

RAJKIYA SNATKOTTAR MAHAVIDHYALAYA, JOSHIMATH (CHAMOLI)
DEPARTMENT OF CHEMISTRY

PROGRAM OUTCOMES

- Students will have a firm foundation in the fundamentals and applications of chemical and scientific theories including those in analytical, inorganic, organic and physical chemistry.
- Students will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
- Students will be able to clearly communicate the results of scientific work in oral, written and electronic formats to both scientists and the public at large.
- Students will be able to design and carry out scientific experiments as well as accurately record and analyze the data of such experiments.
- Students will develop skill in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
- Students will be able to explore new areas of research in both chemistry and allied fields of science and technology.
- Students will appreciate the central role of chemistry in our society and use this as a basis for ethical behavior in issues facing chemists including an understanding of safe handling of chemicals, environmental issues and key issues facing our society in energy, health and medicine.
- Students will be able to explain why chemistry is an integral activity for addressing social, economic, and environmental problems.
- Students will be able to function as a member of an interdisciplinary problem-solving team.

Rahul Tiwari

Rahul Tiwari
In-charge
Department of Chemistry

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PROGRAM SPECIFIC OUTCOMES

1. CERTIFICATE IN INTRODUCTORY CHEMISTRY (First Year)

Certificate in Introductory Chemistry will give the student a basic knowledge of all the fundamental principles of chemistry like atomic structure, molecular polarity, bonding theories of different molecules, resonance concept, hyperconjugation, field effects, periodic properties of more than 111 elements, mechanism of organic reactions, stereochemistry, detailed study of states of matter including kinetic theories of gases, solid and liquid states, chemistry of aliphatic and aromatic compounds, chemical kinetics, its scope and first law of thermodynamics. Student will be able to understand the qualitative and quantitative chemical analysis of the compounds in the laboratory. This certificate course is definitely going to prepare the students for various fields of chemistry and will give an insight into all the branches of chemistry. It will enable students to join the diploma course (semester III and IV) in any University or College of Higher education in Uttarakhand.

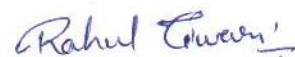
2. DIPLOMA IN CHEMICAL SCIENCE (Second Year)

Diploma in Chemical Science will provide the theoretical as well as practical knowledge of handling chemicals, apparatus, equipment and instruments. The knowledge about second law of thermodynamics, chemical equilibrium, phase equilibrium, electrochemistry, coordination chemistry, acid-base theories, chemistry of transition elements, halides, alcohols, phenols, aldehydes, ketones and carboxylic acids will enable the students to work as chemists in various industries. The experimental work during the diploma course will enhance the skill of the students regarding chemical and physical tests of inorganic as well as organic compounds along with some physical experiments which will be beneficial to achieve their goals in industrial sectors. It will enable students to join the Bachelor of Science course (semester V and VI) in any University or College of Higher education in Uttarakhand.

3. DEGREE IN BACHELOR OF SCIENCE (Third Year)

Degree in Bachelor of Science programme aims to introduce very important aspects of modern-day course curriculum, namely, chemistry of nitrogen containing compounds, organometallic, lipids, fats, dyes, paints, reagents in organic synthesis, carbohydrates, proteins, biomolecules, data analysis, nano-

chemistry, green chemistry, stability of coordination compounds, cement, paint, ceramics, glass, inorganic fertilizers, radioactivity, corrosion, magnetic behaviour of transition metal complexes, surface chemistry, quantum mechanics, solutions, third law of thermodynamics, photochemistry, and spectroscopic techniques. This knowledge will make the students skilled to work in various chemical industries like cement industries, agro product, paint industries, rubber industries, petrochemical industries, food processing industries, fertilizer industries, pollution monitoring and control agencies etc. It will also enable the students to understand the importance of the biomolecules in biological science and related fields. Upon completion of a degree, chemistry students will be able to employ critical thinking and scientific inquiry in the performance, design, interpretation and documentation of laboratory experiments. It will help a candidate to succeed at an entry-level position in chemical industry or a chemistry postgraduate program.



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COURSE OUTCOMES

Semester-I Paper-I (Theory)

Course Title: Fundamentals of Chemistry-I

There is nothing more fundamental to chemistry than the chemical bond. Chemical bonding is the language of logic for chemists. Chemical bonding enables scientists to take the 100-plus elements of the periodic table and combine them in myriad ways to form chemical compounds and materials. Periodic trends, arising from the arrangement of the periodic table, provide chemists with an invaluable tool to quickly predict an element's properties. These trends exist because of the similar atomic structure of the elements within their respective group families or periods, and because of the periodic nature of the elements. Reaction mechanism gives the fundamental knowledge of carrying out an organic reaction in a step-by-step manner. This course will provide a broad foundation in chemistry that stresses scientific reasoning and analytical problem solving with a molecular perspective.

