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AAF-7301 Seat No._____

M. Sc. (Sem. II) Examination

April/May – 2018

CHN-501 : Chemistry : Paper - VII

(Inorganic Chemistry)

Time : 3 Hours] [Total Marks : 70

Instructions : (1) All questions carry equal 14 marks.
(2) All questions are compulsory.

1 (a) Answer any two : 10

(i) Derive the term symbols for all the possible states (Ground and excited) show by V^{+3} aquo complex.

(iii) Identify the ground state term for each set of the following terms with reason :

(a) ^5D ^3H ^3P ^3I ^1G

(b) ^3P ^1D ^1S

(c) ^3F ^1D ^3P ^1S ^1G

(iii) Derive the calculation of 10 Dq, B and β parameters by appropriate example.

(b) Answer any one : 4

(i) Explain the "charge transfer spectra" of MnO_4^-.

(iii) What is Orgel - diagram ? Explain the Orgel-diagram for $d^4 - d^6$

2 (a) Answer any two : 10

(i) "Metal-Carbonyl cluster" - Give brief report.

(ii) Define metal carbonyls. Give their classification. Explain the structure of $CO_2(CO)_8$.

(iii) Explain the nature of Carbonyl (CO) ligand as a π-acid ligand with reference to Metal-carbon (M-C) bond in Metal-Carbonyls.

(b) Answer any one : 4

(i) What is mono nuclear metal carbonyls ? Discuss the structure of Iron penta carbonyl $[Fe(CO)_5]$.

(ii) Calculate Effective Atomin Number (EAN) for the
$Ni(CO)_4$, $Fe_3(CO)_{12}$

3 (a) Answer any two : 10

(i) Explain the Wed's rule for "Boron-Cages"

(ii) Write report on "Metallo-carborane"

(iii) Give the method of Preparation for higher-boranes like
B_4H_{10}, B_5H_9, B_6H_{10}, B_8H_{12}, $B_{10}H_{14}$

(b) Answer any one : 4

(i) Give the classification of 'Carboranes'

(ii) Describe the Keggin's Theory.

4 (a) Answer any **two** : 10

(i) Give brief Report on "Isopoly Tungstates"

(ii) Classified the organo-metallic compounds.

(iii) Explain : "Heteropoly Blues"

(iv) Discuss the structure of Irons Organo-metallic Compound - "Ferrocine".

(b) Answer any one : 4

(i) Explain the structure of Tetramethyle lithim.

(ii) Explain the structure of $(Me_3Al)_2$

5 Answer any seven : 14

(i) What is term-symbol ? Give the formula of term- symbol given by "Russel-Saunders"

(ii) What are Microstates ? Calculate the No. of possible microstable for d^2 electronic configuration.

(iii) Give the limitations of Orgel-diagram.

(iv) Find the value of L, S, J and No. off unpained electrons for 5_I term symbol.

(v) Draw the structure of $Fe_3(CO)_{12}$ and show the oxidation states of Fe.

(vi) Classified the carbonyls (CO) show by Metal-carbonyls.

(v) Draw the Bridge-bonded structure of B_2H_6 and give Hybridisation show by Boron in this compound.

(vi) Draw the combined-orgel diagram for d^1–d^9 case.

(vii) Give two classes of metal clusters bassi on the oxidation states of metal.

(viii) Draw the structures of B_5H_9 and $B_{12}H_{12}^-$

(ix) Find the EAN value for $Cr(CO)_6$ and $Fe_2(CO)_9$.

(x) Give the characteristics of "Organo-metallic compounds.
