Total Pages : 4

End Semester Examination of Semester–III, 2015
Subject : CHEMISTRY (PG)
Paper : CEM–303 (Theory)
(Inorganic Spl.)
Full Marks : 40
Time : 2 Hrs

The figures in the margin indicate the marks corresponding to the question

Candidates are requested to give their answers in their own word as far as practicable.

Illustrate the answers wherever necessary.

Unit–I

Answer **any one** question - 1x10=10

1) a) Find the number of microstates for Mn(III) ion and find its ground state term symbol. 1+2

b) What are homogeneous and heterogeneous catalysts? Give example of each type explaining their role in a definite chemical reaction. 2+3

c) What do you mean by THEXI–state? 2

2. a) Write a note on L–S coupling. 3

b) What is meant by 'insertion reaction'? Explain the mechanison of CO insertion in $Mn(CO)_5$. 3

c) State the basic principles of polarography. Draw a polarogram and explain the reason of current upsurge at a definite potential. Explain the meaing of half-wave potential, diffusion current, potential window. 4

Unit–II

Answer any **one question** 1x10=10

3. a) Calculate μ_s and μ_{s+L} for Cr(III) ion. 2

b) What is Hydroformylation Reaction? Describe the catalytic cycle for this reaction. 1+3

c) Explain Stark-Einstein law of photochemistry. 2

d) What is florescence quantum yield? How it is calculated? 2

4. a) What is antiferromagnetism via super exchange mechanism? Explain with an example. 3

b) Write a note on Wacker Oxidation Poiniting out the role of catalyst and co-catalyst. 4

c) Write down Ilkovic equation and mention its significance. 3

Unit–III

Answer any **one question** 1x10=10

5. a) How is magnetic susceptibility determined by Gouy method? 4

b) Write a note on oxidative addition reaction. 3

c) Draw Jablonski diagram and explain the meaning of IC, ISC, Fluorescence and Phosphorescence. 3

6. a) Discuss the catalytic cycle of alkene hydrogenation by Wilkinson catalyst. 4

b) Explain whether the following complexes will have any orbital contribution to their μ_{eff} values:
d^2(oh); d^4(Td); d^7(Td) 3

c) Write a note on Fluorescence Resonance Energy Transfer (FRET). 3

Unit–IV

Answer any **one question** 1X10=10

7. a) Explain the catalytic cycle for preparing acetic acid by Monsanto acetic acid by enthesis. 4

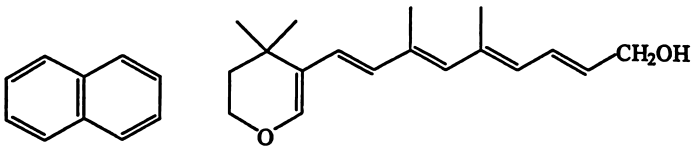
b) What is hole formalism? Assign the possible transition of holes in Cu(II) octahedral complexes. 3

c) Give one example of each photoisomerisation, photodissociation and photoredox reaction. 3

8. a) Write a note on Zieglar-Natta polymerisation of alkenes. 4

b) High spin octahedral complexes of Co(II) show much higher μ_{eff} values than their tetrahedral complexes. Explain. 2+2

c) Explain following observation: 2



(i) (ii)

(i) and (ii) have five conjugated double bonds while fluorescence intercity of (i) is five times more than (ii).