Unit –I (Atomic Structure and Periodic Properties)

Students will gain an understanding of:

- Dual nature of matter through the de Broglie concept.
- Wave mechanical aspect of atom which includes Schrodinger wave equation, the wave function ψ and its significance, Quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s, p and d orbital's.
- Principles for filling the electrons in an atom; Aufbau energy diagram, Pauli's exclusion principle. Hund's rule of maximum multiplicity.
- Electronic configuration of elements (s block, p block and first series of d-block elements).
- Effective nuclear charge, Slater's rule.
- Periodic properties; Atomic and ionic radii, ionization potential, electron affinity, electro-negativity and their variation as well as their application in prediction and explaining the chemical behavior of elements and compounds thereof.

Unit II (Chemical Bonding-I)

Students will gain an understanding of:

- Valence Bond Theory and other bonding models for simple inorganic and organic molecules in order to predict structures and important bonding parameters.
- Hybridization and shapes of different inorganic and organic molecules.
- Valence Shell Electron Pair Repulsion Theory (VSEPR) and shapes of different molecules and ions.
- Resonance, hyperconjugation and field effects- inductive, mesomeric, electromeric effect.

Unit – III (Mechanism of Organic Reactions)

Students will gain an understanding of

- Reactive intermediates, transition states and states of all the bonds broken and formed.
- Reactants, catalyst, stereochemistry and major and minor products of any organic reaction. It describes the types of reactions and the kinetic and thermodynamic aspects one should know for carrying out any reaction and the ways how the reaction mechanism can be determined.

Unit – IV (Stereochemistry of Organic Compounds)

Students will gain an understanding of

- Elements of symmetry and chirality.
- Isomers, enantiomers and their properties
- Different nomenclature systems for optical and geometrical isomers.
- 2D and 3D structure of the molecules, and their role in reaction mechanism.

Unit – V (States of Matter-I)

Students will gain an understanding of

- The ideal gas, the real gas and difference between them.
- Deviation of real gases from ideal behavior.
- Van der Waal's equation of states for real gases and van der waals constants for real gases.
- Critical phenomena – PV isotherms of real gases.
- Molecular velocities and its distribution with the help of the Maxwell's distribution curves.
- Physical properties of liquids like surface tension , viscosity and their methods of determination.
- Laws of crystallography.
- Basic terminology in Solid state chemistry.

- X-ray diffraction and Bragg's equation.
- Colloid and its classification
- Properties (kinetic, optical and electrical) of colloidal solutions.
- Stability of colloids, protective action, Hardy-Schulze law, gold number

Semester-I Paper-II (Practical)

Course Title: Chemical Analysis –I

Upon completion of this course, the students will have the knowledge and skills to: understand the laboratory methods and tests related to inorganic mixture analysis and estimation of surface tension of commercial products. Also, they can understand the absolute configuration of organic molecules with the help of models.

Unit I – (Laboratory hazards and safety precautions)

Through this unit the students will learn about the precautions those they should take while entering a chemical laboratory.

Unit –II (Salt mixture analysis)

The students will be able to estimate the anions and the cations in the given sample qualitatively.

Unit- III (Organic exercise)

The students will be able to find out the absolute configuration of organic molecules.

Unit - IV (Physical exercise)

The students will be able to determine the relative surface tension of a given liquid.

Semester-II Paper-I (Theory)

Course Title: Fundamentals of Chemistry-II

Upon successful completion of this course, the students will be able to describe the reactions shown by aliphatic and aromatic compounds. They will also be able to understand the bonding in inorganic molecules, salient features of s- and p- block elements, different aspects of chemical kinetics, catalysis and first law of thermodynamics.

Unit – I (Chemical Bonding-II)

Students will gain an understanding of

- The Molecular Orbital Theory and its application to diatomic inorganic molecules.
- Multicentre bonding in electron deficient molecules.
- Fajan's rule, Polarization of covalent molecules, dipole moment, Polarizing power and polarizability.
- Metallic bond and theories introduced to explain the unique character of metallic bond.
- Hydrogen bond and van der Waals interactions.

