STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86
(For candidates admitted from the academic year 2011–12 & thereafter)

SUBJECT CODE: 11CH/PC/CO44

M. Sc. DEGREE EXAMINATION, APRIL 2015
BRANCH IV- CHEMISTRY
FOURTH SEMESTER
REG.NO …….

COURSE : CORE
PAPER : COORDINATION CHEMISTRY
TIME : 30 MINUTES **MAX. MARKS: 20**

SECTION – A
TO BE ANSWERED ON THE QUESTION PAPER ITSELF

Answer all the questions. **(20 x 1= 20)**

I. Choose the correct answer:

1. Which shows optical isomerism?
   a) $K_3[Fe(CN)_6]$ b) trans $K_3[Cr(ox)_3]$
   c) cis- $K_3[Cr(ox)_3]$ d) trans $K_3[Co(en)_2(NH_3)_2]$
2. Complex does not show Jahn-Teller distortion.
   a) $K_3[Cr(ox)_3]$ b) $[Cr(acac)_3]$ c) low spin $K_4[Co(CN)_6]$ d) $K_2[CuF_4]$
3. Metal ion appears higher in nephelauxetic series
   a) Mn^{2+} b) Mo^{3+} c) Cr^{3+} d) Co^{3+}
4. Ligand with least trans effect is
   a) H_2O b) Cl^- c) Br^- d) NH_3

II. Fill in the blanks:

5. CFSE for 'Oh' and 'Td' geometries are related as_____.
6. Inter-electronic repulsion parameter B = _____.
7. 3d Metal ion showing lower Irving-William order of stability is _____.
8. Deficiency of magnesium causes_____.

III. State whether True or False:

9. $[Co(NH_3)_6]Cl_3$ is thermodynamically unstable but kinetically inert.
10. According to CFT, rate of substitution in weak field 'Oh' Ni(II) complex is found to be greater than Co(II)Complexes.
11. Most preferable shape of intermediate in S_N2 reactions of 'Oh' complexes is square pyramidal.
12. All 'Td' complexes are high spin since Δ_t is always smaller than Δ_o.

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IV. Match the following:

13. Haemochematosis	–	i) organometallic enzyme
14. Cytochrome C	–	ii) excess iron
15. Vitamin B_{12}	–	iii) iron storage
16. Ferritin	–	iv) iron in electron transport

V. Answer in a line or two:

17. What are labile complexes? Give an example.

18. Illustrate a reference used in ESR.

19. Give an example for non-complementary reaction.

20. Name three important biological redox-systems.

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TIME : 2½ HOURS **MAX. MARKS: 80**

SECTION – B

Answer any Five Questions: **(5 x 8 = 40)**

1. a] Distinguish labile and inert complexes.
   b] Explain the factors affecting the stability of complexes.
2. Write an account on photo substitution reaction of cobalt complexes.
3. Describe i) the factors affecting CFSE ii) spectro-chemical series
4. Explain i) Orgel and Tanabe-Sugano diagrams ii) Nephelauxetic series.
5. Write a brief account on Mossbauer spectra of Iron compounds.
6. Explain the theories and applications of trans effect.
7. Write an account on transport and storage of oxygen by globins.

SECTION – C

Answer any Two Questions: **(2 x 20 = 40)**

8. a] Discuss the stereo isomerism exhibited by complexes of Coordination Number four.
   b] Explain the method of determining stability constant of a complex. (12+8)

9. a] Discuss the CF splitting in complexes of Coordination Number four and six.
   b] Describe the magnetic behavior of lanthanides and explain spin-orbit coupling. (10+10)

10. a] Discuss the ESR spectrum of copper(II)system.
    b] Explain outer sphere mechanism based on Marcus theory.
    c] Write a brief account on iron storage. (8+6+6)

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