

**Q.P. Code – 56711**

**M.Sc. (Final) Degree Examination**

**OCTOBER/NOVEMBER 2014**

**(Directorate of Distance Education)**

**Applied Chemistry**

**(DCB 510) DEC.APP.CHEM. 2.01 – ADVANCED INORGANIC  
CHEMISTRY**

*Time : 3 Hours]*

*[Max. Marks : 80/85*

**Instructions to Candidates :**

- 1) Answer any **ELEVEN** questions from Part **A**, any **FOUR** questions from Part **B** and any **TWO** questions from Part **C**
- 2) **Figures to the right** indicate **marks**.

**PART – A**

1. Answer any **ELEVEN** questions :

**11 × 2 = 22**

- (a) Find the ground state term symbol for  $Ti^{3+}$  and  $Mn^{2+}$ .
- (b) Predict the structure and magnetic behaviour of  $[Ni(CO)_4]$  and  $[Ni(CN)_4]^{2-}$ .
- (c) Account for the splitting energy :  $\Delta_o > \Delta_t$ .
- (d) What are the reasons for complexes containing metal-metal bonds are intensely colored?
- (e) What is a redox states of metal?
- (f) What are the prerequisites for the operation of an inner sphere redox mechanism?
- (g) What are metal clusters?
- (h) Draw the mechanism of water-gas shift reaction.
- (i) Distinguish between labile and inert complexes with examples.
- (j) What is 18 electron rule?
- (k) Why iron in hemoglobin does not undergo oxidation on dioxygen binding?
- (l) What are ferridoxins?
- (m) Give any two anti cancer agents.
- (n) Why is manganese better suited for PS II than Co or Ni?
- (o) What is the significance of cytochrome p-450?

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**PART – B**

Answer any **FOUR** of the following questions :

**4 × 8 = 32**

2. (a) Discuss Ziegler-Natta polymerization.  
(b) Explain M.O. treatment of bonding in octahedral complexes. **4 + 4**
3. (a) Explain the mechanism of inner sphere and outer sphere reactions with suitable examples.  
(b) Give an account of Orgel diagrams. **5 + 3**
4. (a) Discuss the magnetic behaviours of Cu(II) and Co(II) complexes.  
(b) Write a note on Vitamin B-12-coenzyme. **4 + 4**
5. (a) How are metal carbonyls and metal nitrosyls complexes synthesized? Discuss their reactivity.  
(b) Explain metal complexes as therapeutic agents? **5 + 3**
6. (a) What is an ion pump? Explain the mechanism of transport of Na<sup>+</sup>/K<sup>+</sup> ion across cell membrane.  
(b) Outline the probable mechanistic pathways for nitrogenase activity in N<sub>2</sub> fixation. **4 + 4**
7. (a) Discuss the cooperativity effect in hemoglobin and myoglobin.  
(b) What are cytochromes? How are they classified? Discuss the structural features and biological role of cytochrome C. **4 + 4**

**PART – C**

Answer any **TWO** of the following questions :

**2 × 13 = 26**

8. (a) Discuss the factors effecting  $\Delta$  values in CFSE.  
(b) What is the importance of Tanabe-sugano diagram? Represent an Orgel diagram for a d<sup>4</sup> ion.  
(c) Discuss the Gouy method for determining magnetic susceptibility of a complex. **4 + 5 + 4**
9. (a) Write note on spectrochemical series.  
(b) Mention the factors effecting M-M bonding.  
(c) Discuss the mechanism of base hydrolysis of an octahedral Co (III) complex. **3 + 5 + 5**

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10. (a) Explain toxicity of metal ions with suitable examples.  
(b) Discuss the mechanism involved in oxo-reaction using rhodium catalyst.  
(c) Discuss the properties of 5d metal ion complexes. **3 + 5 + 5**
11. (a) Explain the chelating agents used in medicine fields.  
(b) How is biomethylation of heavy metals caused? What are its effects?  
(c) Discuss the role of alkali earth metals used in biological systems. **4 + 4 + 5**

**Compulsory question for 85 marks scheme only** **1 × 5 = 5**

12. Discuss the classification of organometallic compounds on the basis of the position of the elements in the periodic table.

Or

13. Write note on antiferromagnetic coupling and orbit coupling.
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