Unit – II (Salient Features of s- and p-Block Elements)

Students will gain an understanding of

- General discussion about the physical and chemical properties of s and p block elements
- Diagonal relationship, catenation, inert pair effect, $p\pi-p\pi$, $d\pi-p\pi$ bond,
- Chemistry of hydrides, halides, oxides and oxyacids of p-block elements.
- Silicates, Boron nitrogen compounds (borazene and boron nitrides), interhalogen compounds, basic property of iodine.

Unit – III (Aliphatic Compounds)

Students will gain an understanding of

- Chemical reactions of alkanes, alkenes and alkynes and mechanisms of some commercially important chemical reactions.
- Ring strain in cyclic hydrocarbons, Baeyer's strain theory and its limitations.

Unit – IV (Aromatic Compounds)

Students will gain an understanding of

- Aromaticity.
- The chemical reactions, with special emphasis on electrophilic substitution, taking place in Benzene and its derivatives.

Unit - V (Chemical Kinetics and Catalysis)

Students will gain an understanding of

- Basic terminology of Chemical kinetics.
- Factors influencing the rate of a reaction
- Catalysis and catalyst.
- Radioactive decay, half life.
- Different methods of determination of the order of reaction.

Unit – VI (Thermodynamics I)

Students will gain an understanding of

- Definition of thermodynamic terms and terminology used in thermodynamics, Types of thermodynamic systems and thermodynamic processes.
- First law of thermodynamics,
- Heat capacities and Kirchoff's equation.
- Calculation related to work done, heat exchange, change in internal energy and enthalpy.
- Hess's law and its importance.

Semester-II, Paper-II (Practical)

Course Title: Chemical Analysis -II

After completing this course, the students will be able to quantitatively find out the amount of acid or base in the samples, to qualitatively differentiate among different classes of organic compounds and to measure the relative viscosity of a given liquid.

Unit I – (Laboratory hazards and safety precautions)

Through this unit the students will learn about the precautions those they should take while entering a chemical laboratory.

Unit – II (Inorganic exercise)

Through this unit, Students will learn to do the standardization using a primary standard solution and will be able to determine the strength of unknown solution.

Unit – III (Organic exercise)

Students will be able to Differentiate alkanes, alkenes and alkynes as well as Differentiate aliphatic and aromatic compounds using chemical and physical tests.

Unit – IV (Physical exercise)

The students will be able to determine the relative viscosity of the given liquid using Ostwald viscometer.

Semester-III Paper-I (Theory)

Course Title: General Chemistry-I

This paper provides detailed knowledge of synthesis of various classes of organic compounds and functional groups inter conversion. Organic synthesis is the most important branch of organic chemistry which provides jobs in production & QC departments related to chemicals, drugs, medicines, FMCG etc. industries.

Unit – I (Chemistry of Transition Elements)

Students will gain an understanding of

- Characteristic properties of the elements, coordination number and geometry.
- Comparative treatment of 3d, 4d and 5d elements.

Unit – II (Coordination Chemistry-I)

Students will gain an understanding of

- Basic definitions, terminology, Nomenclature of coordination compounds
- Theories of coordination complexes.
- Effective atomic number, stability of complexes and factors contributing to the stability.

Unit - III (Halides)

Students will gain an understanding of

- Chemical reactions, including some industrially important reactions of Alkyl, aryl and vinyl halides.
- Mechanism of nucleophilic substitution reactions.

Unit – IV (Alcohols and Phenols)

Students will gain an understanding of

- Chemical reactions, including some industrially important reactions of monohydric, dihydric and trihydric alcohols.
- Comparative acidic strengths of alcohols and phenols.
- Chemical reactions, including some industrially important reactions of phenol and its derivatives.

Unit – V (Thermodynamics II)

Students will gain an understanding of

- **Carnot cycle and carnot theorem.**
- The basic concepts of spontaneity and the second law of thermodynamics.
- The concepts of entropy, Gibb's free energy and Helmholtz work functions.
- chemical and phase equilibrium and able to apply these concepts in predicting the spontaneous reactions and will be able to solve the numerical problems based on these concepts

Unit – VI (Chemical Equilibrium)

Students will gain an understanding of

- The concept of equilibrium, different equilibrium constants and Le-Chatelier's principle.
- Gibbs phase rule and its application in explaining the one component systems.

Semester-III Paper-II (Practical)

Course Title: Analytical Procedures-I

Course outcomes:

After completing this course, the students will be able to test the inorganic mixtures of acidic and basic radicals in given samples, to qualitatively differentiate between alcohols and phenols and determine the critical solution temperature of partially miscible liquids.

