DEPARTMENT OF CHEMISTRY

B. Sc. Chemistry

Goals:

The Department has formulated three broad educational goals for the undergraduate degree programs:

Chemistry knowledge: To provide students with the basic foundation in Chemistry and related subjects, the interplay of theory and experiment, and to motivate scientific enthusiasm and curiosity and the joy of learning.

Problem solving skills: To provide students with the appropriate tools needed to analyze problems with the skills required which helps them to succeed in graduate school, the chemical industry or professional school. Also, to prepare background for advanced and applied studies in chemistry

Employment and technical skills: To provide the students with technical skills necessary for successful careers in chemistry and related or alternative careers for which a chemistry foundation can be very useful. These include to a breadth of experimental techniques using modern instrumentation and communication skills (oral and written).

Programme Outcomes:

Knowledge outcome:

After completing B.Sc. Chemistry Programme students will be able to:

PO1: Transfer and apply the acquired fundamental knowledge of chemistry, including basic concepts and principles of (1) organic chemistry, Inorganic chemistry, Physical and Analytical Chemistry; (2) analytic techniques and experimental methods for chemistry to study different branches of chemistry;

PO2: Demonstrate the ability to explain the importance of the Periodic Table of the Elements and represent key aspects of it and its role in organizing chemical information.

Skills Outcomes

Professional Skills

After completing B.Sc. Chemistry Programme students will be able to:

PO3: apply and demonstrate knowledge of essential facts, concepts, laws, principles and theories related to chemistry;

PO4: demonstrate the learned laboratory skills, enabling them to perform qualitative and quantitative analysis of given samples and able to make conclusions on it;

PO5: set procedure and synthesize simple compounds of commercial importance;

PO6: engage in oral and written scientific communication, and will prove that they can think critically and work independently.

PO6: Communicate effectively using graphical techniques, reports and presentations within a scientific environment.

PO7: to recognize problems in chemical science and make strategies to solve it

PO8: Respond effectively to unfamiliar problems in scientific contexts

PO9: Plan, execute of design experiment, make documentation of it, interpret data at entry level of chemical industry and report the results;

PO10: Integrate and apply these skills to study different branches of chemistry.

Generic Competencies

PO11: The student will acquire knowledge effectively by self-study and work independently, present information in a clear, concise and logical manner and apply appropriate analytical and approximation methods

PO12: The student will learn professionalism, including the ability to work in groups and in society, and apply basic ethical principles.

Program Specific Outcomes

After completing B. Sc. Chemistry, students will be able to

PSO1: Understand the nature and basic concepts of Physical, Organic and Inorganic chemistry;

PSO2: Analyze Organic & inorganic compounds qualitatively and quantitatively;

PSO3: Understand the applications of physical, organic, inorganic and analytical chemistry in pharmaceutical, agriculture and chemical industries;

PSO4: Able to perform experimental procedures as per laboratory manual in the area of physical, Inorganic and organic chemistry;

PSO5: interpretation and synthesis of chemical information and data obtained from chemical and instrumental analysis.

Course Outcomes:

F.Y.B.Sc. Chemistry

SEMESTER-I

CH- 101: Physical Chemistry (2 Credits, 36 Lectures of 50 min.)

At the end of course student will be able to –

1. Apply thermodynamic principles to physical and chemical process
2. Calculate of enthalpy, Bond energy, Bond dissociation energy, resonance energy
3. Study variation of enthalpy with temperature –Kirchhoff's equation
4. Apply third law of thermodynamic and its applications
5. Understand relation between Free energy and equilibrium and factors affecting on equilibrium constant.
6. Understand exergonic and endergonic reaction
7. Understand relation between Gas equilibrium, equilibrium constant and molecular interpretation of equilibrium constant
8. Study Van't Haff equation and its application
9. Concept to ionization process occurred in acids, bases and pH scale
10. Related concepts such as Common ion effect hydrolysis constant, ionic product, solubility product
11. Degree of hydrolysis and pH for different salts , buffer solutions

CH- 102: Organic Chemistry (2 Credits, 36 Lectures of 50 min.)
At the end of course student will be able to –

1.The students are expected to understand the fundamentals, principles, and recent developments in the subject area.
2. It is expected to inspire and boost interest of the students towards chemistry as the main subject.
3. To familiarize with current and recent developments in Chemistry.
4. To create foundation for research and development in Chemistry.

CH- 103: Chemistry Practical Course I (1.5 Credits, 46.8 Lectures of 50 min.)
At the end of course student will be able to –

1. Importance of chemical safety and Lab safety while performing experiments in laboratory
2. Determination of thermochemical parameters and related concepts
3. Techniques of pH measurements
4. Preparation of buffer solutions
5. Elemental analysis of organic compounds (non-instrumental)
6. Chromatographic Techniques for separation of constituents of mixtures

SEMESTER-II

CH-201: Inorganic Chemistry (2 Credits, 36 Lectures of 50 min.)
At the end of course student will be able to –

