UE-5236

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M. Sc. (Sem. II) Examination,
June-2025

CHEMISTRY

Paper - 2.1

CHEM-521-T

Inorganic Chemistry

Time Allowed : **Three Hours**

Max. Marks : **70**
Min. Marks : **28**

This question paper contains two sections as under :

Section-A ***Max. Marks-20***

This section will have 10 questions, having 02 questions from each unit with no internal choice. Answer in about 20 words. All questions will have equal marks. (02×10=20)

Section-B ***Max. Marks-50***

This section will have 10 questions, having 02 questions from each unit, one question to be attempted from each unit. Word limit approximately 400-500 words. Questions may have sub divisions. All questions will have equal marks. (10×05=50)

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SECTION - A

1 (a) What is anation reactions?

(b) Write down a reaction without metal-ligand bond cleavage for a ligand substitution.

(c) Explain with example, how trans effect is useful in distinguising cis and trans isomers.

(d) What is inner sphere complex? Give two examples.

(e) What is LS coupling? Write down ground state term symbols for d^3 and d^4 configurations.

(f) What is charge transfer spectra? Show many types of charge transfer spectra are there?

(g) Explain EAN rule in carbonyls with two example.

(h) Describe the dioxygen complex.

(i) What is Wade's rule? Give one example.

(j) What are Carboranes? How are they classified?

2×10=20

SECTION - B

UNIT - I

2 (i) What are the direct and indirect evidences in favour of conjugate mechanism?

(ii) What are direct and labile complexes? Describe these via energy profile diagrams.

6+4=10

OR

Discuss :

(i) Acid hydrolysis.

(ii) Kinetic application of VBT & CFT.

5+5=10

UNIT - II

3 (i) Describe various theories of trans effect.

(ii) Discuss Marcus theory.

5+5=10

OR

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(i) Citing an example discuss the outer sphere mechanism of electron transfer reaction.

(ii) Write a explanatory note on substitution reactions in square planar complexes.

5+5=10

UNIT - III

4 Write short notes on following :

(i) Racah Parameter.

(ii) Selection rules of electronic spectroscopy.

(iii) Tanabe – Sugano diagram.

3+3½+3½=10

OR

(i) Explain the orgel diagram for $[V(H_2O)_6]^{3+}$ ion in octahedral field.

(ii) What are correlation diagram? Explain it for d^3 in octahedral complexes.

5+5=10

UNIT - IV

5 (i) Explain synergic bonding in carbonyl.

(ii) Write preparations, properties and structures of (i) $Ni(CO)_4$ and $Fe(CO)_5$.

5+5=10

OR

Write short notes on :

(i) Tertiary phosphine as ligand

(ii) Dinitrogen complex.

5+5=10

UNIT - V

6 (i) Discuss structure of Closo & Nido boranes giving suitable examples.

(ii) What are Styx code? Give styx code of $B_{10}H_{14}$ and B_6H_{10}.

5+5=10

OR

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What are metal clusters? Discuss the structure of metal halide clusters with metal-metal multiple bonds with giving a suitable example.

10

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