

**TDC Odd Semester Exam., 2020
held in July, 2021**

CHEMISTRY

(Honours)

(3rd Semester)

Course No. : CHMH-301

(Inorganic Chemistry—III)

Full Marks : 35

Pass Marks : 12

Time : 2 hours

*The figures in the margin indicate full marks
for the questions*

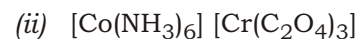
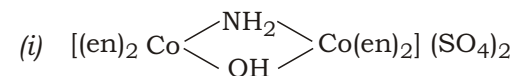
Answer **five** questions, taking **one** from each Unit

UNIT—I

1. (a) Define first-order and second-order innermetallic complexes. 2
- (b) Why is a terminal ligand so called? Contrast such a ligand with a bridging one. Define nuclearity of a complex. 1+1+1=3

- (c) Draw the structures of any *two* of the following ligands : 1×2=2
- (i) 18-crown-6
- (ii) (2.2.1) crypt
- (iii) The parent porphyrin ring

2. (a) Write the IUPAC names (2005) of the following : 1×2=2



- (b) What are the stereochemistries possible for a complex of type $[ML_5]$? Give examples. 1+2=3
- (c) How does colour change principle help in detection of complex formation? 2

UNIT—II

3. (a) How is manganese extracted from its most important ore? 3
- (b) Lanthanum exhibits +3 oxidation state whereas certain other elements of lanthanum series show +2 and +4 also. Explain. 3
- (c) Comment on the colour of scandium (III) ion. 1

(3)

4. (a) Give an account for the colour exhibited by compounds of lanthanum series. 3
(b) How can chrome alum be prepared from potassium dichromate? 2
(c) How is scandium series different from lanthanum series in respect of complex formation? 2

UNIT—III

5. (a) "Covalent contribution is the main force in formation of an H_2 molecule in terms of VBT." Elucidate. 3
(b) Define resonance and resonance energy. Draw all the canonical structures of benzene. 2+2=4
6. (a) Discuss the natures and relative strength of Debye, Keesom and London forces. 3
(b) Explain the structure of SF_4 and BrF_5 in terms of VSEPR theory. 2+2=4

UNIT—IV

7. (a) In the light of band theory, explain the properties of semiconductor. 3
(b) Name and give the formulae of four pseudohalogens. Write two reactions showing the resemblance of pseudohalogens with halogens. 2+2=4

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(Turn Over)

(4)

8. (a) What are interhalogen compounds? How are they prepared? Write two important properties of interhalogen compounds. 1+1+2=4
(b) Give the formulas and preparations of Caro's and Marshall's acids. $1\frac{1}{2}+1\frac{1}{2}=3$

UNIT—V

9. (a) Write two methods of preparation of metal carbonyls. Explain the synergic effect with respect to bonding in carbonyls. 2+2=4
(b) Explain the tetragonal distortion in $[PtCl_4]^{2-}$. Comment on its magnetic properties. 2+1=3
10. (a) What is SHAB principle? On the basis of this principle, state why $[Ag(CN)_2]$ is stable whereas $[AgCl_2]$ is unstable. 2+2=4
(b) The stretching frequencies in $[Ni(CO)_4]$, $[Co(CO)_4]^{2-}$ and $[Fe(CO)_4]^{2-}$ are $\sim 2060\text{ cm}^{-1}$, $\sim 1890\text{ cm}^{-1}$ and $\sim 1790\text{ cm}^{-1}$ respectively. Explain this decreasing order on the basis of metal-CO bonding. 3

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