M.Sc. First Year (Chemistry) (NEP Pattern) Semester-I

NEP-11 / 01MSCCH01 - Major DSC : Inorganic Chemistry Paper-I

P. Pages : 2 **GUG/W/23/15070**

Time : Three Hours * 7 9 9 6 * Max. Marks : 80

Notes : 1. All questions are compulsory.

1. a) What is VSEPR theory? What are the postulates of VSEPR theory? Explain the shape of following molecules on the basis of VSEPR theory. **8**

i) H_2O ii) SF_4

iii) $BeCl_2$ iv) BF_3

b) Describe molecular orbital diagram for square planar complexes with or without $\pi-$ bonding. **8**

OR

c) Discuss the Bent's rule with suitable example. **4**

d) Explain the geometries of the following molecules. **4**

i) PF_5 ii) IF_7

e) Describe d-orbital splitting in octahedral complexes. **4**

f) Explain Jahn Teller distortion with suitable example. **4**

2. a) Explain Job's method for the determination of formation constant. **8**

b) Write a note on- **8**

i) Inert & Labile complexes ii) Conjugate base mechanism

OR

c) Explain the factors affecting the stability of metal complexes with reference to- **4**

i) Chelate effect ii) Metal ion

d) Explain Irving -Rossotti method for the determination of formation constant. **4**

e) Discuss Annation reaction. **4**

f) Explain factors affecting acid hydrolysis reaction. **4**

3. a) What are boranes? Discuss the structure and bonding in following borane molecules. **8**

i) $B_{10}H_{14}$ ii) B_4H_{10}

b) What are carboranes? Discuss the preparation methods of carboranes. **8**

OR

c) Sketch the molecule B_2H_6 and show the different bonding between hydrogen and boron. **4**

d) What is STYX number? Give the STYX numbers for following molecules. **4**
i) B_2H_6 ii) B_4H_{10}
iii) B_5H_9 iv) B_5H_8

e) Give the preparation of metallocarboranes. **4**

f) Discuss the classification of carboranes with suitable example. **4**

4. a) What are metal clusters? Explain the structure of $[Re_2X_8]^{2-}$ ion. **8**

b) Write note on- **8**
i) Isopolyacids ii) Heteropolyacids

OR

c) Give some examples of metal clusters having metal-metal multiple bonds. Draw structure of any two. **4**

d) Explain binuclear cluster of metal oxide. **4**

e) Discuss the applications of polyacids. **4**

f) Write a note on acetate cluster. **4**

5. a) What is spectrochemical series. **2**

b) What are the limitations of VSEPR theory. **2**

c) Explain stereochemistry of intermediate formed in SN^1 mechanism. **2**

d) Write a note on base hydrolysis reaction. **2**

e) Give the nomenclature of following boranes. **2**
i) B_3H_7 ii) B_3H_7

f) Draw the structure of B_6H_{10} **2**

g) Explain alkoxide cluster with suitable example. **2**

h) Explain trinuclear cluster with suitable example. **2**

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