

Roll No.

Exam Code : D-18 **Creative Study**

Subject Code—6786

B. Sc. EXAMINATION

(Batch 2018 Onwards)

(First Semester)

CHEMISTRY

CCL-104

Inorganic Chemistry-I

Time : 3 Hours

Maximum Marks 80 **Creative Study**

Note : Attempt *Five* questions in all, selecting at least *one* question from each Section.
Q. No. 1 is compulsory. Marks are indicated against each question.

1. (a) What is Resonance and Resonance energy ?

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P.T.O.

- (b) What do you mean by node and nodal plane ?
- (c) What does the symbol ψ^2 stands for ?
- (d) Can we apply the Heisenberg's uncertainty principle to stationery electron ? Justify.

(c) Cu^+ and Na^+ are of the same size but CuCl is insoluble while NaCl is soluble in water.

(d) What are Eigen values and Eigen Functions ?

(g) What do you mean by terms :

(i) Hydration energy

(ii) Lattice energy ?

(h) What are main points of VSEPR theory ?

(i) What are the shapes of hybrid orbital
 sp^3d^2 and sp^3 ?

valence

(j) Write molecular orbital configuration of
 N_2 and NO ?

10×2

2. (a) What is significance of de-Broglie equation ? An electron is moving with KE of 2.275×10^{-25} J. Calculate its de-Broglie wavelength. 5

(b) What do you mean by Eigen values and Eigen functions of energy ? 5

(c) What is the physical significance of ψ and ψ^2 ? 5

3. (a) What are the conditions upon which ψ must satisfy to give meaningful solution ? 5

(b) What will become to the wavelength associated with a moving particle if its velocity is doubled ? 5

(c) Determine the wavelength of a proton emitted during transition from $n = 5$ to $n = 2$ in the hydrogen atom. 5

Unit II

4. (a) What do you mean by understand by Hund's rule of maximum multiplicity ? Apply this rule in writing electronic configuration of Oxygen and Nitrogen. 5
- (b) What is a nodal plane ? How many nodal planes are in orbital ? 5
- (c) Draw the shapes of 2 Py, 2S and d_{z^2} orbitals. 5

5. (a) Write short notes on following : Creative Study

(i) Pauli's exclusion Principle

(ii) Exchange energy.

5✓

(b) What can be maximum number of electron in the following orbitals $3d$, $4p$, $2s$, $4f$ and $1s$.

5✓

(c) What is spin quantum number ? Give its significance.

5✓

6. (a) What are Fajan's rules ? How do they help in deciding covalent character in a bond ? 5
- (b) Define ionic bonds. Explain the non-directional nature of Ionic Bond. 5
- (c) Calculate the Lattice Energy of NaCl from the following Data $A = 1.75$, $r_0 = 280 \text{ pm}$, $N = 6.02 \times 10^{23}$, $n = 9$, $e = 4.8 \times 10^{-10} \text{ esu}$. 5

7. (a) Draw Born-Haber cycle for the formation of solid sodium chloride. Explain various terms involved in its. 5

(b) Explain the following :

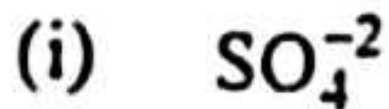
(i) ZnCl_2 is soluble in organic solvent while MgCl_2 is insoluble. 5 }

(ii) Fluoride have higher melting point as compared to those of Chlorides. 5

8. (a) What are main points of **Creative Study** Molecular Orbital Theory ? 

(b) Differentiate between Sigma (σ) and Pi (π) molecular orbital. 

(c) Explain on the basis of hybridization the shapes of :



9. (a) Draw Molecular Orbital energy level diagram for NO. Creative Study
5
- (b) Define bond order and how is it related to stability of a molecule ? 5
- (c) What are importance characteristics of bonding and antibonding molecular orbital ? 5

