(T) Roll No. .....

PAPER ID—13647

B. Sc. EXAMINATION, 2023

(First Semester)

CHEMISTRY-I

Code : CH-101

Inorganic Chemistry

Time : 3 Hours *Maximum Marks : 30*

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting *one* question from each Section. Q. No. 1 is compulsory. All questions carry equal marks.

(Compulsory Question)

1. (a) Write Schrödinger wave equation for hydrogen atom. **1**

   (b) What are van der Waals radius and covalent radius of atoms ? **1**

   (c) What is Slater's rule ? **1**

   (d) Why NaCl is soluble in water but AgCl is insoluble ? **1**

   (e) Why He_2 does not exist ? **1**

   (f) Draw the shape and write the geometry of ClF_3. **1**

Section I

2. (a) What are radial and angular wave functions ? **2**

   (b) What is significance of de-Broglie equation ? **2**

   (c) Discuss the shapes of *d*-orbitals. **2**

3. (a) Write the electronic configuration of $_{29}Cu$ and $_{57}La$. **2**

(b) Draw the shapes of 1*s* and 2*s* orbitals. 1

(c) Discuss the significance of all quantum numbers. 3

Section II

4. (a) Explain the following : 3

(i) Hund's Rule

(ii) Aufbau's Principle.

(b) Explain the factors affecting the ionization energy with examples. 3

5. (a) What are isoelectronic species ? Compare the size of Mg^{2+} and O^{2-} ions. 2

(b) Define electron affinity. Why successive electron affinities have negative values ? Why electron affinity of fluorine is less than chlorine. 4

Section III

6. (a) Calculate the percentage ionic character in HCl molecule. Electronegativities of H and Cl are 2.1 and 3.0 respectively. 2

(b) Which of the two : NF_3 or NH_3 will have smaller bond angle and why ? 2

(c) Calculate the bond order of O_2^{2-}, N_2 and CO. 2

7. (a) All the P-F bonds in PF_5 are not equivalent. Explain. 2

(b) Draw the molecular orbital energy diagram for NO molecule. Predict its bond order and magnetic behavior. 4

Section IV

8. (a) Write a short note on Schottky defect. 2

(b) What are the limitations of radius ratio rule ? 2

(c) Explain the structure of CaF_2. 2

9. (a) What is Polarization ? Discuss it with the help of Fajan's rule. 3

(b) Explain the types of defects in non-stoichiometric crystals with examples. 3