

AU-313

M.Sc. Part-I (Semester-II) (CBCS Scheme) Examination
CHEMISTRY (OLD) (UPTO WINTER-2018)
(Inorganic Chemistry)
(Co-ordination Chemistry)
Paper—V

Time : Three Hours]

[Maximum Marks : 80

Note :— (1) All questions carry equal marks.(2) **ALL** questions are compulsory.

(3) Use of log table and scientific calculator is allowed.

1. (a) Give evidences in support of metal ligand overlap in complexes. 6
- (b) Give the explanation of charge transfer spectra on the basis of MO theory. 5
- (c) Differentiate between crystal field theory and MO theory. 5

OR

- (p) Draw a qualitative MO diagram for square planar complexes with suitable example. 6
- (q) Explain the formation of molecular orbital diagram for tetrahedral $[\text{Ni}(\text{Co})_4]$. 5
- (r) Give the limitations of CFT. 5
2. (a) Derive the ground state term for d^1 and d^6 configurations of metal ion. 6
- (b) Discuss the various types of transitions occurring in transition metal complexes. 5
- (c) An octahedral $\text{Ni}(\text{II})$ complex exhibits three electronic spectral bands at 9000 cm^{-1} , 15500 cm^{-1} and 23400 cm^{-1} . Identify these bands and calculate Δ_o , B and β parameters. [B for free ion = 1030 cm^{-1}] 5

OR

- (p) Explain and draw the Orgel energy level diagram for d^2 and d^8 configurations in octahedral complexes. 6
- (q) What is meant by nephelauxetic effect ? Explain its contribution of covalent bonding in metal ligand bond. 5
- (r) How do the Racah Parameters of a complex ion differ from that of the corresponding free ion ? Explain with suitable example. 5

3. (a) Explain the mechanism of ligand displacement on the basis of labile and inert complexes. 6
 (b) Discuss the factors affecting acid hydrolysis reaction. 5
 (c) Discuss the isomerization reactions with suitable examples. 5

OR

- (p) Explain the conjugate base mechanism in detail. 6
 (q) Explain the kinetics of octahedral substitution reaction. 5
 (r) What is ligand stereospecificity ? Explain with suitable examples. 5
 4. (a) Discuss the photochemical reactions occurring in chromium complexes. 6
 (b) How are coordination compounds synthesised using electron transfer reactions ? Explain. 5
 (c) Discuss the mechanism of substitution reactions in Pt(II) complexes. 5

OR

- (p) Define trans effect. Give a brief account of use of trans effect in the synthesis of cis and trans isomer of $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$. 6
 (q) What is tunneling effect ? Explain in brief. 5
 (r) Discuss the photochemical reactions in Ruthenium complexes. 5
 5. (a) Explain the role of vibrational spectra in elucidation of structure and bonding of metal carbonyls. 6
 (b) What are fluxional molecules ? Explain fluxional behaviour in π -allyl complexes. 5
 (c) What is the role of Wilkinson's catalyst in homogeneous hydrogenation of alkenes ? Explain. 5

OR

- (p) What are metal carbonyls ? How are they classified ? Give examples. 6
 (q) How is X-ray diffraction useful in study of metal nitrosyl for bonding and structure elucidation ? 5
 (r) Give the various important reactions of dioxygen complexes. 5