Unit – I (Laboratory hazards and safety precautions)

Through this unit the students will learn about the precautions those they should take while entering a chemical laboratory.

Unit – II (Inorganic exercise)

Through this unit the students will learn the qualitative analysis of inorganic mixture including both acid and basic radicals with a special emphasis on the role of common ion effect and solubility product.

Unit – III (Organic exercise)

Through this unit the students will learn Functional group tests for alcohols and phenols

Unit – IV (Physical exercise)

Through this unit the students will learn how to determine critical solution temperature (CST) Or Transition temperature of given inorganic salt.

Semester-IV Paper-I (Theory)

Course Title: General Chemistry-II

This paper provides detailed knowledge of synthesis of aldehydes, ketones, carboxylic acids and functional groups inter conversion. The students will be able to describe the concepts of electrochemistry in detail and its applications. Also, they will be able to solve the numerical problems based on these concepts. Students will be able to define

the acids and bases on the basis of various concepts/ theories and will be able to identify the position of various elements in the periodic table and able to explain their properties on the basis of their position.

Unit – I (Acids and Bases)

Students will gain an understanding of

- Different theories of acids and bases.
- Hard – Soft acid base concept, symbiosis

Unit – II (Chemistry of Inner Transition Elements)

Students will gain an understanding of

- Physical and Chemical properties and periodic trends in Lanthanides.
- Lanthanide contraction and its consequences.
- Methods of separation of lanthanides
- Physical properties and characteristic periodic trends in Chemistry of Actinides

Unit – III (Aldehydes and Ketones)

Students will gain an understanding of

- Industrially important named reactions and some other specific reactions of aldehydes and ketones in addition to the comparative account of properties of aliphatic and aromatic aldehydes and ketones.

Unit - IV (Carboxylic Acids)

Students will gain an understanding of

- Industrially important named reactions and some other specific reactions of carboxylic acids.

Unit – V (Electrochemistry I)

Students will gain an understanding of

- Conductance in the electrolytic solutions and its variation with dilution.
- Ostwald's dilution law, its uses and limitations.

Unit – VI (Electrochemistry II)

Students will gain an understanding of

- Concept of equivalence and equivalent weight.
- Different methods of balancing a redox reaction.
- Nernst equation and its application
- Different standard electrodes
- Basic terminology used in the galvanic, concentration cells.

- Conventional representation of electrochemical cells. EMF of a cell and its measurements.
- Calculation of thermodynamic quantities of cell reactions (ΔG , ΔH and K), Numerical Problems.

Semester-IV Paper-II (Practical)

Course Title: Analytical Procedures-II Course outcomes:

After completing this course, the students will be able to determine the concentrations of oxidising and reducing agents through double titration, qualitatively differentiate between aldehydes, ketones and carboxylic acids and determine the solubility of salts.

Unit – I (Laboratory hazards and safety precautions)

Through this unit the students will learn about the precautions those they should take while entering a chemical laboratory.

Unit – II (Inorganic exercise)

Through this unit the students will learn to perform the double titration based on redox reactions involving internal as well as external indicators.

Unit – III (Organic exercise)

Through this unit the students will learn the preliminary and functional group tests for aldehydes, ketones and carboxylic acids (both aliphatic and aromatic).

Unit – IV (Physical exercise)

Through this unit the students will be able to Determine of solubility of salts.

Semester-V Paper-I (Theory)

Course Title: Inorganic Chemistry

Upon successful completion of this course, the students will be able to describe the stability, crystal field theory, electronic spectra and magnetic properties of coordination compounds. They will also learn about organometallic compounds, some industrially important inorganic materials and their applications in various industries. It will assist them to get a suitable job in the relevant industrial and scientific field.

Unit – I (Metal-Ligand Bonding in Transition Metal Complexes)

Students will gain an understanding of

- Crystal field theory and its basic applications, crystal field splitting in elementary shapes in complexes.
- Jahn-Teller distortion.
- Spectrochemical series.
- Limitations of VBT and CFT.

