

M.Sc. (Previous) Examination, 2019

# CHEMISTRY

Paper - I (CH-401)

Inorganic Chemistry

*Time : 3 Hours*

*Maximum Marks : 100*

- Note:** (i) No supplementary answer-book will be given to any candidate. Hence the candidates should write the answer precisely in the main answer-book only
- (ii) All the parts of one question should be answered at one place in the answer book. One complete question should not be answered at different places in the answer book.
- (iii) Attempt five questions in all, selecting at least one question from each Unit. All questions carry equal marks.

### Unit-'I'

1. List all the symmetry elements, symmetry operations and point group of each of the following molecules:
  - (a) Cis -  $[\text{Pt}(\text{NH}_3)_4\text{Cl}_2]$
  - (b) Staggered form of ethane
  - (c) HCl
  - (d)  $\text{B}(\text{OH})_3$
  - (e)  $\text{IF}_7$
  - (f)  $[\text{PtCl}_6]^{2-}$
  - (g)  $\text{PCl}_5$
  - (h)  $\text{POCl}_3$  8×2½
2.
  - (a) Describe the Great Orthogonality Theorem and construct the character table for point group  $\text{C}_{2v}$ . 10
  - (b) Write notes on: 2×5
    - (i) Character of a representation
    - (ii) Proper axis of rotation with example

### Unit-'II'

3. Write notes on : 4×5
  - (i) Metal nitrosyl
  - (ii) Tertiary phosphine as ligand
  - (iii) Isopoly acid
  - (iv) Heteropoly acid

4. Write notes on
- (i) Walsh diagram for pentaatomic ( $\text{CH}_3\text{I}$ ) molecules
  - (ii) Postulates of VSEPR theory
  - (iii) Bent rule with suitable examples 10+4+6

### Unit-'III'

5. (a) Explain Tanabe Sugano diagram for transition metal complexes with  $d^2$  state. 10
- (b) Explain spectroscopic method of assignment of absolute configuration in optically active metal chelates 10
6. (a) Describe the determination of binary formation constant by pH-metry and spectrophotometry. 10
- (b) What is meant by thermodynamic stability of metal complexes? Discuss the factors affecting it 10

### Unit-'IV'

7. Write short notes on the following. 4×5
- (a) Base hydrolysis
  - (b) Anation reactions
  - (c) Substitution reaction in square planar complexes
  - (d) Redox reactions

- 8 (a) Discuss electron transfer reactions with the mechanism in one electron transfer reaction 10
- (b) What do you know about Inner Sphere Reactions and Outer Sphere Reactions? 10

### Unit-'V'

- 9 Write notes on
- (i) Ionization chamber
- (ii) Solid state detectors
- (iii) GM tubes and their characteristics 6+7+7
- 10 What is activation analysis? Discuss its limitations and applications 20

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