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KAA-1741 Seat No._____

M. Sc. (Sem. II) Examination

April/May - 2013

Chemistry : Paper - VII

(CHN - 501 : Inorganic Chemistry)

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

Instruction : All questions carry **equal 14** marks.

1 (a) Answer any two of the following : **10**

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

(ii) Which of the following term represents the ground state of the V^{+3} ion ? Give reasons for your choice.

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

(iii) Explain :

(a) Orgel diagram of $d^3 - d^7$

(b) Laporte rule

(b) Answer any one of the following : **4**

(i) Explain the correlation diagram for d^2 electronic configuration.

(ii) Write note on : Charge transfer spectra.

2 (a) Answer any two of the following : **10**

(i) Discuss the effect of the following on IR frequency of terminal CO :

(a) polarizability of ligands

(b) presence of bridging CO

(c) pressure of non π-accepting ligand.

(ii) Explain the behaviour of CO as π-acid ligand in relation to M-C bond.

(iii) Explain with examples the use of vibrational spectra in determine the molecular symmetry of polynuclear carbonyls.

(b) Answer any one of the following : **4**

(i) On the basis of IR spectra discuss the structure of Cr $(CO)_6$.

(ii) Explain the use of IR spectra in elucidating the structures of CO_2 $(CO)_8$.

3 (a) Answer any two of the following : **10**

(i) Write note on : "Metallo Carboranes".

(ii) Explain the bridge structure of diborane with the help of Sp^3 hybridization.

(iii) Give the preparation of B_4H_{10}, B_5H_9, B_6H_{10}, $B_{10}H_{14}$.

(b) Answer any one of the following : **4**

(i) Write note on : Wed's rule for boron cages.

(ii) Explain the molecular description of Metal-Metal bonding.

4 (a) Answer any two of the following : **10**

(i) Write note on : "Isopolytung state".

(ii) Explain : 'Hetropoly blues'.

(iii) Write a short note on classification of O.M.C.

(b) Answer any one of the following : **4**

(i) Give brief account of organometallic compounds of Mg or Al.

(ii) Explain the structure of $(Me_3\ Al)_2$.

5 Answer any seven : **14**

(i) What are the Micro states ? Give the formula of microstates.

(ii) What is orgal diagram ?

(iii) Find out the values of L, S and J for 3F term.

(iv) State laws of spin selection and orbital selection.

(v) Give the classification of CO group.

(vi) Draw the structure :
$Mn_2\ (CO)_{10}$ and $OS_2\ (CO)_9$

(vii) What is mononuclear metal carbonyls ? Give one example.

(viii) Draw the bridge bonded structure of B_2H_6.

(ix) What is organo metallic compounds ?

(x) Give the two classes of Metal clusters basis on the oxidation states of metal.
