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PPP-2051 Seat No._____

M. Sc. (Sem. II) Examination

April / May - 2016

CHN - 501 : Chemistry : Paper - VII

(Inorganic Chemistry)

Time : **3** Hours] [Total Marks : **70**

Instruction : All questions carry equal 14 marks.

1 (a) Answer any two of the followings : **8**

(1) Find the L, S, J and no. of unpaired electrons for the following terms :

^1_G, ^5_D, ^3_F

(2) Deduce the term symbols for all the states arising from d^2 electronic configuration. Arrange them in increasing order of energy.

(3) Explain the combined orgel diagram for d^2-d^8. Give reason for bending of tig line.

(b) Answer any one of the followings : **6**

(1) Write short note on "Charge transfer spectra"

(2) Drive the co-relation diagram for d^2-case.

2 (a) Answer any two of the following : **8**

(1) Explain the polymeric nature of M-C bond in Metal Carbonyls on the basis of V.B.T. and M.O.T.

(2) What is polynuclear metal carbonyl ? Explain the structure of Iron dodeca carbonyl $[Fe_3(Co)_{12}]$

(3) Give the method of preparation for carbonyl clusters.

(b) Answer any one of the following : 6

(1) Explain the Eighteen (18) electrons rule for metal carbonyls.

(2) Explain the use of vibrational spectra (IR spectra) for bonding and structure of carbonyl compounds.

3 (a) Answer any two of the following : 8

(1) Explain the structural chemistry of boron cages by wed's rule.

(2) Explain the structure of B_2H_6 on the basis of Sp^3 hybridization.

(3) What are carboranes ? Give report on "Metallo-Carboranes".

(b) Answer any one of the following : 6

(1) What are boranes ? Give their nomenclature, classification and various types of bonds present in higher boranes.

(2) Explain the structure of higher boranes like B_5H_9, B_5H_{11}, $B_{10}H_{14}$.

4 (a) Answer any two of the following : 8

(1) Give brief report on Isopoly and Heteropoly acid and salts.

(2) Explain the "Keggin's Theory".

(3) Brief report on O.M.C. of Al and Mg.

(b) Answer any one of the following : 6

(1) Write short note on "Heteropoly blues"

(2) Explain the Heteropoly anions.

5 Answer any seven of the following : **14**

(1) Give the limitations of orgel diagram.

(2) Derive the ground state term for Fe^{+++} ion.

(3) How many microstates are arise from d^2 case ?

(4) What is O.M.C. ?

(5) Give example with structures of bridged and Non-bridged polynuclear metal carbonyls.

(6) Give the IR frequency ranges for terminals bridged and back-donated carbonyl groups in metal carbonyls.

(7) Give the degeneracy of the E_g, T_{1g}, T_{2g} and A_{1g} terms.

(8) Define the $\Delta S = 0$ term for electronic transition.

(9) Which of the following term represents the ground state term ? Why ?

^1G ^1D ^1S 3p ^3F

(10) What is E.A.N. ? Find the E.A.N. value for $Ni(CO)_4$, $Fe(CO)_5$.
