

FIFTH SEMESTER

Code : **CHT-502:**

Univ Code :502

Contact Hours :45

Work load : 4 hours per week

Credit Points :

Evaluation: Continuous Internal Assessment - 30 marks

Semester and Examination - 70 marks

PAPER-5.2

UNIT-I:INORGANIC CHEMISTRY-6

15 Hours

Analytical chemistry 05 hours

Errors & evaluations: Definition & terms, mean & median, precision, standard deviation, relative standard deviation. Accuracy, absolute error & relative error.

Types of errors-Determinate (systematic) & Indeterminate (Random) errors. Sources of errors and effects upon analytical results. Methods of reporting analytical data. Significant figures & computations, reporting analytical data. Sampling of solids, liquids and gases.

Non- aqueous solvents

5hours

Solvent properties, classification of solvents, general properties. dielectric constant, electrical conductance, viscosity, proton affinity.

Protonic solvent: Liquid ammonia as a solvent - Physical data, solubility in liquid NH₃, Auto-ionization of liquid ammonia, reactions in liquid ammonia.

Aprotic solvent: Liquid sulfur dioxide as a solvent - Physical data, solubility in liquid SO₂, chemical reactions in liquid SO₂.

Nuclear chemistry

05 hours

Structure of nucleus, nuclear models (shell model). Nuclear stability based on N/P ratio.

Mass defect binding energy. Radioactive displacement law, radioactive equilibrium.

Artificial radioactivity – Units of radioactivity.

Nuclear fission & nuclear fusion.

UNIT-II: ORGANIC CHEMISTRY-6**15 Hours****Organic synthesis via Enolates****03 hours**

Reactive methylene compounds – Introduction. Acidity of α -H atoms in ethyl acetoacetate. Synthesis of ethyl acetoacetate (mechanism of Claisen condensation). Keto-enol tautomerism in ethylacetoacetate. Synthetic applications of ethyl acetoacetate.

Carbohydrates**04 hours**

Introduction and classification, mechanism of osazone formation. Interconversion of glucose into fructose and vice-versa, chain lengthening in aldoses (Killiani-Fischer synthesis). Chain shortening in aldoses (Ruff degradation) Epimerization and mutarotation. Elucidation of open-chain structure of D-glucose. Cyclic structures of glucose (Fischer & Haworth representations).

Oils, fats, soaps and detergents**04 hours**

Oils & fats – composition of oils & fats. Determination of saponification number and iodine number of oils & fats.

Soaps – Introduction, manufacture of soap by hydrolyser process (modern continuous process)

Synthetic detergents (syndets) – Introduction, synthesis of sodium lauryl sulfate and sodium dodecyl benzene sulfonate. Cleaning action of soaps.

Synthetic polymers**02 hours**

Definition, classification with examples. Synthesis and uses of teflon, nylon and terylene.

Thermoplastic & thermosetting polymers.

Synthetic dyes**02 hours**

Introduction, Classification of dyes based on structure, chromophore & auxochrome theory of color & constitution. Synthesis of methyl orange, Bismarck brown & malachite green.

UNIT-III: PHYSICAL CHEMISTRY 15 Hours Electrochemistry 12 hours

Revision of conduction in metals and electrolyte solutions, specific conductance, molar conductance, equivalent conductance, variation of equivalent conductance and specific conductance with dilution. Cell constant, determination of equivalent conductance, ionic conductance, ionic mobility, Kohlrausch's law and its applications. Transport number by Hittorf's method. (non-attackable electrodes).

Debye-Huckel-Onsagar equation for strong electrolytes (elementary treatment only).
Numerical problems.

Application of conductance measurements

- (a) Solubility and solubility product of sparingly soluble salt.
- (b) Degree of dissociation of weak electrolytes
- (c) Conductance titrations (acid-base) and precipitation titration and advantage of these.

Polymers

03 hours

Degree of polymerization, number average and mass average molecular weights.

Determination of molecular weight of polymers by viscosity method. Influence of molecular weight on mechanical properties of polymers.

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Contact Hours :45

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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 – 6

Physical chemistry instrumental experiments part-I

45 hours

- **In the beginning two practical durations may be used for instructions and demonstration. Instructions should cover theory and principle of each experiment.**
 - **Minimum 11 experiments are to be given for practical exercise.**
1. Conductometric titration of strong acid (HCl) against strong base (NaOH).
 2. Conductometric titration of weak acid (acetic acid) against strong base (NaOH).
 3. Conductometric titration of mixture of acids against strong base.
 4. Determination of amount of Cu^{2+} in CuSO_4 solution and verify Beer-Lambert's law.
 5. Estimation of HCl by titrating with standard NaOH potentiometrically.
 6. Estimate the amount of iron in ferrous ammonium sulphate by titrating with standard $\text{K}_2\text{Cr}_2\text{O}_7$ solution potentiometrically.

7. Determine the specific and molecular refractivities of two given liquids by Abbey's refractometer. And determine the densities of two given liquids.
8. Determine the specific rotation of cane-sugar solution using polarimeter.
9. Conductometric precipitation titration of NaCl against AgNO₃.
10. Preparation of buffer solutions and determination of their pH using pH meter.
11. Estimation of vitamin C by UV spectrophotometer.
12. Potentiometric titration of acetic acid with NaOH and determination of dissociation constant of acetic acid using quinhydrone electrode.