1. Understand various theories and principles applied to revel atomic structure
2. Origin of quantum mechanics and its need to understand structure of hydrogen atom
3. Schrodinger equation for hydrogen atom
4. Radial and angular part of hydrogenic wave functions
5. Significance of quantum numbers
6. Shapes of orbitals
7. Explain rules for filling electrons in various orbitals- Aufbau's principle, Pauli exclusion principle, Hund's rule of maximum multiplicity
8. Discuss electronic configuration of an atom and anomalous electronic configurations.
9. Describe stability of half-filled and completely filled orbitals.
10. Discuss concept of exchange energy and relative energies of atomic orbitals
11. Design Skeleton of long form of periodic table.
12. Describe Block, group, modern periodic law and periodicity.
13. Classification of elements as main group, transition and inner transition elements
14. Write name, symbol, electronic configuration, trends and properties.
15. Explain periodicity in the following properties in details:
    a. Effective nuclear charge, shielding or screening effect; some numerical problems.

b. Atomic and ionic size.
c. Crystal and covalent radii
d. Ionization energies
e. Electronegativity- definition, trend, Pauling electronegativity scale.
f. Oxidation state of elements

16. Attainment of stable electronic configurations.
17. Define various types of chemical bonds- Ionic, covalent, coordinate and metallic bond
18. Explain characteristics of ionic bond, types of ions, energy consideration in ionic bonding,
lattice and solvation energy and their importance in the context of stability and solubility
of ionic compounds
19. Summarize Born-Lande equation and Born-Haber cycle,
20. Define Fajan's rule, bond moment, dipole moment and percent ionic character.
21. Describe VB approach, Hybridization with example of linear, trigonal, square planer, tetrahedral, TBP, and octahedral.
22. Discuss assumption and need of VSEPR theory.
23. Interpret concept of different types of valence shell electron pairs and their contribution in
bonding.
24. Application of non-bonded lone pairs in shape of molecule
25. Basic understanding of geometry and effect of lone pairs with examples such as ClF3, Cl2O, BrF5, XeO3 and XeOF4.

CH- 202: Analytical Chemistry (2 Credits, 36 Lectures of 50 min.)
At the end of course student will be able to –

1. Introduce to Analytical Chemistry i. Analytical Chemistry –branch of chemistry ii. Perspectives of analytical Chemistry iii. analytical problems
2. Calculations used in Analytical Chemistry i. Calculations of mole, molar concentrations and various units of concentrations which will be helpful for preparation of solution ii. Relation between molecular formula and empirical formula iii. Stoichiometric calculation iv. Define term mole, millimole, molar concentration, molar equilibrium concentration and Percent Concentration. v. SI units, distinction between mass and weight vi. Units such as parts per million, parts per billion, parts per thousand, solution-dilatant volume ratio, function density and specific gravity of solutions.
3 Compounds Basics of type determination, characteristic tests and classifications, reactions of different functional groups. i. Separation of binary mixtures and analysis ii. Elemental analysis -Detection of nitrogen, sulfur, halogen and phosphorous by Lassiagen's test. iii. Purification techniques for organic compounds.
4. Study Paper and Thin layer Chromatography i. Basics of chromatography and types of chromatography ii.Theoretical background for Paper and Thin Layer Chromatography
5. Study pH meter and electrodes for pH measurement ii. Measurement of pH iii. Working of pH meter iv. Applications of pH meter

CH- 203: Chemistry Practical –II (1.5 Credits, 46.8 Lectures of 50 min.)

1. Inorganic Estimations using volumetric analysis
2. Synthesis of Inorganic compounds
3. Analysis of commercial products
4. Purification of organic compounds
5. Preparations and mechanism of reactions involved

S.Y.B.Sc. Chemistry
SEMESTER-III

CH-301: Physical and Analytical Chemistry [Credit -2, 36 L]

After completion of course student will able to

1. Define / Explain concept of kinetics, terms used, rate laws, molecularity, order.
2. Explain factors affecting rate of reaction.
3. Explain / discuss / derive integrated rate laws, characteristics, expression for half-life and examples of zero order, first order, and second order reactions.
4. Determination of order of reaction by integrated rate equation method, graphical method, half-life method and differential method.
5. Explain / discuss the term energy of activation with the help of energy diagram.
6. Explanation for temperature coefficient and effect of temperature on rate constant k.
7. Derivation of Arrhenius equation and evaluation of energy of activation graphically.
8. Derivations of collision theory and transition state theory of bimolecular reaction and comparison.
9. Solve / discuss the problem based applying theory and equations.
10. Define / explain adsorption, classification of given processes into physical and chemical adsorption.
11. Discuss factors influencing adsorption, its characteristics, differentiates types as physisorption and Chemisorption
12. Classification of Adsorption Isotherms, to derive isotherms.
13. Explanation of adsorption results in the light of Langmuir adsorption isotherm, Freundlich's adsorption Isotherm and BET theory.
14. Apply adsorption process to real life problem.
15. Solve / discuss problems using theory
16. Define, explain and compare meaning of accuracy and precision.
17. Apply the methods of expressing the errors in analysis from results.
18. Explain / discuss different terms related to errors in quantitative analysis
19. Apply statistical methods to express his / her analytical results in laboratory
20. Solve problems applying equations
21. Explain / define different terms in volumetric analysis such as units of concentration, indicator, equivalence point, end point, standard solutions, primary and secondary standards, complexing agent, precipitating agent, oxidizing agent, reducing agent, redox indicators, acid base indicators, metallochome indicators, etc.
22. Perform calculations involved in volumetric analysis.
23. Explain why indicator show colour change and pH range of colour change.
24. To prepare standard solution and b. perform standardization of solutions.
25. To construct acid – base titration curves and performs choice of indicator for particular titration.

