Roll No.

Total No. of Pages : 02

Total No. of Questions : 11

B.Sc. (Honours) (Chemistry) (Sem.-1) INORGANIC CHEMISTRY-I Subject Code : BHCL-101-19 M.Code : 77223 Date of Examination : 12-01-23

Time: 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

- 1. SECTION-A is COMPULSORY consisting of EIGHT questions carrying TWO marks each.
- 2. SECTION-B contains EIGHT questions carrying FOUR marks each and students have to attempt any SIX questions.
- 3. SECTION-C will comprise of two compulsory questions with internal choice in both these questions. Each question carries TEN marks.

SECTION-A

1. Answer briefly :

- a) What is Rydberg constant and how it is related with wavenumber? Give its value for hydrogen atom.
- b) What do you understand by Hund's rule of maximum multiplicity? Apply this rule to show the electronic configuration of nitrogen.
- c) What is effective nuclear charge? Calculate the effective nuclear charge felt by a 3d electron of chromium atom?
- d) Calculate the electronegativity of A atom from the following data :

 $E_{H-H} = 438 \text{ KJ mol}^{-1}$

 $E_{A-A} = 154 \text{ KJ mol}^{-1}$

 $E_{H-A} = 565 \text{ KJ mol}^{-1}$

- e) Explain the term interfacial angles with respect to a crystal.
- f) What is metal deficiency defect? Explain.
- g) Bond angle in NF₃ is smaller than that of NH₃. Why?
- h) What is bond order? How it is related with bond energy?

SECTION-B

- 2. According to Bohr's theory of hydrogen atom, the velocity of electron in the first orbit is 10^6 m/s. Suppose the electron can be located in the orbit within 0.1 A°. What will be the uncertainty in its velocity? Comment on your result.
- 3. What is a radial distribution functions? Draw this function for 1s, 2p and 4p orbitals in a hydrogen atom.
- 4. a) Give reasons:
 - (i) Second ionization energy of Na is higher than Mg
 - (ii) How does hybridization affect the electronegativity of an atom?
 - b) What is Sanderson's electron density rule?
- 5. Discuss Slater's rule.
- 6. Draw the Sodium Chloride and Wurtzite structure. Tell their coordination number, stoichiometry and radius ratio.
- 7. Explain Schottky and Frenkel defects and their consequences.
- 8. What is hybridization? What are the important characteristics of hybridization?
- 9. Discuss the shape of following molecules on the basis of VSEPR theory
 - (i) CIF₃ (ii) I_3^-

SECTION-C

10. Derive Schrondiger wave equation. Discuss the significance of wave function ψ and this equation.

OR

Explain the periodic variation of electronegativity. Enlist the various factors affecting the electronegativity.

11. Draw the MOEL diagram of O_2 . Explain why bond strength of O_2^+ is more than that of O_2 .

OR

Discuss the Born Haber cycle for the formation of NaCl crystal. Also explain the energy cycle for hydration of ions.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.