(Pages : 3) S - 6837

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## Third Semester M.Sc. Degree Examination, February 2024 Chemistry/Analytical Chemistry/Polymer Chemistry CH 231/CL 231/PC 231: INORGANIC CHEMISTRY III (2020 Admission Onwards)

Time: 3 Hours Max. Marks: 75

## SECTION - A

Answer **any** two sub–questions among (a), (b), or (c) from each question. Each sub–question carries **2** marks.

- 1. (a) Illustrate the Hapto nomenclature of organometallic compounds.
  - (b) Discuss the bonding in metal carbonyls.
  - (c) What is the Wilkinson's catalyst? What is its use?
- 2. (a) What is trans effect theory?
  - (b) Discuss the Marcus theory of electron transfer reactions
  - (c) Discuss the photo-isomerization reactions of metal complexes.
- 3. (a) What are the functions of biological membranes?
  - (b) What is the difference between photosynthesis I and photosynthesis II?
  - (c) What are the functions of the hemoglobin and myoglobin?

- 4. (a) Using IR spectroscopy how will you distinguish between NH<sub>3</sub> and H<sub>2</sub>O ligands of a metal complex?
  - (b) Discuss the CD spectrum of metal complexes
  - (c) What are the uses of <sup>19</sup>F NMR?
- 5. (a) What are magic numbers? What are their specialties?
  - (b) Distinguish between half-life and average lite.
  - (c) What is meant by heavy ion induced nuclear reactions? Give an example.

 $(10 \times 2 = 20 \text{ Marks})$ 

## SECTION - B

Answer either (a) or (b) of each question. Each question carries 5 marks.

- 6. (a) Explain the structure and bonding in ferrocene.
  - (b) With a suitable example, describe the oxidative addition reaction.
- 7. (a) Discuss the stability of complex ions in aqueous solutions.
  - (b) Describe the dissociative mechanism in metal complexes.
- 8. (a) Briefly explain the mechanism of ion transport across membranes.
  - (b) Briefly explain the toxic effects of cadmium and mercury.
- 9. (a) Discuss the changes in ligand vibration frequency on coordination with metal ions.
  - (b) What are the applications of ESR spectroscopy to metal complexes?
- 10. (a) Discuss the principle of working of G.M. counter.
  - (b) Discuss the principle of working of the reactors of nuclear power plants.

 $(5 \times 5 = 25 \text{ Marks})$ 

## SECTION - C

Answer any three questions. Each question carries 10 marks.

- 11. (a) Describe the Monsanto acetic acid process
  - (b) Discuss the synthesis and reactivity of metal complexes with linear it  $\pi$  ligands.
- 12. Explain the kinetics and mechanism of ligand substitution reactions in square planar complexes.
- 13. (a) Explain the role of calcium in biological systems.
  - (b) Describe the structure and functions of Carboxypeptidase A.
- 14. Explain the use of Mossbauer Spectroscopy for the studies of iron and tin complexes.
- 15. (a) Explain the shell nuclear model.
  - (b) Explain nuclear fission and its applications.

 $(3 \times 10 = 30 \text{ Marks})$ 

S – 6837