

2025

CHEMISTRY

(Minor)

Paper : CHE0500504

(Inorganic Chemistry—II)

(Set—B)

Full Marks : 45

Time : 2 hours

*The figures in the margin indicate full marks
for the questions.*

1. Fill in the blanks of the following : 1×5=5

- (a) Geometry of I_3^- ion is ____.
- (b) Number of 3c-2e bonds present in diborane is ____.
- (c) Effective number of electrons in $\text{Fe}(\text{CO})_5$ is ____.
- (d) Geometry of XeF_2 is ____.
- (e) The ground state term among ^1S , ^3P , ^1D , ^3F , ^1G is ____.

(2)

2. Answer the following questions (any five) :

2×5=10

- (a) Define allotropy with example.
- (b) H_3PO_3 is dibasic acid. Why?
- (c) How can $(\text{NPF}_2)_3$ be prepared?
- (d) What is the action of moisture on XeF_6 ?
- (e) Define *L-S* coupling.
- (f) Calculate magnetic moment (spin only) for Co^{2+} .
- (g) Why is $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ ion violet?
- (h) KO_2 is used in space shuttle. Why?
- (i) Name two peroxyacids of sulfur. Give their structures.
- (j) Define hapticity with example.

3. Answer the following questions (any four) :

5×4=20

- (a) What do you mean by interhalogen compounds? Discuss any one of them.
- (b) Compare the acidic character of oxoacids of chlorine.
- (c) Describe the use of Zeolites as water softeners.

(3)

- (d) Why does Li have dissimilarities with other alkali metals? What is the reason for the Li having a greater tendency to form covalent compounds than the other elements of the group?
- (e) Determine the ground state terms for low-spin and high-spin d^2 octahedral configuration.
- (f) Derive the term symbols for d^1 , d^4 , d^6 and d^9 complexes.
- (g) Beryllium shows covalency whereas other members of the family show electrovalency. Explain.
- (h) Write notes on *ortho*- and *para*-hydrogen.

4. Answer the following questions (any one) : 10

- (a) What is meant by diagonal relationship in periodic classification? Discuss the diagonal relationship of boron and silicon.
- (b) What is meant by hapticity of a ligand? How is it designated? Classify ligands on the basis of hapticity and give examples. Show clearly that the hapticity of a ligand varies from one organometallic compound to another.

- (c) Discuss the utility of Orgel diagrams. What are their limitations? Draw the Orgel diagrams for high-spin d^5 configuration in octahedral field.
- (d) Write notes on the following :
- (i) Charge transfer spectra
 - (ii) Spectrochemical series

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