STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086
(For candidates admitted from the academic year 2015-16 & thereafter)
SUBJECT CODE: 15CH/MC/IC64
B.Sc. DEGREE EXAMINATION, APRIL 2021
BRANCH IV - CHEMISTRY
SIXTH SEMESTER

COURSE: MAJOR CORE
PAPER: INORGANIC CHEMISTRY -II
TIME: 90 MINUTES **MAX. MARKS: 50**

SECTION – A

Answer all the Questions **(15x1=15) marks**

I Choose the correct answer

1. Which of the following valence-shell electronic configurations represents an inner transition element?
   a. ns^2np^6 b. ns^2 c. ns^2np^{1-5} d. $(n-2)f^{1-14}\ (n-1)d^{0-1}\ ns^2$
2. The crystal field stabilization energy CFSE for d^4 ion in high spin octahedral complex is
   a. 18 Dq b. +6 Dq c. -16 Dq+P d. -6 Dq
3. The lanthanide which does not have any f electron is
   a. Ac b. La c. Lw d. Cm
4. Which of the following can function as a chelating agent?
   a. SH^- b. H_2O c. $H_2NCH_2CO^{2-}$ d. SCN^-
5. $[Ni(CN)_4]^{2-}$ is
   a. paramagnetic, square planar b. paramagnetic, tetrahedral
   c. diamagnetic, tetrahedral d. diamagnetic, square planar

II Fill in the blanks

6. The cation present in cyanocobalamin is --------.
7. The common oxidation state of the actinides is ---------.
8. Coordination number of $[Co(en)_3]Cl_3$ is ----------
9. $[Co(NH_3)_5Br]SO_4$ and $[Co(NH_3)_5\ SO_4]Br$ complexes are the example for ---------- isomerism.
10. The IUPAC name for the complex $[Co(NO_2)(NH_3)_5]Cl_2$ is----------.

III Answer in a sentence or two

11. A complex with the composition $[MA_2B_2]X_2$ is found to have no geometrical isomers. Both A and B are monodentate ligands. Identify the structure of the complex.
12. Calculate the number of 'd 'electrons in $[Fe(bpy)_3]^{3+}$coordination complex.
13. Name any two organometallic compounds with pi-bonded ligands.
14. What is meant by hapticity of a ligand? How is it designated?
15. Draw the optical isomers of $[Co(en)_2\ Cl_2\ ]$.

SECTION – B

Answer any three questions **(3x5=15 marks)**

16. Discuss the properties of the transition metals with respect to a) oxidation state b) Magnetic property c) Colour
17. Explain Jahn Teller effect with a suitable example
18. How will you extract uranium from pitch blende?
19. Draw the CFT diagram and calculate CFSE for the octahedral complexes.
    a) $[Fe(H_2O)_6]^{2+}$ b) $[Cr(NH_3)_6]^{3+}$
20. Give the applications of the following i. Alizarin ii.DMG iii. $K_4[Fe(CN)_6]$ in qualitative Analysis. (2+2+1)

SECTION – C

Answer any two questions **(2x10=20 marks)**

21. Discuss the preparation, properties and structure of $Fe(CO)_5$.

22. a) Discuss geometrical isomerism in 6 coordinate complexes.
    b) What is lanthanide contraction? What are its consequences? (5+5 marks)
23. a) What is spectrochemical series for ligands? How can it be used to predict whether the given complex is low or high spin.
    b) Apply 18 electron rule to i. $[(\eta^5Cp)(\eta^1Cp)\ Fe]$ .ii. $[V(CO)_6]^-$
    c) Give any three reactions of Ferrocene. (4+3+3 marks)

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