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Total No. of Questions: [09]

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B.Sc. (Hons) Physics (Semester –1st)
INORGANIC CHEMISTRY-I
Subject Code: BCHMS1-101
Paper ID: [19131506]

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-Landé 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.