1212-19-503-009

Code No.0038/CORE

FACULTY OF SCIENCE

M. Sc. I – Semester Examination, January/February 2020

Subject: Chemistry

Paper – I: Inorganic Chemistry

Time: 3 Hours **Max. Marks: 80**

Note: Answer all questions from Part–A and Part–B. Each question carries 8 marks in Part–A and 12 marks in Part – B.

PART – A (4 x 8 = 32 Marks)

(Short Answer Type)

1. (a) Define symmetry element and symmetry operation.
   (b) Write the symmetry elements and assign point group for the following molecules.
   (i) CH_3Cl (ii) $[PtCl_4]^{2-}$

2. (a) Sketch the d-orbital splitting in square planar and tetragonal complexes.
   (b) Calculate CFSE of high spin d^6 and d^7 octahedral metal complexes.

3. (a) Discuss briefly the ligand effects on stability constants of metal complexes.
   (b) Define ternary metal complexes and explain their formation.

4. (a) Explain the ligational properties of CO in Metal carbonyls.
   (b) Write a short note on chemical fixation of dinitrogen.

PART – B (4 x 12 = 48 Marks)

(Essay Answer Type)

5. (a) Explain the correlation between symmetry and dipole moment properties.
   (b) Discuss improper rotational axis of symmetry with suitable examples.

   OR

   (c) Explain descent in symmetry with substitution by taking suitable examples.
   (d) Explain the following point groups giving two examples each
   (i) C_n (ii) Dnd (iii) C_{nh}

6. (a) Explain the salient features of crystal field theory.
   (b) Explain quenching of orbital angular momentum.

   OR

   (c) Describe the determination of magnetic susceptibility of metal complexes by Guoy's method.
   (d) Discuss the applications of magnetic moment data.

7. (a) What is Jahn-Teller effect? How it effects on stability constants of metal complexes?
   (b) Write the determination of the stability constant by p^H metric method.

   OR

   (c) Explain Macrocyclic and Cryptate effects on stability constants of metal complexes.
   (d) Explain step-wise and simultaneous equilibria with suitable examples.

8. (a) Draw the molecular orbital diagram of CO and indicate its bonding in metal carbonyls.
   (b) Write the structural aspects of Ru(II) and Os(II) dinitrogen complexes.

   OR

   (c) Explain stereochemical control of valence in $[Co(diars)_2(NO)]^{2+}$ and $[Co(diars)_2(NO)(SCN)]^{+}$.
   (d) What is 18 electron rule? Mention its application in $Co_2(CO)_8$, $Fe_2(CO)_9$ and $Mn_2(CO)_{10}$ complexes.

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121219-503-009

Code No.0040/CORE

FACULTY OF SCIENCE

M. Sc. I – Semester Examination, January/February 2020

Subject: Chemistry

Paper – II: Organic Chemistry

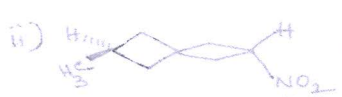
Time: 3 Hours **Max. Marks: 80**

Note: Answer all questions from Part–A and Part–B. Each question carries 8 marks in Part–A and 12 marks in Part – B.

PART – A (4 x 8 = 32 Marks)

(Short Answer Type)

1. (a) What is desymmetrisation? Explain with suitable examples.
   (b) Assign R,S-configuration to the following.



2. (a) Predict the product of the following

   (i) Fumaric acid $\xrightarrow{Br_2}$? (ii)  (Major Product)

   (b) How the product isolation helps in determination of reaction mechanism? Explain with a suitable example.

3. (a) Write the preferred conformation of the following and give reasons.
   (i) Propylene (ii) 1,2-dibromoethane.
   (b) Define conformational enantiomers and give two examples.

4. (a) Discuss the reactivity of indole towards electrophiles.
   (b) Formulate the synthesis of Camphor.

PART – B (4 x 12 = 48 Marks)

(Essay Answer Type)

5. (a) What is chemical correlation method? Explain it with a suitable example.
   (b) Define and explain S_2-axis of symmetry with suitable examples.

OR

   (c) Discuss briefly about planar chirality.
   (d) Write a brief note on the use of spectral methods in determination of E, Z-configuration.

6. (a) Complete the following reactions and give mechanism.

   (i) Cis-2-pentene $\xrightarrow[H_2O]{KMnO_4}$? (ii) Meso-stilbene dibromide $\xrightarrow{\ominus OEt}$?

   (b) Explain the use of isotopes in reaction mechanism with relevant examples.

OR

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