

Roll No. 1300 16/30/20

January 2018
M. Sc. 1st Semester Examination

CHEMISTRY
Paper 1 Inorganic Chemistry (MCH-401)

Time 3 Hours

(Max. Marks Regular 85 / Private 100
(Min. Marks Regular 28 / Private 33

Note : This question paper is meant for all Regular and Private students. Answer all five questions. All questions carry equal marks. The blind candidates will be given 60 minutes extra time.

1. (a) What is VSEPR Theory? Give its postulates. Describe the structure of NH_3 and SF_4 on the basis of this theory.
(b) Define $d_{\pi} - p_{\pi}$ bonds with suitable examples.

OR

- (a) What are Walsh diagrams? Describe their applications for molecular orbitals of square pyramidal molecules.
(b) Define Bent-rule with suitable examples. Also discuss its applications.
2. Discuss the following with suitable examples :
(a) Chelate effect.
(b) Factors affecting the stability of Metal Complexes.

OR

Write detailed notes on the following :

- (a) Stepwise and Overall Formation Constant.
(b) Spectrophotometry determination of Binary Formation Constant.

3. (a) Discuss the mechanism of one electron transfer reactions.
(b) Describe Marcus-Hush Theory.
(c) Factors affecting Acid Hydrolysis

OR

- (a) Define Inert and Labile Complexes.
(b) Mechanism of substitution reactions in Square Planar Complexes.
(c) Kinetics of Octahedral Substitution

4. Give important postulates of Crystal-Field Theory. Define it by a suitable example. Also discuss its limitations.

OR

- (a) Discuss the Low-spin and High-spin Complexes in the light of Molecular-Orbital Theory (MOT).
(b) Define the Valency Bond Theory with suitable examples like $[\text{Co}(\text{F})_6]^{3-}$ ion and $[\text{Co}(\text{NH}_3)_6]^{3+}$.

5. Explain with suitable examples :

- (a) Symbiosis
(b) E & C equations
(c) Donor and Acceptor Numbers.

OR

Describe HSAB Principle. Classify the cations and anions as Hard and Soft acids and bases on the basis of HSAB concept. Give applications of HSAB theory.