Bachelor of Science (B.Sc.) (CBCS Pattern) First Semester

USCHT01 - Chemistry : Paper-I (Inorganic Chemistry)

P. Pages : 2 **GUG/W/18/11544**

Time : Three Hours * 3 6 1 9 * Max. Marks : 50

Notes : 1. All questions carry equal marks.
2. Diagrams wherever necessary.

1. a) Define Quantum numbers. Discuss the significance of Spin Quantum number & magnetic quantum number? **5**

b) What is ionization potential? Explain factors affecting ionization potential. **5**

OR

c) State and explain Heisenberg's uncertainty principle. **2½**

d) Explain the concept of Ionization energy to know relative reactivity, metallic and non-metallic character? **2½**

e) Calculate effective Nuclear charge acting on $Ca\,(z = 20)$? **2½**

f) Derive de-broglie equation? **2½**

2. a) Draw and explain Coulson's M. O. diagram of carbon monoxide and Calculate its Bond Order? **5**

b) What is Hybridization? Explain why BeF_2 molecule is linear while H_2O is bent? **5**

OR

c) Explain on the basis of M. O. theory, N_2 molecule is diamagnetic while O_2 molecule is paramagnetic? **2½**

d) Using VSEPR theory, explain the shapes of **2½**
i) H_3O^+ and ii) SF_4

e) Write the postulates of VBT. **2½**

f) Draw potential energy diagram for Bonding M. O. and Antibonding M. O. and State the rules of LCAO approximation? **2½**

3. a) What are s-block elements? Discuss s-block elements with respect to **5**
i) Ionization Potential and ii) Electroactivity

b) Discuss the p-block elements with respect to **5**
i) Atomic and ionic radii ii) Oxidation state

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c) What is solvation energy? How does its affects the solubility of ionic solids in polar solvents? **2½**

d) What is diagonal relationship? Discuss diagonal relationship between Li & Mg? **2½**

e) Explain the role of alkali and alkaline earth metals in biological systems? **2½**

f) Explain the structures of orthophosphoric acid (H_3PO_4). **2½**

4. a) Explain structure of xenon oxyfluoride and xenon tetrafluoride? **5**

b) Define volumetric titration. Explain Ostwald's theory of acid-base titration. **5**

OR

c) Explain the principle of complexometric titration? **2½**

d) Explain the general principles involved in redox titration. **2½**

e) Explain chemical property of Nobel gas. **2½**

f) What is effect of hydrogen bonding an solubility and boiling point. **2½**

5. Solve **any ten**. **1x10=10**

i) Write electronic configuration of
   a) Mg^{2+} b) $C\ell^{-}$

ii) What is covalent radius and Van der Waal Radius?

iii) Calculate screening constant of 3p electron in silicon?

iv) Define bond energy & Bond angle.

v) He_2 molecule does not exists. Why.

vi) Draw the shape of CO_3^{2-}

vii) Draw the shape of NO_3^{-} & NH_3.

viii) What is action of hydrogen on Li & Ca atom?

ix) How hydrogen bonding affects on viscosity?

x) Define self indicator with example.

xi) Define Redox titration.

xii) What is metallochrome indicator?

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