

**FACULTY OF SCIENCE**

M.Sc. II-Semester Examination, May / June 2016

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) Discuss the plane of symmetry with examples.  
b) How do you explain symmetry criteria for optical activity?
- 2 a) Derive all the possible terms for  $d^2$  configuration.  
b) Discuss j-j coupling.
- 3 a) Explain the structural and bonding aspects of  $Fe_3(CO)_{12}$  based on spectral data.  
b) What is 18e<sup>-</sup> rule and calculate valence electrons in below complexes.  
i)  $[\eta^4(C_4H_4)Fe(CO)_3]$     ii)  $[Co(NH_3)_6]^{3+}$
- 4 a) Explain the structural aspects of hemocyanin.  
b) Discuss briefly the importance of  $Na^+$ ,  $K^+$  and  $Fe^{+2}$  in biological systems.

**PART – B (4 x 12 = 48 Marks)**

(Essay Answer Type)

- 5 a) Discuss descent in symmetry with increasing substitution on  $ML_6$  of Oh point group.  
b) Assign the point group for the following molecules and identify the symmetry elements  
i)  $O-C_6H_4X_2$     ii)  $B(OH)_3$     iii) Phenol  
**OR**  
c) Discuss improper rotational axis of symmetry both in eclipsed and staggered conformations of ethane.  
d) Write briefly symmetry and dipole moment.
- 6 a) Draw the generalized Orgel diagrams for one electron and two electro systems of octahedral and tetrahedral complexes.  
b) Calculate the number of microstate for the configurations –  $d^4$ ,  $p^3$ ,  $p^1$  and  $d^{10}$ .  
**OR**  
c) Discuss the effect of weak fields on D and F terms.  
d) Write a note on spin-orbital coupling parameters.
- 7 a) Discuss electron count theory based on wades rules in metal clusters.  
b) Explain the structure and bonding patterns of  $[Mo_6(Cl)_8]^{4+}$ .  
**OR**  
c) Discuss metal-metal bonding features in face sharing biooctahedra with suitable examples.  
d) Write a note on isolobal analogy in octahedral complexes.
- 8 a) Explain the role of globin chain in hemoglobin.  
b) What is photosynthesis? Explain photosystem I and II.  
**OR**  
c) Explain the physiological effect of metal ion concentration in biological system.  
d) Explain the reaction mechanism of decarboxylation and dealdolation by Vit-B<sub>6</sub>.

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Subject : CHEMISTRY

Paper : II  
Organic Chemistry

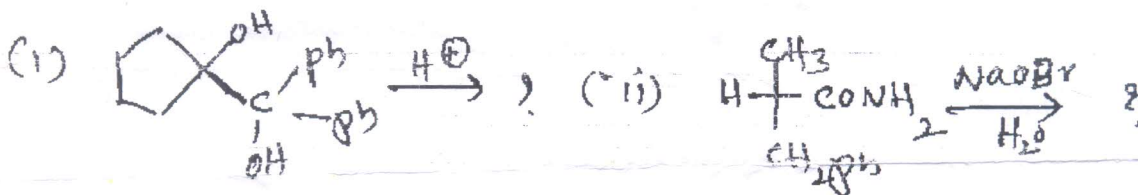
Time : 3 hours

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)

- Draw the preferred conformations of butanone and 1, 2 - dichloroethane.
  - State and explain Curtin-Hammett principle.
- When o-chloro anisole is treated with potassium amide in liquid ammonia m-Anisidine is formed. Explain this rearrangement with mechanism.
  - Explain  $SE^1$  and  $SE^2$  mechanism with example.
- How free radicals are generated? Explain their detection.
  - Predict the products in the following reactions.



- Write the synthesis of quinic acid.
  - How the structure of  $\alpha$ -terpeniol is established? Explain.

PART - B (4 x 12 = 48 Marks)  
(Essay Answer Type)

- Draw the staggered conformations of possible stereoisomers of 2, 3-butanediol and indicate the preferred one for each. Give reasons.
  - Explain the importance of physical and spectral methods in conformational analysis.

OR

- Explain the reactivity of (2S), (3R) - 2, 3-dibromobutane and (2R), (3S) - 2,3 - dibromobutane towards iodide induced debromination.
- What is Winstein-Holness equation? Illustrate with example.

