

Paper : III
CHN-603 (I) (Coord) Inorganic Chemistry (Co-ordination Chemistry)

Unit :- 1

- © Theories of bonding :

Theoretical principles of CFT, Introduction to spherical harmonics & the shape of d-orbitals, Derivation of crystal field potential for tetragonal, cubic and square planar arrangement of ligands around central metal ion, Transformation of these potential from Cartesian to spherical harmonics, Effect of V_{oct} on d^1 system. Evaluation of the various integrals involved,. Solution of the secular determinant to obtain energies and corresponding wave functions, Crystal field splitting diagram for O_h , T_d & Square planar systems.

Unit :- 2

- © RS Coupling & J. J. Coupling

- © Ladder operators :

- Step up & step down operators and their use to obtain wave functions.
- Derivation and use of the equation.

$$X(\) = \frac{\sin(1+1) / 2}{\sin / 2} = 2A_{2g} / 3T_{1g}$$

Unit :- 3

- © Weak field approximation :

The splitting of the free ion terms of d^2 in an o_h field Calculation in weak field, approximation energy of the various terms; $2A_{2g}$, $3T_{2g}$, & $3 T_{1g}$ derived from $3F(d^2)$ in an O_h field.

- © Strong field approximation :

Determination of multiplicities by the method of descending symmetry. Calculation of energy of various terms within the frame work of strong field approximation.

Unit :-4

- © Electronic spectra of metal complexes :

Introduction, Selection rules, Vibronic coupling spectra of $Ti(III)$, $VO(IV)$, $Ni(II)$, $Co(II)$, $Co(III)$, $Fe(II)$, $Fe(III)$, $Cu(II)$, $Mn(II)$ complexes under different geometries, Jahn-Teller theorem.

Paper : III CHN-603 (I) (Crns) Inorganic Chemistry (Corrosion)

Unit :1

- a. Importance of studying corrosion.
Electrochemical mechanism – Type of corrosion damage, (uniform attack, pitting, Dezincification. Intragranular cracking).
- b. Corrosion tendency and electrode potential : The oxygen electrode and differential cell aeration cell, Pourbaix diagram, emf and galvanic series.

Unit :2

- a. Polarization : The polarized cell, How measured, Causes of polarization, Hydrogen over voltage, Influence of polarization on corrosion rate.
- b. Atmospheric corrosion : Types of atmospheres, corrosion product films. Factors influencing corrosivity of the atmosphere, remedial measures.

Unit :3

- a. Underground corrosion : Factors influencing the corrosivity of soils, Pitting characteristics, Remedial measures.
- b. Oxidation and Turnish : Theory e.g. of oxidation, Wagner theory of corrosion. Oxidation resistant alloys.

Unit :4

- a. Stray current corrosion : Sources of stray current Detection of stray current.
Method of measuring the resistivity of soil, Effect of stray current on steel covered by concrete. Damage of steel by SC.
- b. Stress corrosion cracking – Mechanism of cracking.
Hydrogen cracking – Mechanism of cracking
Corrosion fatigue – Mechanism of cracking
Fretting corrosion – Mechanism of cracking
Treatment of water and steam system. Hot and cold water treatment, Boiler water treatment.