[This question paper contains 3 printed pages.] 3/11/19 E

Your Roll No.....

Sr. No. of Question Paper : 8590 **J**

Unique Paper Code : 32171101

Name of the Paper : Inorganic Chemistry

Name of the Course : **B.Sc. (H) Chemistry**

Semester : **I**

Duration : 3 Hours Maximum Marks : 75

1. Write your roll number on the top immediately e on receipt of this question paper
2. Attempt six questions in all.
3. Question number one is compulsory.
4. The questions should be numbered in accordance with the number in the question paper.
5. Calculator and lock tables may be used.

1. Explain any five of the following

(I) Ionic radii of Na^+ and Cu^{2+} ions are almost similar.

(II) An electron moving in an orbital dose not slow down gradually.

(III) Electron affinity of Nitrogen is lower than Oxygen.

(IV) HF is liquid whereas HCl is a gas.

(V) H_2 is known while He_2 is not.

(VI) $BeCl_2$ has zero dipole movement while H_2S has some.

(3x5=15)

2. (I) Draw radial probability distribution curve for 1s,4p,5s,4d. What are radial and angular wave functions ?

(II) Drive the Born-Lande's equation for lattice energy of a crystal lattice.

(III) Explain significance of Azimuthal quantum number. (6, 4,2)

3. (I) Calculate Z* (effective nuclear charge- Slater's rule) for 2s and 4s electrons.

(II) During ionization of atoms having ns and (n-1)d electrons, the electron of ns orbital lost first. Why?

(III) Find out electron gain enthalpy using following data:

Enthalpy of formation :382 KJ mol^{-1}

Lattice Energy :759 KJ mol^{-1}

Ionization Enthalpy : 494 KJ mol^{-1}

Dissociation Energy Cl_2 : 121 KJ mol^{-1}

Sublimation Energy (Na) : 108 KJ mol^{-1} (3,3,6)

4. (I) Draw molecular orbital energy level diagram of O_2^- and NO^+ . Which has higher bond energy?

or

Draw molecular orbital energy level diagram of NO^- and HCl. Which has higher bond energy?

(II) Using VSEPR theory give the shape of $POCl_3$, SF_6, BrF_4^-,NH_3.

(III) What is Fajan's Rule ? Explain why lithium halides are covalent in spite of the fact that Li is an alkali metal. (4X3)

5. (I) First ionization energy of Be is greater than Li but position is reversed in case of second ionization energy of Be and Li. Why?

(II) Why P-Nitrophenol has higher boiling point than O-nitrophenol phenol?

(III) Write short note on following (any three)

a. Londen or dispersion forces b. Diple-dipole interaction

c. HF is liquid HCl is gas d. Hybridization (3,3,2x3)

6. (I) Explain Conductivity of metals and semiconductors using band theory.

(II) What was the velocity of a beam of electron if they are display a de-Broglie wavelength of 100 A^{o}

(III) ψ has no physical significance and ψ^2 has. Explain.

(IV) Be and N in second period and Mg and P in third period of the periodic table have higher ionization energy than expected. Justify

(V) What do you understand by equivalent and non-equivalent hybrid orbital's give one example of each

(VI) Bond angle of CH_4 is higher than NH_3.Explain. (2X6)

7. (I) Draw neatly labelled molecular orbital diagram of N_2^- and O_2^{2+} with bond order and magnetic behaviour .

(II) Write Schrödinger equation for Hydrogen atom. Explain terms involved in it and write conditions for physical significance of the equation.

(III) What are Slater rules, calculate the Z* effective nuclear charge for the valence electrons in G, Z is equal to 31. (4X3)

8. (I) First ionization enthalpy of Oxygen is less than that of Nitrogen. Give reason.

(II) Which of following is more covalent and why?

CuCl or KCl

(III) Define electro negativity according to Mullikan Scale.

(IV) If a solid "A^+B^-" has a structure similar to NaCl. Consider the radius of anion as 250 pm. Find the ideal radius of the cation in the structure. Is it possible to fit a cation C^+ of radius 180 pm in the tetrahedral site of the structure "A^+B^-"?

(3,2,2,5)