26. Explain / discuss acid-base titrations, complexometric titration / precipitation titration / redox titration.
27. Apply volumetric methods of analysis to real problem in analytical chemistry / industry.

CH-302: Inorganic and Organic Chemistry [2Credit, 36 L]
After completion of course student will able to

1. Define terms related to molecular orbital theory (AO, MO, sigma bond, pi bond, bond order, magnetic property of molecules, etc).
2. Explain and apply LCAO principle for the formation of MO's from AO's.
3. Explain formation of different types of MO's from AO's.
4. Distinguish between atomic and molecular orbitals, bonding, anti-bonding and nonbonding molecular orbitals.
5. Draw and explain MO energy level diagrams for homo and hetero diatomic molecules. Explain bond order and magnetic property of molecule.
6. Explain formation and stability of molecule on the basis of bond order.
7. Apply MOT to explain bonding in diatomic molecules other than explained in syllabus.
8. Define different terms related to the coordination chemistry (double salt, coordination compounds, coordinate bond, ligand, central metal ion, complex ion, coordination number, magnetic moment, crystal field stabilization energy, types of ligand, chelate effect, etc.)
9. Explain Werner's theory of coordination compounds. Differentiate between primary and secondary valency. Correlate coordination number and structure of complex ion.
10. Apply IUPAC nomenclature to coordination compound.
11. Identify and draw the structures aromatic hydrocarbons from their names or from structure name can be assigned.
12. Explain / discuss synthesis of aromatic hydrocarbons.
13. Give the mechanism of reactions involved.
14. Explain /Discuss important reactions of aromatic hydrocarbon.
15. To correlate reagent and reactions
16. Identify and draw the structures alkyl / aryl halides from their names or from structure name can be assigned.
17. Explain / discuss synthesis of alkyl / aryl halides.
18. Write / discuss the mechanism of Nucleophilic Substitution (SN1 , SN2 and SNi) reactions.
19. Explain /Discuss important reactions of alkyl / aryl halides.
20. To correlate reagent and reactions.
21. Give synthesis of expected alkyl / aryl halides.
22. Identify and draw the structures alcohols / phenols from their names or from structure name can be assigned.
23. Able to differentiate between alcohols and phenols 3. Explain / discuss synthesis of alcohols / phenols.
24. Write / discuss the mechanism of various reactions involved.
25. Explain /Discuss important reactions of alcohols / phenols.
26. To correlate reagent and reactions of alcohols / phenols
27. Give synthesis of expected alcohols / phenols.

CH-303: Practical Chemistry-III [2 credit, 72* L]
After completion of course student will able to

1. Verify theoretical principles experimentally.
2. Interpret the experimental data on the basis of theoretical principles.
3. Correlate theory to experiments. Understand/verify theoretical principles by experiment observations; explain practical output / data with the help of theory.
4. Understand systematic methods of identification of substance by chemical methods.
5. Write balanced equation for the chemical reactions performed in the laboratory.
6. Perform organic and inorganic synthesis and is able to follow the progress of the chemical reaction by suitable method (colour change, ppt. formation, TLC).
7. Set up the apparatus / prepare the solutions - properly for the designed experiments.
8. Perform the quantitative chemical analysis of substances explain principles behind it.
9. Systematic working skill in laboratory will be imparted in student.

SEMESTER-IV

CH-401: Physical and Analytical Chemistry [Credit: 2, 36 L]
After completion of course student will able to

1. Define the terms in phase equilibria such as- system, phase in system, components in system, degree of freedom, one / two component system, phase rule, etc.
2. Explain meaning and Types of equilibrium such as true or static, metastable and unstable equilibrium.
3. Discuss meaning of phase, component and degree of freedom.
4. Derive of phase rule.
5. Explain of one component system with respect to: Description of the curve, Phase rule relationship and typical features for i) Water system ii) Carbon dioxide system iii) Sulphur system
6. Define various terms, laws, differentiate ideal and no-ideal solutions.
7. Discuss / explain thermodynamic aspects of Ideal solutions-Gibbs free energy change, Volume change, Enthalpy change and entropy change of mixing of Ideal solution.
8. Differentiate between ideal and non-ideal solutions and can apply Raoult's law.
9. Interpretation of i) vapour pressure–composition diagram ii) temperature- composition diagram.
10. Explain distillation of liquid solutions from temperature – composition diagram.
11. Explain / discuss azeotropes, Lever rule, Henrys law and its application.
12. Discuss / explain solubility of partially miscible liquids- systems with upper critical. Solution temperature, lower critical solution temperature and having both UCST and LCST.
13. Explain / discuss concept of distribution of solute amongst pair of immiscible solvents.
14. Derive distribution law and its thermodynamic proof.
15. Apply solvent extraction to separate the components of from mixture interest.
16. Solve problem by applying theory.
17. Explain / define different terms in conductometry such as electrolytic conductance, resistance, conductance, Ohm's law, cell constant, specific and equivalent conductance, molar conductance, Kohlrausch's law, etc.

