

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086
(For candidates admitted from the academic year 2011-12 & thereafter)
SUBJECT CODE: 11CH/MC/IC64
B.Sc. DEGREE EXAMINATION, APRIL 2015
BRANCH IV - CHEMISTRY
SIXTH SEMESTER

Reg. No

COURSE : MAJOR-CORE
PAPER : INORGANIC CHEMISTRY - III
TIME : 30 MINUTES

MAX. MARKS : 30

SECTION – A

TO BE ANSWERED ON THE QUESTION PAPER ITSELF.

ANSWER ALL THE QUESTIONS.

(30x1=30)

I. Choose the correct answer:

- Which of the following valence-shell electronic configurations represents a lanthanide element?
a. ns^2np^6 b. $(n-2)f^{0,2-14}(n-1)d^{0,1,2}ns^2$ c. ns^2np^{1-5} d. $ns^2(n-1)d^{1-10}$
- The magnetic moment of $Ni(CO)_4$ in Bohr magneton is
a. Zero b. 1.73 c. 3.85 d. 5.96
- The crystal field stabilization energy (CFSE) for d^7 ion in low spin octahedral complex is
a. 18 Dq b. +6 Dq c. -18 Dq+3P d. -6 Dq
- The oxidation state of Fe in $Fe(CO)_5$ is
a. 2 b. 0 c. 5 d. 3
- Molecular formula of potassium ferrocyanide is
a. $K_3[Fe(CN)_6]$ b. $K_2[Fe(CN)_2]$ c. $K_4[Fe(CN)_6]$ d. $K[Fe(CN)_6]$
- Which of the following is used as an analytical reagent for the detection of phosphate ions?
a. Ammonium chloride b. Ammonium phosphate
c. Ammonium molybdate d. Ammonium sulphate
- The chemical name of oxine is
a. 5-hydroxy quinoline b. 6-hydroxy quinoline
c. 7-hydroxy quinoline d. 8-hydroxy quinoline
- The outer electronic configuration of rhodium is
a. $3d^74s^2$ b. $4d^75s^2$ c. $3d^84s^2$ d. $4d^85s^2$
- Which of the following is used for the estimation of nickel ?
a. Oxine b. $BaCl_2$ c. DMG d. None of these
- The highest oxidation state shown by osmium is
a. +3 b. +2 c. +7 d. +8

II. FILL IN THE BLANKS:

11. The structure of nickel tetra carbonyl is _____.
12. The cation present in haemoglobin is _____.
13. The hybridization of Zn in $[\text{Zn}(\text{NH}_3)_4]^{2+}$ is _____.
14. The common oxidation state of all the lanthanides is _____.
15. Number of 4f electrons present in La^{3+} is _____.
16. Ferroin is an example of _____ indicator.
17. The formula of chloroplatinic acid is _____.
18. The element molybdenum belongs to _____ transition series.
19. The most important and stable oxidation state of zirconium is _____.
20. In the contact process _____ is used as a catalyst.

III. STATE WHETHER TRUE OR FALSE:

21. Ferrocene is aromatic in character .
22. $[\text{Ni}(\text{CN})_4]^{2-}$ is paramagnetic.
23. $\text{Fe}_2(\text{CO})_9$ is a mononuclear carbonyl compound
24. Zinc hydroxide is amphoteric in nature.
25. EDTA exists as a zwitter ion.

IV. ANSWER IN ONE OR TWO SENTENCES:

26. What is haemocyanin?

27. Give the IUPAC name of $\text{K}_3[\text{Fe}(\text{CN})_6]$.

28. Define coordination number.

29. What is an ambidentate ligand?

30. What is Ziegler-Natta catalyst?

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TIME : 2 ½ HOURS **MAX. MARKS: 70**

SECTION – B

ANSWER ANY FIVE QUESTIONS: (5x6 = 30)

1. Explain chelate effect. Give two examples of applications of chelate effect in analytical chemistry.
2. Explain the structure of Fe (CO)₅ compound.
3. Discuss about the magnetic properties of actinides.
4. Explain the structures of [Cr(NH₃)₆]³⁺ and [NiCl₄]²⁻ ions on the basis of Valence Bond Theory. (3+3)
5. Discuss about the following with suitable examples. (3+3)
 - a. Coordination isomerism
 - b. Hydrate isomerism
6. Explain Jahn-Teller distortion with an example.
7. Discuss about the method of determination of hardness of water by EDTA.

SECTION – C

ANSWER ANY TWO QUESTIONS: (2x20 = 40)

8.
 - a. Explain the origin of colour of Ti[(H₂O)₆]³⁺ ion. (6)
 - b. Discuss about the following properties of lanthanides
 - i. Colour
 - ii. Oxidation state
 - iii. Basic character(9)
 - c. Briefly discuss about the catalytic properties of transition elements. (5)
9.
 - a. Explain with examples geometrical isomerism exhibited by 4-coordinated complexes. (6)
 - b. Explain the structure and function of haemoglobin. (4+4)
 - c. Discuss about the role of the following coordination compounds in qualitative analysis.
 - i. Potassium ferricyanide
 - ii. Alizarin
 - iii. Oxine(6)
10.
 - a. Discuss about any three factors which can influence the magnitude of crystal field splitting. (6)
 - b. Discuss about the method of extraction of uranium from pitch blende. (8)
 - c. Discuss about any two methods of preparation of organometallic compounds of tin. Draw the structure of dimethyl tin chloride. (4+2)
