

BSc DEGREE EXAMINATION DECEMBER 2017

(Fifth Semester)

Branch- **CHEMISTRY**

INORGANIC CHEMISTRY !

Time : Three Hours

Maximum : 75 Marks

SECTION-A (20 Marks!)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10x2 = 20)

- 1 Explain the trends in variation of melting and boiling points in the first transition series.
- 2 Write down the IUPAC nomenclature of the following compounds :
(i) $[\text{Co}(\text{en})_3]_2(\text{SO}_4)_3$ (ii) $\text{Na}[\text{Co}(\text{CO})_4]$
- 3 Illustrate an evidence to support Werner's coordination theory.
- 4 Tetrahedral complexes are generally high spin. Why?
- 5 What is trans effect?
- 6 Compute the spin magnetic moment of the following :
(i) $\text{K}_4[\text{MnF}_6]$ (ii) $[\text{Fe}(\text{H}_2\text{O})_6]\text{Cl}_3$
- 7 Draw the structure of vitamin B₁₂.
- 8 Give the functioning of sodium pump.
- 9 Define : *n* - acid ligands and *n* - acid complexes.
- 10 Give the reactions of ferrocene with n-BuLi / CO_2 and ethylene.

SECTION - B (25 Marks!)

• Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

- 11 a What are chelates? Describe three of its applications.
OR
b Enumerate the factors affecting the stability of complexes.
- 12 a Compute the CFSE for d electrons in octahedral field.
OR
b What are the factors that affect the crystal field splitting energy?
- 13 a A solution of $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$ is green but that of $[\text{Ni}(\text{CN})_4]^{2-}$ is colourless. Explain why.
OR
b State and explain John-Teller theorem.
- 14 a Discuss the role of haemoglobin in living systems.
OR
b Citing an example, describe the structural features of iron-sulphur protein.
- 15 a Give a brief account on properties and structure of nitroso ferrous sulphate.
OR
b Explain the bonding present in ferrocene.

SECTION - C (30 Marks)

Answer any **THREE** Questions

ALL Questions Carry **EQUAL** Marks (3 x 10 = 30)

- 16 Discuss the structural and optical isomerism present in coordination compounds.
- 17 On the basis of CFT, account for the following :
(a) While $[\text{CoF}_6]^{3-}$ is paramagnetic, $[\text{Co}(\text{CN})_6]^{3-}$ is diamagnetic. (5)
(b) While $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ is strongly paramagnetic, $[\text{Fe}(\text{CN})_6]^{3-}$ is less paramagnetic. (5)
- 18 a) Draw a comparison between VB and CF theories of coordination compounds. (5)
b) Describe the pi bonding theory to explain trans effect. (5)
- 19 Discuss briefly the biological function and toxicity of essential and trace elements.
- 20 Discuss the structure and bonding of multinuclear iron carbonyls.