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Total No. of Questions: [09]

B.Sc. (Hons) Chemistry (Semester –1st)
INORGANIC CHEMISTRY-I
Subject Code: BCHMS1-101
Paper ID: [19131601]

Time: 03 Hours **Maximum Marks: 60**
Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

SECTION-A **[2 Marks each]**

Q1. Short answer type questions.
   a. Briefly explain the limitations of Bohr's model.
   b. What does it mean for a wave function to be normalized?
   c. What is the significance of orthogonal wave functions?
   d. Write the conditions for acceptable wave functions?
   e. Write the applications of lithium aluminium hydride.
   f. Why does the chemical reactivity of the alkali metals increase from Li to Cs?
   g. How does hybridization affect electronegativity?
   h. Briefly explain Fajan's rules.
   i. Which has larger dipole moment NH_3 or NF_3 and why?
   j. What is the band theory of metals?

SECTION-B **[5 marks each]**

Q2. How do you arrive at Schrodinger wave equation for H-atom starting with simple sine wave equation?
Q3. Draw the radial distribution function curves for 2s, 2p and 3s orbitals of H-atom.
Q4. List the two different scales of electronegativity and briefly describe the theoretical basis behind each.
Q5. Define hydrogen bonding and explain the main theories for hydrogen bonding.
Q6. Draw MO diagram of NO and compare the bond orders of NO, NO^+ ,NO^-.

SECTION-C **[10 marks each]**

Q7. Write down the Born-Lande equation and define the terms used in it. Use the equation to show why some crystals, which according to the radius ratio concept should adopt a coordination number of 8, in fact have a coordination number of 6.
Q8. What are Slater's rules? Using Slater's rules, determine Z* for-
   a. A 3p electron in P, S, Cl, and Ar. Is the calculated value of Z* consistent with the relative sizes of these atoms?
   b. A 2p electron in O^{2-}, F^-, Na^+ and Mg^{2+}. Is the calculated value of Z* consistent with the relative sizes of these ions?

Q9. Explain VSEPR theory. Taking few examples analyze how VSEPR theory helps to visualize the three-dimensional structure of molecules.