Section C

6. (a) Describe Gouy's method for the determination of magnetic susceptibility. **8**

   (b) Explain the calculation of magnetic moments and discuss spin-only magnetic moments. **8**

7. (a) Discuss the magnetic properties of free ions and the effect of the ligand field on magnetic behaviour. **8**

   (b) Explain orbital contribution to magnetic moments in transition metal complexes. **8**

Section D

8. (a) Describe the preparation, bonding and important reactions of metal Carbonyls. **8**

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M. Sc. Chemistry EXAMINATION, 2026

(Second Semester)

(2020-21 Onwards)

(Re-appear Only)

INORGANIC CHEMISTRY-II

Time : 3 *Hours*] [*Maximum Marks :* 80

Before answering the question-paper, candidates must ensure that they have been supplied with correct and complete question-paper. No complaint, in this regard will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting *one* question from each Section. Q. No. **1** is compulsory. All questions carry equal marks.

1. (a) Define crystal field splitting energy.

(b) What is π-back bonding ?

(c) What is meant by spectrochemical series ?

(d) What are charge transfer spectra ?

(e) Define magnetic susceptibility.

(f) State Wade's rules.

(g) What is the role of tertiary phosphine ligands in complexes ?

(h) What is the nephelauxetic effect ?

2+2+2+2+2+2+2+2=16

Section A

2. (a) Discuss Molecular Orbital Theory for octahedral complexes with suitable energy level diagrams. **8**

(b) Describe the bonding in tetrahedral complexes using Crystal Field Theory and compare it with octahedral complexes. **8**

3. Compare Crystal Field Theory and Molecular Orbital Theory with respect to bonding in tetrahedral and square-planar complexes. **16**

Section B

4. (a) Explain Tanabe-Sugano diagrams for d^1 and d^4 systems and their significance in electronic spectroscopy. **8**

(b) Describe the calculation of Dq, B and β parameters from electronic spectral data. **8**

5. (a) Discuss the effect of distortion on *d*-orbital energy levels with suitable examples. **8**

(b) Explain Jahn-Teller distortion and its consequences on electronic spectra and structure. **8**

(b) Explain vibrational spectra of metal carbonyls and their role in structural elucidation. **8**

9. (a) Explain the preparation, bonding and reactions of dinitrogen complexes. **8**

(b) Discuss the structure and bonding of transition metal nitrosyl complexes. **8**

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(b) Explain vibrational spectra of metal carbonyls and their role in structural elucidation. **8**

9. (a) Explain the preparation, bonding and reactions of dinitrogen complexes. **8**

(b) Discuss the structure and bonding of transition metal nitrosyl complexes. **8**

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