

M.Sc. (Part—I) Semester—II (CBCS Scheme) Examination
CHEMISTRY (New)
(Co-ordination Chemistry)
Paper—V

Time : Three Hours]

[Maximum Marks : 80

N.B. :— (1) All questions are compulsory and carry equal marks.

(2) Use of scientific calculator is allowed.

1. (a) Calculate the ground term symbol for d^4 configuration. Write the Mulliken symbol for its around term. 5
- (b) Whether the following configurations in weak octahedral field will contribute orbital magnetic moment to spin-only value ? Explain :
 - (i) d^1
 - (ii) d^3
 - (iii) d^4
 - (iv) d^7
 - (v) d^8 6
- (c) Why tetrahedral complexes show more intense absorption band than octahedral complexes ? Explain with example. 5

OR

- (p) Discuss the electronic spectra of d^3 and d^7 metal ions in weak octahedral field with suitable example using Orgel diagram. 6
 - (q) Explain the following :
 - (i) Ferromagnetism and
 - (ii) Antiferromagnetism. 5
 - (r) What is nephelauxetic effect ? Arrange the following ligands in the increasing order of Nephelauxetic series I^- , H_2O , NH_3 , NCS^- , CN^- , F^- . 5
2. (a) On the basis of CFT, predict whether the following complexes would be inert or labile by giving reason :
 - (i) $[Fe(CN)_6]^{4-}$
 - (ii) $[Co(H_2O)_6]^{3+}$
 - (iii) $[Cr(NH_3)_6]^{3+}$. 6
 - (b) Compare SN^1 and SN^2 reactions in octahedral complexes on the following points :
 - (i) Rate of reaction
 - (ii) Geometry of intermediate complex. 5
 - (c) What is base hydrolysis ? Explain the mechanism of base hydrolysis of $[Co(en)_2(NH_3)Cl]^{2+}$. 5

OR

- (p) What is SN^1CB mechanism ? Explain its mechanism with an example. 6
- (q) Discuss the factors affecting the lability of complexes. 5
- (r) Discuss the mechanism of substitution reaction without metal ligand bond breaking in octahedral complexes. 5
3. (a) What is electron transfer reaction ? Explain complimentary and non-complimentary electron transfer reactions with suitable example. 6
- (b) Discuss the photochemical reactions of chromium complexes. 5
- (c) How will you explain trans effect on the basis of molecular orbital theory ? 5

OR

- (p) What is trans effect ? Discuss any one of its application. 6
- (q) Discuss the electron transfer reaction occurring through inner sphere mechanism. 5
- (r) Discuss the photochemical reactions of Ruthenium complexes. 5
4. (a) What are metal carbonyls ? Discuss the structure and bonding in $Fe_2(CO)_9$. 6
- (b) Discuss the nitrosylating agents used for the synthesis of metal nitrosyls. 5
- (c) Explain the fluxionality in diene complexes. 5

OR

- (p) What are metal nitrosyls ? Write any two methods of their preparations. 6
- (q) What is Vaska's compound ? Highlight its importance. 5
- (r) What are fluxional molecules ? Explain the structure of any one of its molecules. 5
5. (a) What are the functions of different alkali metal ions ? Explain them with their deficiency effects. 6
- (b) Differentiate between haemoglobin and myoglobin. 5
- (c) Give an account on :
(i) Hill equation and
(ii) Bohr effect. 5

OR

- (p) Discuss the structure of haemoglobin and its role as an oxygen transport. 6
- (q) Discuss the mechanism of ion transport across the membrane. 5
- (r) Give an account on :
(i) Transport protein and
(ii) Storage protein. 5