AE-756

M. Sc. (Previous)
Term End Examination, 2016-17

CHEMISTRY

Paper - I

Inorganic Chemistry

Time : Three Hours] [*Maximum Marks* : 100
[*Minimum Pass Marks* : 36

Note : Attempt any **five** questions. All questions carry equal marks.

1. (*a*) Write the rules of VSEPR theory with suitable examples. What are the limitations of VSEPR theory?

(*b*) Explain the Walsh diagram of H_2O molecule and its importance.

2. (*a*) Discuss the various factors affecting the stability of metal complexes.

(*b*) Write the chelate effect in metal complexes and its thermodynamic origin.

3. (*a*) What is 'trans effect'? Discuss the theories of this effect.

(*b*) Explain the SN^1 and SN^2 mechanisms for octahedral complexes.

4. Write notes on (any **two**) :

(*a*) Inert and labile complexes

(*b*) Electron transfer reaction

(*c*) Kinetics of octahedral substitution

5. (*a*) Explain the σ (sigma) bonding in octahedral complexes with suitable examples.

(*b*) Write the effect of π (pi) bonding on value of crystal field stabilisation energy (Δ_0).

6. (*a*) Explain the use of vibrational spectra for bonding and structural elucidation of metal carbonyls.

(*b*) Describe the preparation and properties of metal nitrosyl complexes

7. Write notes on (any **two**) :

(*a*) Dioxygen complexes

(*b*) Tertiary phosphine as ligand

(*c*) Dinitrogen complexes

8. (*a*) Discuss and draw the Orgel diagram for d^1 and d^8 complexes.

(*b*) Write notes on :

(*i*) Charge transfer spectra

(*ii*) Anomalous magnetic moments

9. (*a*) What are metal-clusters? Discuss the structure and bonding in carboranes.

(*b*) What is Keggin ion? Discuss isopoly and heteropoly acids and salt in detail.

10. Write notes on (any **two**) :

(*a*) Crown ether complexes

(*b*) Symmetry elements and operations

(*c*) C_2, C_{2v}, C_{2v} and T_d point group