Unit – II (Thermodynamic and Kinetic Aspects of Coordination Compounds)

Students will gain an understanding of

- Thermodynamic and kinetic stability, stable and unstable complexes, inert and labile complexes
- Different stability constants and their relationship.
- Factors affecting the stabilities.
- Determination of binary formation constants by pH-metry and spectrophotometry

Unit – III (Electronic Spectra of Transition Metal Complexes)

Students will gain an understanding of

- Spectroscopic terms and types of electronic transitions.
- selection rules for d-d transitions
- Orgel energy level diagrams

Unit – IV (Magnetic Properties of Transition Metal Complexes)

Students will gain an understanding of

- Concept of magnetic susceptibility.
- Magnetic moment and its quenching.
- Different types of magnetic behavior shown by the complexes.
- Curie law and Curie Weiss law.
- Methods of determining magnetic susceptibility

Unit – V (Organometallic Chemistry)

Students will gain an understanding of

- Nomenclature, classification, general methods of preparation of organometallic compounds
- Applications of organometallic compounds in chemical industry with special emphasis on Ziegler-Natta catalyst, Wilkinson catalyst .

Unit – VI (Some Industrially Important Inorganic Materials)

Students will gain an understanding of

- Silicones, siloxanes, polymethylhydrosiloxanes, their applications.
- Preparation and properties of Phosphazenes.
- Properties of Alumino-silicates

- Clays and Pillared Clays.
- Composition and manufacturing of Cement.
- Ceramics-definition, traditional and new ceramics, structure of ceramics.
- Inorganic fertilizers-essential nutrients for plants, nitrogenous, phosphatic and potash fertilizers.

Semester-V Paper-II (Theory)

Course Title: Organic Chemistry

Upon successful completion of this course, the students should be able to describe the chemistry of nitrogen containing compounds, the basic understanding of the chemistry of industrially important materials such as lipids, fats, soaps, detergents, dyes, paints and reagents in organic synthesis. Upon completion of this course students may get job opportunities in food, soap, detergent, paint and other organic material based synthetic labs and industries. Biomolecules are important for the functioning of living organisms. These molecules perform or trigger important biochemical reactions in living organisms. When studying biomolecules, one can understand the physiological function that regulates the proper growth and development of a human body. This course aims to introduce the students with basic experimental understanding of carbohydrates and proteins.

Unit – I (Lipids and Fats)

Students will gain an understanding of

- Lipids, its metabolism, nutrition and health, tests.
- Fats, its biological importance, metabolism, digestion.
- Soaps, Detergents and their action mechanism.

Unit – II (Reagents in Organic Synthesis)

Students will gain an understanding of

- Chemical reagents which either have some specific characteristic behavior or have a huge advantage in chemical reaction to form a specific product.

Unit – III (Nitrogen Containing Organic Compounds)

Students will gain an understanding of

- Physical and chemical properties of amines and nitro compounds.
- Separation of mixture of primary, secondary and tertiary amines.
- Basicity of amines and structural features affecting basicity of amines.

- Phase-transfer catalysts.
- Some commercial named reactions.
- Aryl diazonium salt.

Unit – IV (Organometallic Compounds)

Students will gain an understanding of

- Grignard reagent
- Organozinc compounds

Unit – V (Dyes and Paints)

Students will gain an understanding of

- Color and constitution, types of dyes.
- Paints and Varnishes: Definition, components, chemistry, applications

Unit – VI (Carbohydrates and Proteins)

Students will gain an understanding of

- Classification, nomenclature and chemical reactions of carbohydrates.
- Configuration of monosaccharides.
- Cyclic structure of D(+)-glucose. Mechanism of mutarotation. General study of disaccharides.
- Classification, structure and stereochemistry of amino acids.
- Isoelectric point and electrophoresis.
- Classification of proteins.

Semester-V, Paper-III (Practical)

Course Title: Analytical Procedures-III

Upon completion of this course, the students will have the knowledge and skills to understand the synthetic methods related to inorganic and organic fields. Also, they can easily analyze the nitrogen containing compounds and separate the binary organic mixture.

Unit – I (Laboratory hazards and safety precautions)

Through this unit the students will learn about the precautions those they should take while entering a chemical laboratory.

Unit – II (Inorganic exercise)

Through this unit the students will be able to prepare inorganic crystals.

Unit - III (Organic exercise)

Through this unit the students will able

- to analyse the Nitrogen containing organic compounds.
- To separate the binary mixture of organic compounds with the help of water and organic solvent.
- Simple reactions of organic synthesis.

Semester-VI Paper-I (Theory)

Course Title: Physical Chemistry

The core concepts of Physical Chemistry have been included in this semester with a view that students' command over these topics will help them to understand the higher chemistry in PG classes. Their understanding of Photochemistry and Solutions will help him to explain the day today phenomenon of the relevant field whereas. Thermodynamics will help them to understand the natural flow of energy. Learning the Quantum Mechanics will help them to praise the beauty of behavior of fundamental particles. It will assist them to get a suitable job in the relevant industrial and scientific field.