18. Discuss / explain Kohlrausch's law and its Applications, Conductivity Cell, Conductivity Meter, Whetstone Bridge.
19. Explain / discuss conductometric titrations.
20. Apply conductometric methods of analysis to real problem in analytical laboratory.
21. Solve problems based on theory / equations.
22. Correlate different terms with each other and derive equations for their correlations.
23. Explain / define different terms in Colorimetry such as radiant power, transmittance, absorbance, molar, Lamberts Law, Beer's Law, molar absorptivity
24. Discuss / explain / derive Beer's law of absorptivity.
25. Explain construction and working of colorimeter.
26. Apply colorimetric methods of analysis to real problem in analytical laboratory.
27. Solve problems based on theory / equations.
28. Correlate different terms with each other and derive equations for their correlations.
29. Explain / define different terms in column chromatography such as stationary phase, mobile phase, elution, adsorption, ion exchange resin, adsorbate, etc.
30. Explain properties of adsorbents, ion exchange resins, etc.
31. Discuss / explain separation of ionic substances using resins.
32. Discuss / explain separation of substances using silica gel / alumina.
33. Apply column chromatographic process for real analysis in analytical laboratory.

CH-402: Inorganic and Organic Chemistry [2 credit, 36L]
After studying the aromatic hydrocarbons student will able to

1. Isomerism in coordination complexes
2. Explain different types of isomerism in coordination complexes.
3. Apply principles of VBT to explain bonding in coordination compound of different geometries.
4. Correlate no of unpaired electrons and orbitals used for bonding.
5. Identify / explain / discuss inner and outer orbital complexes. 4. Explain / discuss limitation of VBT
6. Explain principle of CFT.
7. Apply crystal field theory to different type of complexes (Td, Oh, Sq. Pl complexes)
8. Explain: i) strong field and weak field ligand approach in Oh complexes ii) Magnetic properties of coordination compounds on the basis of weak and strong ligand field ligand concept. iii) Origin of colour of coordination complex.
9. Calculate field stabilization energy and magnetic moment for various complexes.
10. To identify Td and Sq. Pl complexes on the basis of magnetic properties / unpaired electrons.
11. Explain spectrochemical series, tetragonal distortion / Jahn-Teller effect in Cu(II) Oh complexes only.
12. Identify and draw the structures aldehydes and ketones from their names or from structure name can be assigned.
13. Explain / discuss synthesis of aldehydes and ketones.
14. Write / discuss the mechanism reactions aldehydes and ketones.
15. Explain /Discuss important reactions of aldehydes and ketones.
16. To correlate reagent and reactions of aldehydes and ketones

17. Give synthesis of expected aldehydes and ketones.
18. Perform inter conversion of functional groups
19. Identify and draw the structures carboxylic acids and their derivatives from their names or from structure name can be assigned.
20. Explain / discuss synthesis of carboxylic acids and their derivatives.
21. Write / discuss the mechanism reactions carboxylic acids and their derivatives.
22. Explain /Discuss important reactions of carboxylic acids and their derivatives.
23. Correlate reagent and reactions of carboxylic acids and their derivatives
24. Give synthesis of expected carboxylic acids and their derivatives.
25. Perform inter conversion of functional groups.
26. Identify and draw the structures amines from their names or from structure name can be assigned.
27. Explain / discuss synthesis of carboxylic amines.
28. Write / discuss the mechanism reactions carboxylic amines.
29. Explain /Discuss important reactions of carboxylic amines.
30. To correlate reagent and reactions of carboxylic amines.
31. Give synthesis diazonium salt from amines and reactions of diazonium salt.
32. Perform inter conversion of functional groups.
33. Draw the structures of different conformations of cyclohexane.
34. Define terms such as axial hydrogen, equatorial hydrogen, confirmation, substituted cyclohexane, etc.
35. Convert one conformation of cyclohexane to another conformation and should able to identify governing structural changes.
36. Explain / discuss stability with respect to potential energy of different conformations of cyclohexane.
37. Draw structures of different conformations of methyl / t-butyl monosubstituted cyclohexane (axial, equatorial) and 1, 2 dimethyl cyclohexane.
38. Identify cis- and trans-isomers of 1, 2 dimethyl substituted cyclohexane and able to compare their stability.

CH-403: Practical Chemistry-IV [2 credit, 72* L]

After studying the aromatic hydrocarbons student will able to

1. Verify theoretical principles experimentally
2. Interpret the experimental data on the basis of theoretical principles.
3. Correlate the theory to the experiments. Understand / verify theoretical principles by experiment or explain practical output with the help of theory.
4. Understand systematic methods of identification of substance by chemical methods.
5. Write balanced equation for all the chemical reactions performed in the laboratory.
6. Perform organic and inorganic synthesis and able to follow the progress of the chemical reaction.
7. Set up the apparatus properly for the designed experiments.
8. Perform the quantitative chemical analysis of substances and able to explain principles behind it.

T.Y.B. Sc. Chemistry

CH-331 Physical chemistry, Sem.-I

At the end of course students will able to

CO1: define / recall various terms related to electrolytic conductance, molecular spectroscopy, chemical kinetics and phase diagram.

CO2: write correct equation such as Ohms law, equivalent conductance, molar conductance, rate constant of first, second, third order reactions, Kohlarch law, Debye equation, transport number, molar polarization, force constant, energy of rotational, vibrational excitations, etc.

