Q.P. Code – 56772

Final M.Sc. Degree Examination

OCTOBER/NOVEMBER 2014

(Directorate of Distance Education)

CHEMISTRY

(DPB 520) Paper DECHEM 2.02 – INORGANIC CHEMISTRY - VI

Time : 3 Hours] *[Max. Marks : 75/85*

Instructions to Candidates :

1) *Scheme : 75 marks - Answer Part **A** (any **TEN** subdivisions), any **TWO** questions from Part **B** and any **THREE** questions from Part **C**.*

2) *Scheme : 85 marks - Answer Part **A** (any **TEN** subdivisions), any **TWO** questions from Part **B** and any **THREE** questions from Part **C**; and any **ONE** question from Part **D**.*

PART – A

I. Answer any **TEN** of the following : **10 × 2 = 20**

1. (a) Give the general electronic configuration of d-block and f-block elements.

(b) With suitable examples, explain the significance of 18-electron rule.

(c) What is chelating ligand? Write the structure of two such ligands.

(d) Mention the significance of Irwing-William series.

(e) $KMnO_4$ is pink in colour eventhough manganese do not have any d-electrons. Why?

(f) Calculate the spin only magnetic moment for $K_4[Fe(CN)_6]$ and $K_3[Fe(CN)_6]$.

(g) Explain the role of Co and Cu in biological systems.

(h) Mossbauer spectra is recorded generally for solid samples and preferably at low temperature. Give reason.

(i) Define the terms : Prolate and Oblate nucleus.

(j) What is Bohr effect? Mention its significance.

(k) Explain the terms : 'Asymmetry Parameter"and nuclear quadrupole moment.

(l) What do you mean by oxidative phosphorilation? Explain.

(m) Define the terms : Coenzyme and metallo enzyme.

(n) What is Zeise salt? Give its structure.

(o) Distinguish inner sphere mechanism from outer sphere mechanism.

PART – B

II. Answer any **TWO** questions : **2 × 8 = 16**

2. (a) What is stability of metal complex? Discuss the factors affecting the stability of metal complexes.

(b) What are metal carbonyls? Discuss the preparation and bonding in $Fe(CO)_5$. **4 + 4 = 8**

3. (a) What is lanthanide contraction? Explain how lanthanides can be separated by ion exchange method.

(b) Briefly discuss about the selection rules of electronic spectra. **4 + 4 = 8**

4. (a) Explain the effect of temperature on magnetic susceptibility of ferromagnetic and antiferromagnetic materials.

(b) With illustrative examples, explain the role of metal complexes as anticancer drugs. **4 + 4 = 8**

PART – C

III. Answer any **THREE** questions : **3 × 13 = 39**

5. (a) Discuss the characteristics of lanthanides with special reference to electronic configuration, oxidation and ionic radii.

(b) Give a comparative account on spectral and magnetic properties of d-block and f-block elements.

(c) Write notes on : (i) Lanthanides as shift fragments (ii) term symbols. **5 + 4 + 4 = 13**

6. (a) With illustrative examples, explain any three methods for the preparation of metal complexes.

(b) Explain : Spectrochemical series and nephelauxetic series.

(c) With an example each, explain complementary and non complementary electron transfer reactions. **5 + 4 + 4 = 13**

7. (a) With suitable example, explain preparation and structure of metal olifin complexes.

   (b) Give a comparative account on mononuclear and polynuclear metal carbonyls.

   (c) Explain the mechanism of hydrogenation of olefins using Wilkinson Catalyst. **5 + 4 + 4 = 13**

8. (a) Explain the role of copper, cobalt, magnesium and calcium in biological systems.

   (b) What is Na^+/K^+ pump? Explain its role and mechanism.

   (c) Write notes on : (i) Nitrogen fixation (ii) Photosynthesis. **5 + 4 + 4 = 13**

9. (a) Sketch and explain the salient features of Mossbauer spectra of low spin and high spin iron complexes.

   (b) For a quadrupole nucleus with I = 3/2, calculate the energy of nuclear quadrupolar energy levels (in an axially symmetric field) in terms of eQq values and predict the number of transitions.

   (c) Write notes on (i) Vitamin B_{12} coenzyme (ii) Crown ethers. **5 + 4 + 4 = 13**

PART – D

IV. Answer any **ONE** question : **1 × 10 = 10**

10. (a) Discuss Gouy method for the determination of magnetic susceptibility of complexes.

    (b) Explain preparation, structure and bonding in ferrocene. **5 + 5 = 10**

11. (a) Discuss the principle and applications of Mossbauer Spectroscopy.

    (b) Explain the role of Hemoglobin and Myoglobin in biological systems. **5 + 5 = 10**