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H-6321

M.Sc. (Semester-II) Examination, July 2022

CHEMISTRY

(Inorganic Chemistry - II)

Time Allowed : Three Hours

Maximum Marks : 70

Minimum Passing Marks : 25

Note : This question paper is divided into four sections. All sections are **compulsory**. Attempt questions as per given instruction in each section.

SECTION-A

(Objective Type Questions)

Note : Attempt **all ten** questions. Each question carries **1** mark. [1x10=10]

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(1)

[P.T.O.]

1. (A) Multiple choice type questions :
- (i) The ligand system present in vitamin B₁₂ is :
- (a) Porphyrin
 - (b) Corrin
 - (c) Phthalocyanine
 - (d) Crown ether
- (ii) Which is more stable?
- (a) $[\text{Be}^{\text{II}}(\text{OH})]^+$
 - (b) $[\text{Ca}^{\text{II}}(\text{OH})]^+$
 - (c) $[\text{Mg}^{\text{II}}(\text{OH})]^+$
 - (d) $[\text{Ba}^{\text{II}}(\text{OH})]^+$
- (iii) Which ligand has more splitting power?
- (a) H₂O
 - (b) Cl⁻
 - (c) CN⁻
 - (d) CO

(iv) Hard base is :

(a) SCN^-

(b) I^-

(c) CO

(d) F^-

(v) Possible Microstates for d^2 configuration is :

(a) 45

(b) 10

(c) 120

(d) 70

(vi) Colour of $\text{Cr}_2\text{O}_7^{2-}$ is due to :

(a) d-d transition

(b) Unpaired electrons

(c) Charge transfers

(d) f-f transition

(B) Fill in the blanks :

- (vii) The number of Ions given by $[\text{Co}(\text{NH}_3)_5\text{H}_2\text{O}]\text{Cl}_3$ in solution is _____.
- (viii) The most widely used extracting solvent for extraction of lanthanides is _____.
- (ix) EAN of central ion in complex $[\text{Ag}(\text{NH}_3)_2]^+$ is _____.
- (x) Spectroscopic ground state term for Cr^{3+} ion will be _____.

SECTION-B

(Very Short Answer Type Questions)

Note : Attempt **any five** questions. Each question carries **2** marks. (Maximum word limit is **25-30** words).

[2x5=10]

2. (i) Calculate CFSE for LS complex octahedral having d^7 configuration.
- (ii) Give one example of ligand isomerism.
- (iii) Give two applications of HSAB concept.

- (iv) Give the role of Calcium in Biological system.
- (v) What is Chelate effect?
- (vi) Give any two limitations of valence bond theory.
- (vii) Give the causes of Lanthanide contraction.

SECTION-C

(Short Answer Type Questions)

Note : Attempt **any five** questions. Each question carries **4** marks. (Maximum word limit is **250** words). [4x5=20]

- 3.
- (i) Iron sulphur protein
 - (ii) Jahn Teller distortion
 - (iii) Charge Transfer spectra
 - (iv) Metal deficient diseases of Fe and Zn and its therapy
 - (v) Sodium - Potassium Pump
 - (vi) Metal carbonyl and Halide clusters
 - (vii) Spin - orbit coupling

SECTION-D

(Essay Type Questions)

Note : Attempt **any three** questions. Each question carries **10** marks. (More than **500** words). [10x3=30]

4. (i) What are Orgel and Tanabe Sugano diagrams? Discuss with suitable examples.
- (ii) Discuss the separation of Lanthanides and Actinides by solvent extraction and Ion exchange methods.
- (iii) Describe stereoisomerism in inorganic complexes with suitable examples.
- (iv) What is Nano Technology? Discuss its characterization, preparatory methods and important applications.

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