CO3: derive equations for half-life of third order reaction, rate constant of third order reaction, transport number, dipole moment, molar polarization, reduced mass of diatomic molecule, etc.

CO4: explain / describe various terms in electrolytic conductance, molecular spectroscopy, chemical kinetics and phase diagram. To derive relations between / among various terms / quantities in electrolytic conductance, molecular spectroscopy, chemical kinetics and phase diagram

CO5: differentiate between / among the terms / quantities with suitable example such as molecularity and order of reaction, conductance and resistance, equivalent and molar conductance, rotational and vibrational spectra, etc.

CO6: apply his knowledge to explain / interpret spectra of simple diatomic molecules

CO7: describe facts and observations in electrolytic conductance, molecular spectroscopy, chemical kinetics and phase diagram.
CO8: solve numerical related to electrolytic conductance, molecular spectroscopy, chemical kinetics and phase diagram.

CH-341 Physical chemistry, Sem.-II,

At the end of course students will able to

CO1: define / recall various terms related to electrochemistry, nuclear chemistry and application of radioactivity, crystallography and basics of quantum chemistry.
CO2: write / remember the correct equation such as Nernest equation, representation of cell and cell reactions, Bragg equation, half of radioactive materials, etc.
CO3: derive equations for potentials of various types of cells and electrodes, Bragg equation, half of radioactive materials, kinetics of decay of radioactive materials, particle in 1D box, quantum tunneling, etc.
CO4: explain / describe various terms related to electrochemistry, nuclear chemistry and application of radioactivity, crystallography and basics of quantum chemistry.
CO5: derive relations between / among various terms / quantities related to electrochemistry, nuclear chemistry and application of radioactivity, crystallography and basics of quantum chemistry.
CO6: apply his knowledge to explain experimental observation and should able to correlate theory and particle or observed facts.
CO7: describe facts and observations related to electrochemistry, nuclear chemistry and application of radioactivity, crystallography and basics of quantum chemistry.
CO8: solve numerical in in electrolytic conductance, molecular spectroscopy, chemical kinetics and phase diagram.

CH-332 Paper –II Inorganic Chemistry Sem-III

At the end of course students will able to

CO1: Define terms related to molecular orbital theory, coordination chemistry
CO2: Explain mononuclear and hetero nuclear molecules, LCAO principle, primary and secondary valancy, bond order and magnetic properties of molecules
CO3: Distinguish between atomic and molecular orbitals, bonding and antibonding molecular orbitals, different theories of coordination chemistry
CO4: Draw MO energy level diagrams for homo and hetero nuclear diatomic molecules, crystal field splitting energy level dig. for octahedral and tetrahedral complexes
CO5: Apply IUPAC nomenclature rules and writ name of coordinate complexes, predict structure of complexes by using hybridization

CO6: Describe valance bond theory and crystal field theory to different type of complexes
CO7: Calculate effective atomic number and crystal field stabilization energy for various complexes
CO8: solve numerical problems related to syllabus

CH-342 Paper –II Inorganic Chemistry Sem-IV

At the end of course students will able to
CO1: define lanthanides, actinides, semiconductors, superconductor, close packed structure, lanthanide contraction, super heavy elements, catalyst, catalysis
CO2: describe lanthanide contraction, types of holes in close pack structure
CO3: distinguish between lanthanides and actinides, homogeneous & heterogeneous catalysis, n-type and p-type semiconductor, nuclear fusion and fission
CO4: explain applications of lanthanides and actinides, superconductivity, acetic acid synthesis, properties of heterogeneous catalyst, separation of lanthanides
CO5: explain n(E), and N(E) curves for semiconductors, band structures for sodium metal, hemoglobin, vit. B12
CO6: predict product of nuclear reactions, geometry of ionic solid from radius ratio effect
CO7: derive names of super heavy elements and symbols form IUPAC rules
CO8: solve numerical problems related to syllabus.

CH -333 Paper III: Organic chemistry Sem. III

By the end of this course students will able to
CO1: define the terms related to Organic Reactions such as Aliphatic Nucleophilic, Aromatic electrophilic and Nucleophilic Substitution Reactions
CO2: list Different factors responsible for reactivity of organic compounds in Addition reactions to Unsaturated compounds
CO3: recall the information about acidity and Basicity
CO4: explain the Elimination reactions
CO5: solve the chemical Reactions for Aliphatic Nucleophilic, Aromatic electrophilic and Nucleophilic Substitution Reaction
CO6: classify the organic reactions like substitution, Addition and elimination Reactions.
CO7: categorize different nucleophiles Electrophiles and Bases. CO8:
judge what type of reagent need for the organic Conversion.

CH-343 Paper III: Organic chemistry Sem. IV

By the end of this course students will able to
CO1: define the terms related to Organic Reactions such as Carbanion, Retrosynthetic analysis Rearrangement Reactions and Spectroscopic methods of structure determination.

