

212161

S-2116

M.Sc. (Second Semester)

Examination, 2024-25

CHEMISTRY

Paper First

(Inorganic Chemistry-II)

(CHEM-007)

Time : Two Hours]

[Maximum Marks : 60

Note : Attempt any *four* questions. All questions carry equal marks.

1. (a) Draw a Orgel diagram for d^1 ion and out of its basis. Explain the absorption spectrum of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$.
(b) Discuss Laporte selection rule and spin selection rule for the electron. Under what conditions are these rules relaxed?
2. (a) Discuss the structure and bonding in metal nitrosyl complexes. 8
(b) What are the applications of magnetic moment data for explaining the metal complexes. 7

3. Discuss the nature of bonding in metal carbonyls. How IR absorption spectra is helpful to illustrate the structure of these compounds? Explain with example.
4. (a) Describe Wade's rules to classify boranes and borane anion.
(b) What are carbonyl cluster compounds?
5. Discuss preparation, properties and uses of transition metal cyclo-butadiene complexes.
6. (a) Draw structure of the following silicates:
(i) $[\text{SiO}_3]^{-2n}$.
(ii) $[\text{Si}_4\text{O}_{11}]^{-6n}$.
(iii) $[\text{Si}_2\text{O}_5]^{2-n}$.
(b) What are the characteristic of charge-Transfer spectra?
7. Write a short note on the following:
(a) Silicate in technology
(b) Zeolite used as water softer
(c) Redox parameters
8. Explain the following:
(a) Spin crossover
(b) Nature of M-C bond synthesis
(c) Five electron ligand.
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