

MANAV RACHNA UNIVERSITY
DEPARTMENT OF CHEMISTRY

"T3, Examination, June 2018"

Semester: IV
Subject: Inorganic Chemistry-III
Branch: Chemistry
Course Type: Core
Time: 3 Hours
Max.Marks: 80

Date of Exam: 17/05/2018
Subject Code: CHH217-T
Session: I
Course Nature: Hard
Program: B.Sc. (H)
Signature: HOD/Associate HOD: *meghe*

Note All Questions are compulsory from Part A (2X 10=20 Marks). Attempt any two questions from part B (30 Marks) Attempt any two questions from Part C (30 Marks).

PART A

- Q1. (a) Differentiate double salts and complex compounds by giving suitable example.
(b) Explain primary and secondary valences according to Werner's theory.
(c) Calculate EAN for $[\text{Pt}(\text{NH}_3)_3\text{Cl}_3]^+$ and $[\text{Fe}(\text{CN})_6]^{3-}$.
(d) Draw geometrical isomers of $[\text{Co}(\text{en})_2\text{Cl}_2]$ and optical isomers of $[\text{CoCl}_2 \text{en} (\text{NH}_3)_2]^+$
(e) Write a short note on spectro-chemical series.
(f) Calculate EAN for $\text{Mn}_2(\text{CO})_{10}$
(g) Write names of following complexes (i) $[\text{Co}(\text{NO}_2)_3(\text{NH}_3)_3]$ (ii) $\text{K}_4[\text{Fe}(\text{CN})_6]$ (iii) $[\text{PtCl}_4(\text{NH}_3)_2]$ (iv) $\text{K}_4[\text{Mo}(\text{CN})_8]$
(h) Write hybridization in $[\text{FeF}_6]^{3-}$ and $[\text{Cr}(\text{NH}_3)_6]^{+3}$
(i) Why are d-d electronic transitions forbidden.
(j) What do you mean by degeneracy. How it is destroyed in d orbital.

PART B

- Q.2. (a) What do you understand by Structural Isomerism. Explain with examples Ionization and Linkage Isomerism. (5 Marks)
(b) Explain structure of $[\text{Ni}(\text{CN})_4]^{2-}$ and $[\text{Ni}(\text{Cl})_4]^{2-}$ on the basis of VBT. (5 Marks)
(c) What do you understand by CFSE. Calculate CFSE in octahedral complexes for d^4 and d^6 configurations. (5 Marks)
- Q.3 (a) Describe and explain Jahn Teller distortion in octahedral, square planar and tetrahedral complexes. (4+4+4 Marks)
(b) Write a short note on Chelates and Chelation. (3 Marks)
4. (a) Explain magnetic behavior of coordination complexes with suitable examples. (3 Marks)
(b) With the help of MOT explain structures of $[\text{Co}(\text{NH}_3)_6]^{+3}$ and $[\text{CoF}_6]^{-3}$ by making their molecular orbital diagrams. (6+6 Marks)

PART C

- Q 5 (a) What are mononuclear carbonyls. Explain structures of $\text{V}(\text{CO})_6$ and $\text{Fe}(\text{CO})_5$ on the basis of VBT. (2+4+4 Marks)
(b) Explain the concept of back bonding in metal carbonyls with example. (5 Marks)

Q 6 (a) What are polynuclear carbonyls. Explain structures of $Mn_2(CO)_{10}$ and Co_2CO_8 . (10 Marks)

(b) Explain structure of $M_3(CO)_{12}$ type carbonyl with any one example. (5 Marks)

Q 7 (a) Explain the structure of $M_4(CO)_{12}$ type carbonyls with any one example. (5 Marks)

(b) Calculate EAN of $Fe_2(CO)_9$, $[V(CO)_6]$ and $Fe_3(CO)_{12}$. (5 Marks)

(c) How IR spectroscopy is helpful in the structural elucidation of carbonyl complexes. (5 Marks)