CO2: list Different factors responsible for reactivity of organic compounds in Oxidation, Reduction, Rearrangement Reactions
CO3: recall the information about Reactivity stability of carbanion
CO4: explain the Rearrangement reactions
CO5: solve the chemical Reactions for Carbanion Retrosynthetic analysis and rearrangement reactions
CO6: calculation of Wavelengths of Organic compounds.
CO7: identification of different functional groups in organic compounds. CO8: judge the structure of organic compounds

CH-334 Paper- IV Course- Analytical Chemistry, (Semester -I)

At the end of course students will able to

CO1: remember /write/ explain terms/ recall the terms such as gravimetric analysis, common ion effect, solubility product, formation of complex ion, TGA, DTA DSC, spectrophotometry, terms related to absorption measurement, polarography, FES, AAS.
CO2: explain principles of electro-gravimetric analysis, Thermogravimetric analysis, differential thermal analysis, beers law and lamberts law, Polarography, AAS, FES.
CO3: describe various components used in UV-Visible Spectrophotometry, AAS, FES, Polarography, TGA and DTA
CO4: describe equations or reaction of solubility product, law of mass action, Lambert –Beers Law equation, Ilkvoic equation, equation for no. atoms in excited state, Nernst equation.
CO5: describe Instrumentation of UV-Visible Spectrophotometry, AAS, FES, Polarography, TGA and DTA
CO6: solve numerical problems related to solubility product, common ion effect, Thermal methods of analysis, polarography, spectrophotometry, AAS and FES
CO7: apply Electro-gravimetric analysis for separation of metal ion, TGA, DTA, spectrophotometry, polarography AAS and FES.
CO8: select particular chemical or instrumental method for analysis of sample

CH-344 Analytical Chemistry, (Semester -II)

At the end of course students will able to

CO1: remember /write/ explain terms/ recall the terms such as Distribution coefficient, Distribution ratio, Solvent extraction, chromatography, types of chromatography, Electrophoresis, types of electrophoresis, Nephelometry and Turbidimetry.
CO2: define the terms migration velocity, moving boundary method, zone electrophoresis, disc electrophoresis, Rf value, retention time, supercritical fluid chromatography, normalization, secondary peak, salting out, masking agent, counter-current extraction, synergistic extraction.
CO3: discuss various components used in GC, HPLC, Turbidimetry and Nephelometry.
CO4: derive relationship between distribution coefficient and distribution ratio, equation of turbidance, equation of multiple extraction.

CO5: describe Instrumentation of HPLC, GC, Turbidimetry, Nephelometry, electrophoresis.
CO6: solve numerical problems related to distribution ratio, % extracted, Rf values, no. of plates and theoretical plate, turbidance.
CO7: apply HPLC, paper chromatography, solvent extraction, GC, electrophoresis, Turbidimetry and Nephelometry technique for analysis.
CO8: select particular techniques for separation of sample

CH 335 Paper –V of Industrial Chemistry (Paper-V) Sem III,

By the end of this course student will able to-

CO1: define all the terms related to modern approach to chemical industry, agrochemicals, food and starch.
CO2: list basic chemicals, petrochemicals and eco-friendly fuels, cement and glass industry.
CO3: recall information about basic chemicals used in industry, agrochemicals, fuels and their types, nutritive aspects of food.
CO4: explain processes of manufacture of chemicals related to industry, properties of fuels, nutritive aspects of food and quality of soil.
CO5: calculate/determine calorific values of fuels.
CO6: classify fuels, chemical reactions, plant nutrients, herbicides, pesticides, insecticides and fungicides, glass and cement.
CO7: analyze applications and synthesis of different types of industrial chemicals and agrochemicals
CO8: select which principles are appropriate for industrial set up and to improve the yield of product.

CH 345 Industrial Chemistry (Paper V) Sem. IV,

By the end of this course students will able to

CO1: define the terms related to polymer chemistry, sugar and fermentation industry, soaps, detergents and cosmetics, dyes and paints, pharmaceutical industry, and terms related with pollution prevention and management.
CO2: list types of polymers, soaps, detergents, cosmetics, dyes, paints and pharmaceuticals.
CO3: recall information about soaps, detergents, fermentation process, dyes paints, drugs and pollution.
CO4: explain properties of drugs, polymers, soaps, detergents, dyes, paints and sugars.
CO5: determine quality of manufactured products in sugar and fermentation industry.
CO6: classify commercial polymers, soaps, detergents, cosmetics, dyes, paints, pigments and drugs.
CO7: analyze different types of manufacturing process of sugar industry, fermentation process and pollution prevention and waste management.

CO8: select what types of cosmetic products, drugs are important for human health.

CH 336E Chemistry (Paper-VI) Agriculture Semester: - III

By the end of this course students will able to

CO1: define all the terms related to soil chemistry, quality of irrigation water and plant nutrients.

CO2: list of fertilizers, manures, herbicides, pesticides, insecticides and fungicides.

CO3: recall information about soil, nutrient, quality of water, fertilizers and plant protecting chemicals.

CO4: explain properties of soil, impurities in water, effect of environmental condition on nutrient uptake, roll of fertilizers and effect of different types of plant protecting chemicals.

CO5: determine quality of irrigation water in terms of ppm meq/lit, epm, TSS, SAR, ESP and RSC.

CO6: classify soils, quality of water, plant nutrients, herbicides, pesticides, insecticides and fungicides

CO7: analyze different types of impurities present in irrigation and drinking water.

CO8: select appropriate fertilizer which would be more suitable for cultivation of different verities of crop with improve yield.

