) | | 1-3(01) 2-vii(03) 5a(06) | | 1-10(01) 2-vi(03) 2-ix(03) 3a(06) | | | 1-9(01) | 1-12(01) | 25 | 28.7% |
| (Understanding based) | 1-4(01) 2-iii(03) | 1-2(01) 2-ii(03) 2-iv(03) | 2-v(03) 4b(04) | 2-viii(03) | 1-5(01) 1-7(01) 2-x(03) 5b(04) | 1-6(01) 1-8(01) 2-xv(03) | 2-xii(03) 2-xiii(03) | 2-xiv(03) | 44 | 50.6% |
| (Application based) | 2-i(03) | | 1-1(01) | 3b(04) | | 2-xi(03) | 4a(06) | 1-11(01) | 18 | 20.7% |
| Total marks for each Topic/Subtopic | 07 | 17 | 08 | 20 | 09 | 8 | 13 | 5 | 87 | 100% |

**KEY:**

1-1(01)

Question No-Part No. (Allocated Marks)