Unit – I (Surface Chemistry)

Students will gain an understanding of

- Adsorption and its types
- Freundlich's and Langmuir's adsorption isotherms.
- Adsorption in catalysis.

Unit – II (Elementary Quantum Mechanics)

Students will gain an understanding of

- Black-body radiation, Plank's radiation law.
- Photoelectric effect.
- Bohr's model of hydrogen atom, Compton effect,
- Operator used in quantum mechanics.
- Schrödinger wave equation and its importance, physical interpretation of the wave function.

Unit – III (Photochemistry)

Students will gain an understanding of

- Laws of photo chemistry.
- Jablonski diagram.

Unit – IV (Solutions and Colligative Properties)

Students will gain an understanding of

- Colligative properties.
- Raoult's law

Unit – V (Thermodynamics III)

Students will gain an understanding of

- Statement and concept of residual entropy
- Third law of thermodynamics
- Nernst heat theorem.
- Evaluation of absolute entropy from heat capacity data.

Unit – VI (Radioactivity)

Students will gain an understanding of

- Energetics and kinetics radioactivity, rates of radioactive transitions.
- Applications of radioactivity.

Semester-VI Paper-II (Theory)

Course Title: Analytical Chemistry

After completion of this course, the students will be able to understand the chemistry of biomolecules. They will become acquainted in the field of data analysis. The new frontiers of chemistry such as nano-chemistry and green chemistry are the part of syllabi of this course which boost the knowledge of the students in these fields. The chemistry of industrially important inorganic materials such as cement, ceramics, glass and inorganic fertilizers has been incorporated in the course to enhance the skills and capability of the students pursuing this course. The students will also be able to understand the analytical techniques such as electro-gravimetric analysis, coulometric analysis, thermogravimetry, polarography and chromatography.

Unit – I (General Biochemistry)

Students will gain an understanding of

- Biomolecules, Enzymes and their role in physiology.

- Hormones, Nucleic acids and structure of RNA and DNA molecule.

Unit – II (Data Analysis)

Students will gain an understanding of

- Errors, Significant Figures.
- Mean and Standard deviation and probability.
- Interdisciplinary problem solving.

Unit – III (Fundamentals of Nanochemistry)

Students will gain an understanding of

- Nano particle synthesis and their characterization and the application of nano particles.

Unit – IV (Basics of Green Chemistry)

Students will gain an understanding of

- Sustainable development and role of green chemistry in sustainable development.
- Principles of green chemistry.

Unit – V (Analytical Techniques)

Students will gain an understanding of

- Basic concepts of electro-gravimetric, coulometric analysis, Thermo-gravimetric analysis and voltametry.
- Polarography, Chromatography

Unit – VI (Spectroscopy)

Students will gain an understanding of

- Ultraviolet (UV) absorption spectroscopy and absorption laws.
- Infra-Red (IR) absorption spectroscopy and Hooke's Law,.
- Nuclear magnetic resonance (NMR) spectroscopy with special emphasis on Proton magnetic resonance (^1H NMR) spectroscopy.
- How to determine the structure of organic molecules using UV, IR and NMR spectroscopic techniques.

Semester-VI, Paper-III (Practical)

Course Title: Analytical Procedures-IV

Upon completion of this course, the students will have the knowledge and skills to determine the heat of neutralization, solubility of organic compounds by titration

method. They will be able to estimate different metal ions through gravimetric exercise. Spectroscopic and chromatographic exercise will train them to interpret the spectral data and chromatograms of organic compounds and will make them job ready for suitable industries.

Unit – I (Laboratory hazards and safety precautions)

Through this unit the students will learn about the precautions those they should take while entering a chemical laboratory

Unit – II (Physical exercise)

Through this unit the students will be able to determination of solubility of organic compound in water by titration method and also will be able to calculate the Heat of neutralization.

Unit – III (Spectroscopic exercise)

Through this unit the students will be able to determine Functional Group by UV and IR Spectroscopy. And also be able to analyze of organic compounds given in the syllabus.

Unit – IV (Inorganic Exercise)

Through this unit the students will be able to do gravimetric analysis one or two metal ions given in the syllabus.

Unit – V (Inorganic Exercise)

Through this unit the students will be able to do gravimetric analysis one or two metal ions given in the syllabus.

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