CH 346E Dairy Chemistry (Paper-VI) Semester: - IV

By the end of this course, the student will able to

CO1: define market milks, special milks, milk protein, carbohydrates, vitamins, died milk, butter, cheese, enzymes and adulterants in milk.

CO2: list out market milks, special milks, milk constituents, nutrients in milk, preservatives and adulterants in milk, milk products and dried milk products.

CO3: discuss about common dairy products, market milks, special milks, milk protein, carbohydrates and vitamins, adulterants in milk, cream, butter, cheese and dried milk.

CO4: explain properties of market milks, common dairy products, special milks, milk protein, carbohydrates and vitamins, cream, butter, cheese and dried milk products.

CO5: classify nutrient in milk, major milk constituents, common dairy processes, preservatives and adulterants in milk, milk products and dried milk powders, common dairy processes.

CO6: classify nutrients in milk, major milk constituents, common dairy processes, chemical composition of milk, milk proteins, special milks, pasteurization of milk process, preservatives and adulterants in milk and dried milk powders.

CO7: analyze different types of adulterations in milk, milk products and dried milk powders.

CO8: choose good quality milk and allied milk products available in the market, which would be suitable for human consumption.

CH-347 Practical Paper-I, Physical Chemistry Practical

CO1: Maintaining records of chemical and instrumental analysis.
CO2: Laboratory skills for the purpose of collecting, interpreting, analysing, practical data.
CO3: Laboratory skills for the purpose handling different analytical instruments.
CO4: Interpretation of results of experiment and their correlation with theory.
CO5: Study of reaction kinetics practically.
CO6: Study of conduct metric, potentiometric, colorimeter and pH metric principles.
CO7: Application of conduct metric, potentiometric, colorimetric and pH metric measurement in quantitative analysis.
CO8: Viscosity measurement and its application. CO9: Refractometric measurement and its application.

CH-348 Practical Paper-II, Inorganic Chemistry Practical

CO1: Maintaining records of quantitative and qualitative analysis.
CO2: Laboratory skills for the purpose of collecting, interpreting, analysing, and reporting (in written form) chemical data.
CO3: Laboratory skills for the purpose handling different equipment's and analytical instruments.
CO4: Identify methods and instruments that can be used qualitative and quantitative analysis.
CO5: Mole concept and its application in the preparation of normal and molar solutions, and use of mole concept in quantitative calculations for inorganic analysis.
CO6: Choice of proper quantitative methods for analysis of samples containing inorganic substances.
CO7: Synthesis and purify coordination compounds. CO8: Statistical treatment to quantitative data
CO9: Quantitative analysis using instrumental methods of quantitative analysis.

CH-349 Practical Paper-III, Organic Chemistry Practical

CO1: Maintaining records of quantitative and qualitative analysis.
CO2: Laboratory skills for the purpose handling different equipment's and analytical instruments.
CO3: Study of organic reactions their applications.
CO4: Separation of mixture of organic compound and their identification by chemical methods.
CO5: Perform organic synthesis and follow the progress of the reaction by using TLC technique.

CO6: Write balanced equation for all the reaction performed in laboratory and write it mechanism.
CO7: Choice of proper quantitative methods for analysis of samples containing organic substances.
CO8: Synthesis and purify organic compounds.
CO9: understanding of reaction mechanism involved
CO10: physical constant determination.

M. Sc. Chemistry

B. Sc. Che

Goals :

The Department has formulated three broad educational goals for the undergraduate degree programs:

Chemistry knowledge: To provide students with the advanced knowledge in Analytical Chemistry and allied subjects, the interplay of theory and experiment, and to motivate scientific enthusiasm and curiosity and the joy of learning.

Problem solving skills: To provide students with the tools needed to analyse problems with the skills required to succeed in graduate school, the chemical industry or professional school.

Employment and technical skills: To provide the students with technical skills necessary for successful careers in chemistry and related or alternative careers for which a advanced chemistry foundation can be very useful. These include to a breadth of experimental techniques using modern instrumentation and communication skills (oral and written).

Programme Outcomes :

Knowledge outcome:

After completing M.Sc. Chemistry Programme students will be able to:

PO1: Transfer and apply the acquired fundamental knowledge of chemistry, including basic concepts and principles of (1) organic chemistry, Inorganic chemistry, Physical and Analytical Chemistry; (2) analytic techniques and experimental methods for chemistry to study different branches of chemistry;

PO2: Demonstrate the ability to explain the importance of the Periodic Table of the Elements and represent key aspects of it and its role in organizing chemical information.

Skills Outcomes

Professional Skills

After completing B.Sc. Chemistry Programme students will be able to:

PO3: apply and demonstrate knowledge of essential facts, concepts, laws, principles and theories related to chemistry;

PO4: demonstrate the learned laboratory skills, enabling them to perform qualitative and quantitative analysis of given samples and able to make conclusions on it;

PO5: set procedure and synthesize simple compounds of commercial importance;

PO6: engage in oral and written scientific communication, and will prove that they can think critically and work independently.

PO6: Communicate effectively using graphical techniques, reports and presentations within a scientific environment.

PO7: to recognize problems in chemical science and make strategies to solve it

PO8: Respond effectively to unfamiliar problems in scientific contexts

PO9: Plan, execute of design experiment, make documentation of it, interpret

data at entry level of chemical industry and report the results;

PO10: Integrate and apply these skills to study different branches of chemistry.

