## MCH12 — INORGANIC CHEMISTRY – I

Time : Three hours　　　　　　　Maximum : 75 marks

SECTION A — (5 × 6 = 30 marks)

Answer ALL questions.

1. (a) Write notes on the synthesis and structured features of sulphur–nitrogen ring compounds.

Or

 (b) Discuss the preparation and uses of heteropoly acids of chromium.

2. (a) How is tetra borane prepared? Explain its structure and bonding.

Or

 (b) Write brief notes on "Cubane type clusters".

3. (a) Describe the potentiometric method of determination of stability constant of a complex species.

Or

 (b) State the HSAB principle and explain its applications.

4. (a) What are crown ethers? Discuss the properties of crown ether–alkali metal complexes.

Or

(b) Explain the cis–trans isomerism exhibited by 4 and 6–co–ordinated metal complexes.

5. (a) Briefly explain the spectral and magnetic properties of transition metal complexes.

Or

(b) Give an account on "Nephelauxetic effect".

SECTION B — (3 × 15 = 45 marks)

Answer any THREE questions.

6. (a) What are polyphosphazines? Explain their preparation, reactivity and structures. (10)

(b) Write a short note on "molecular sieves". (5)

7. (a) Explain the closo, nido and arachno structures of metallo carboranes. (10)

(b) What are metal clusters? Explain the structure and bonding in $[Re_2Cl_8]^{2-}$? (5)

8. (a) Define the illustrate stepwise and overall stability constants. How are they related to each other? What are the different ways in which the stability of a complex can be expressed? (10)

(b) How is the stability constant of a complex determined by polarographic method? Explain. (5)

9. (a) Explain the ORD and CD are used to deduce the absolute configuration of co–ordination complexes. (10)

(b) What are cryptates? Give the thermodynamic aspects of metal complexation with their macro cyclic ligands. (5)

10. (a) Draw the Orgel diagram for $d^1$ and $d^2$ systems. What is the difference between an Orgel diagram and Tanabe–Sugano diagram. (10)

(b) What are charge transfer spectra? Explain the effect of charge transfer transitions on energy level diagrams with an example. (5)

——————