No. of Printed Pages : 5

MCH–016

M. SC. IN CHEMISTRY/

M. SC. IN ANALYTICAL CHEMISTRY

(MSCCHEM/MSCANCHEM)

Term-End Examination

December, 2025

MCH-016 : INORGANIC CHEMISTRY–II

Time : 2 Hours *Maximum Marks : 50*

Note : *Answer any* ***five*** *questions. All questions carry equal marks.*

1. (a) Name the *four* classes of substitution reactions in inorganic chemistry. What is the basis of this classification ? 5

(b) What are the different classes of metal ions depending on their substitution rates ? Based on this, give reasons for the different rate constants for the following two reactions : 5

$$[Fe(H_2O)_6]^{2+} + Cl^- \rightarrow [FeCl(H_2O)_5]^+ + H_2O$$

$$k = 10^6 m^{-1} s^{-1}$$

$$[Ru(H_2O)_6]^{2+} + Cl^- \rightarrow [RuCl(H_2O)_5]^+ + H_2O$$

$$k = 10^{-2}\ m^{-1}\ s^{-1}$$

2. (a) Explain trans-effect in ligand substitution in square planar complexes with the example of platinum complexes. Also give the energy coordinate diagrams showing poor

trans-effect and π-bonding effect (lower transition state). 6

(b) Give the classification of ligands based on their trans-effects with the help of suitable examples. 4

3. (a) Draw the figures to depict cis $\wedge$ and cis Δ for a six-coordinate octahedral complex. Which axis of symmetry is present in them ? 5

(b) Give reasons for the faster outer-sphere reactions for 2nd and 3rd row transition metal ions compared to the 1st row transition metal ions. 5

4. (a) With the help of suitable examples, explain two electron transfer reactions.

5

(b) Give any *five* salient features of mixed valence coordination complexes. 5

5. (a) What are siderophores ? When are they called siderochromes ? Give any *two* uses of siderophores. 5

(b) What are rubredoxins ? Give an account of the different types of ferredoxins. 5

6. (a) Which metal ion is present in chlorophyll ? Why is it suitable and why heavy transition metal ions are not suitable for the plant species ? 5

(b) Explain the structure of carboxypeptidase A. Which metal is

present in it and why is it suitable as a catalyst in biological systems ? 5

7. (a) Give an account of the redox chemistry of metals with nucleic acids. 5

(b) What is the effect of thallium poisoning in humans ? Which enzymes can it inhibit and how can it be dealt with ? 5

× × × × ×