

FIFTH SEMESTER

Code : **CHT-501**

Univ Code :501

Contact Hours :45

Work load : 4 hours per week

Credit Points :

Evaluation: Continuous Internal Assessment - 30 marks

Semester and Examination - 70 marks

PAPER-5.1

UNIT-I:INORGANIC CHEMISTRY-5

15 Hours

Magnetic properties of complexes

05 hours

Origin magnetic behavior, types of magnetic behavior-diamagnetism, paramagnetism, ferromagnetism & antiferromagnetism, magnetic moment of complex ions, spin-only formula, L-S coupling, correlation of μ_s & μ_{eff} values, orbital contribution to magnetic moments, temperature independent paramagnetism(TIP), magnetic properties of octahedral and tetrahedral complexes based on crystal field theory. Measurement of magnetic susceptibility and magnetic moment by Guoy method.

Electronic spectra of transition metal complexes

05 hours

Types of electronic transitions, selection rules for electronic transitions, spectroscopic ground states, spectrochemical series, Orgel energy level diagram for d^1 & d^9 states. Discussion of electronic spectrum of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ complex ion, charge transfer spectra.

Inorganic chains, rings, cages and clusters

05 hours

Silicates – Occurrence, classification and structures.

Intercalation compounds of graphite with alkali metals – properties and structure.

Sulfur nitrides – Preparation, properties and structure of S_4N_4 ,

Borazines & cyclophosphazenes $(\text{NPCl}_2)_3$ & $(\text{NPCl}_2)_4$ – preparation, properties and structure.

Carboranes – preparation & structure of $\text{C}_2\text{B}_{10}\text{H}_{12}$

UNIT-II: ORGANIC CHEMISTRY-5**15 Hours****Spectroscopy****09 hours**

Introduction and types of spectroscopic methods, advantages of spectroscopic methods, general principles of spectroscopy, basic components of spectrophotometer. Salient features and applications of Infra red (IR) spectroscopy.

Nuclear magnetic resonance (NMR) spectroscopy: Principle and instrumentation of NMR spectroscopy, salient features and applications. Meaning of the terms equivalent and non-equivalent protons, chemical shift, down-field shift, spin-spin coupling and (n+1) rule in NMR spectra.

Organo-sulphur compounds**03 hours**

Thiols: Nomenclature, methods of preparations and chemical reactions of thiols (ethane thiols may be taken as examples).

Thioethers: Nomenclature, methods of preparation and chemical reactions of thioethers (diethyl sulphide may be taken as example).

Amino acids**03 hours**

Introduction, classification and structure of amino acids. Synthesis of α -amino acids (from acids, Strecker & Gabriel's phthalimide method). Acid-base behavior and isoelectric point of amino acid.

UNIT-III: PHYSICAL CHEMISTRY-5 15 Hours Photochemistry 09 hours

Photochemical and thermochemical reactions, definition, examples, differences.

Laws of photochemistry: Grothus – Draper's law, Lambert's law, Beer's law, Absorption coefficient, extinction coefficient and their significance. Molar absorption coefficient, molar extinction coefficient and their significance. Einstein's law of photochemical equivalence. (problems based on only Einstein's law).

Quantum yield: high and low quantum yield, reasons for the deviation. Primary and secondary processes.

Mechanism of the following photochemical processes

(a) Decomposition of HI

(b) Combination of H₂ & Br₂

(c) Combination of H₂ & Cl₂

Chemiluminiscence, fluorescence, phosphorescence, photo inhibition & photo sensitization with examples.

Physical properties & molecular structure

06 hours

Dipole moment, polarization, induced polarization, orientation polarization, Clausius-Mosotti equation (no derivation) and its importance, comparison of bond polarity taking examples of hydro acids of halogens, deciding the shapes of CO₂, H₂O, BF₃ and CCl₄.

Code : **CHP-501**

Univ Code :501

Contact Hours :45

Work load : 4 hours per week

Credit Points :

Evaluation: Continuous Internal Assessment - 10 marks

Semester and Examination - 40 marks (30 marks for examination,

05 marks for Practical record and 05 marks for viva-voce)

LABORATORY COURSE-5 45 Hours Organic mixture separation and analysis of single compound

- Separation of mixture containing two solid compounds. Analysis of any one compound with preparation of derivative.
- Minimum 11 mixtures are to be given for analysis
- In the beginning two practical durations may be used for instructions and demonstration one mixture separation and analysis, Instructions should cover the basis of separation and reactions of elements tests and functional group tests.
- The mixtures may be A+N, P+N and B+N combinations.
Acids: Benzoic, Salicylic, Cinnamic and Phthalic acid.
Phenols: α -naphthol, β -naphthol and resorcinol.

Bases: p-Toluidine, o-Toluidine, m-Toluidine,

Neutrals: Naphthalene, Diphenyl, m-Dinitrobenzene. Acetanilide.