

**G-1/159/22**

Roll No. ....

**I Semester Examination, January, 2022**

**M.Sc.**

**CHEMISTRY**

Paper I

(Inorganic Chemistry)

Time : 3 Hours ]

[ Max. Marks : 80

**Note :** *All questions are compulsory. Question Paper comprises of 3 Sections. Section A is objective type/multiple choice questions with no internal choice. Section B is short answer type with internal choice. Section C is long answer type with internal choice.*

**SECTION A**

**1×8=8**

**(Objective Type/Multiple Choice Questions)**

*Choose the correct answer :*

- 1.**  $\text{XeF}_4$  has Square Planar Structure which contains :
- (a) 1  $\text{C}_4$  axis and 4  $\text{C}_2$  axis
  - (b) 1  $\text{C}_2$  axis and 4  $\text{C}_4$  axis
  - (c) 2  $\text{C}_2$  axis and 2  $\text{C}_4$  axis
  - (d) 3  $\text{C}_2$  axis and 2  $\text{C}_4$  axis

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- 2.** Which type of symmetry is found in  $\text{H}_2\text{O}$  ?
- (a)  $\text{C}_2\text{V}$  Symmetry
  - (b)  $\text{C}_3\text{V}$  Symmetry
  - (c)  $\text{C}_4\text{V}$  Symmetry
  - (d)  $\text{D}_{nh}$  Symmetry
- 3.** Bent rule states that more electronegative substituents prefer hybrid orbitals having :
- (a) More S character
  - (b) Less S character
  - (c) More P character
  - (d) Less P character
- 4.** If  $\text{sp}^3$  hybridisation is found in  $\text{NH}_3$ . The Geometry of  $\text{NH}_3$  molecule will be :
- (a) Tetrahedral
  - (b) Square Planer
  - (c) Pyramidal
  - (d) V Shape
- 5.** Geometrical Isomerism cannot arise in :
- (a) Square Planar Complex
  - (b) Tetrahedral Complex
  - (c) Inner orbital octahedral Complex
  - (d) Outer Orbital Octahedral Complex
- 6.** The property of a complex of rotating the plane of polarised light is called its :
- (a) Geometrical activity
  - (b) Geometrical inactivity
  - (c) Optical inactivity
  - (d) Optical activity

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7. Job's method is variation of the :

- (a) pH metry method
- (b) Conductometry method
- (c) Spectrophotometry method
- (d) None of the above

8. Beer's law used in which method of determination of Stability constant :

- (a) pH metry method
- (b) Spectrophotometric method
- (c) Potentiometric method
- (d) None of the above

#### SECTION B

6×4=24

(Short Answer Type Questions)

**Note :** Answer the following questions in **250** words.

#### Unit-I

1. Giving suitable examples describe the axis. and plane of symmetry in the molecules.

Or

Describe the great orthogonality theorem and its importance.

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#### Unit-II

2. Explain the Bent Rule.

Or

Describe Walsh diagram for triatomic molecules.

#### Unit-III

3. Explain the stereochemistry of complexes having co-ordination number 3, 5, 7 and 8.

Or

Explain the effect of non-bonding electrons on the preferred stereochemistry of complex of co-ordination number 3, 5, 7 and 8.

#### Unit-IV

4. Give relation between stepwise and overall formation constant.

Or

"The stability of complex is increased by chelation." Explain the statement with suitable examples.

#### SECTION C

12×4=48

(Long Answer Type Questions)

**Note :** Answer the following questions in **500** words.

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### Unit-I

1. Define 'Point Groups'. Explain with suitable examples of molecules belonging to  $C_nV$  and  $C_nh$  groups.

Or

Write notes on any *two* of the following :

- (i) Symmetry operation
- (ii) Schoenflies symbol
- (iii) Use of character table

### Unit-II

2. Describe the VSEPR Theory.

Or

Write notes on the following :

- (i)  $d\pi$ - $p\pi$  bond
- (ii) Some simple reactions of covalently bonded molecules.

### Unit-III

3. Describe Geometrical isomerism in square planar Complex.

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Or

Describe optical isomerism in 6 co-ordination compound.

### Unit-IV

4. Determine the binary formation constant by Potentiometric method.

Or

Write the difference between Job's method and mole ratio method.

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