Generic Competencies

PO11: The student will acquire knowledge effectively by self-study and work independently, present information in a clear, concise and logical manner and apply appropriate analytical and approximation methods

PO12: The student will learn professionalism, including the ability to work in groups and in society, and apply basic ethical principles.

Course Outcomes :

M.Sc. Part-I [Organic Chemistry]

Semester-I

CCTP-1: CHP-110, Physical Chemistry-I,

Semester - I (Fundamentals of Physical Chemistry) (4 Credits)

SECTION - I (2 Credits, 24 L, 6T)

SECTION – II (2 Credits, 24 L, 6 T) Chemical Kinetics and Reaction Dynamics

1. The goal of this course is to introduce students to fundamental concepts in Molecular Spectroscopy and Nuclear Chemistry and Radiation Chemistry
2. After completion of this course, successful students will: 1) Students will be able to explore new areas of research in both chemistry and allied fields of science and technology.
3. Students will be able to function as a member of an interdisciplinary problem solving team.
4. Develop skills to critically read the literature and effectively communicate research in a peer setting.

Semester-I CCTP-2: CHI-130, Inorganic Chemistry-I,

Semester - I (Molecular Symmetry and Chemistry of Main Group Elements) (4 credits) SECTION-I (2Credits, 24 L, 6 T) Molecular Symmetry and its Applications

1. Student should visualize/ imagine molecules in 3 dimensions.
2. To understand the concept of symmetry and able to pass various symmetry elements through the molecule.
3. Understand the concept and point group and apply it to molecules.
4. To understand product of symmetry operations.
5. To apply the concept of point group for determining optical activity and dipole moment.
6. Student should understand the importance of Orthogonality Theorem.
7. They should able to learn the rules for constructing character table.
8. Using reduction formulae should be able to find out the possible type of hybridization.
9. Student should know the concept of SALC.
10. Student able to find out character for reducible representation.
11. To know about projection operator.
12. Apply projection operator to find out the normalized wave function for atomic orbital.

13. Student should correlate the application of symmetry to spectroscopy.
14. Students able to find out the possible modes of vibration.
15. From the previous knowledge of symmetry student must able to find out which mode are IR active.

Section-II (2 Credits, 24 L, 6 T) Chemistry of Main Group Elements

1. Student should understand the detail chemistry of S and P block elements w.r.t. their compounds, their reactions and applications.
2. To learn the advance chemistry of boranes, fullerene, zeolites, polymers etc.
3. Organometallic chemistry of some important elements from the main groups and their applications

Semester-I CCTP-3:CHO-150, Organic Chemistry-I, Semester – I (4 Credits)

SECTION-I (2 Credits, 24 L, 6T) Basic Organic Chemistry

SECTION-II (2 Credits, 24 L, 6T)

1. They will understand the criteria for aromaticity in nonbenzenoid molecules and other advanced polycyclic aromatics
2. Understand the chemistry of monocyclic heterocycles, nomenclature and reactions
3. Learn the concept stereochemistry and its importance; their rules and the concept of chirality
4. Understand the role of various reaction intermediates like carbocation, carbanion, carbenes, radicals, and nitrenes in organic reactions; concept of NGP
5. Able to describe mechanism of different rearrangement reactions. Appreciates the various steps involved in the molecular rearrangements.
6. Understand the chemistry of Ylides
7. Use synthetic reagent of oxidation and reduction for solving the problems

Semester-I CBOP-1: CHG – 190, General Chemistry-I, Semester-I (4 Credits)

SECTION-I: Theory Course (2 Credits, 24 L, 6T)

(Any one option is to be selected by candidate)

Elective Option-A : Introduction to Solid State of Matter

At the end of course student will understand

1. Bonding in solids – band theory
2. Electronic conductivity
3. Semiconductors, photoconductivity
4. Non-stoichiometry, defects and types of defects in solids
5. Ionic conductivity and their applications
6. Superconductivity and theory of superconductivity
7. Method of synthesis of solids

Elective Option-B: Chemical Mathematics

Elective Option-C: Introduction to Chemical Biology-I

The goal of this course is to introduce students to fundamental concepts in Chemical Biology and methods of chemistry used to solve problems in molecular and cell biology. After completion of this course, successful students will:

1. Students will be able to explore new areas of research in both chemistry and allied fields of science and technology.
2. Students will be able to function as a member of an interdisciplinary problem solving team.
3. To impart the students thorough idea in the chemistry of carbohydrates, amino acids, proteins and nucleic acids etc.
4. Be able to describe the chemical basis for replication, transcription, translation and how each of these central processes can be expanded to include new chemical matter.
5. Develop skills to critically read the literature and effectively communicate research in a peer setting.

SECTION-II: Practical Course (2 Credits,48 L 12T)

(Any one option to be selected by candidate)

Elective Option-A: Inorganic Material Analysis, Synthesis and Applications

Elective Option-B : Chemical Biology Practical-I

Semester-I CCPP-1: CHP-107: Practical Course – I:

Semester -I Basic Practical Chemistry (Compulsory) (4 Credits, 96 L, 24T)

Sec-I: Physical Chemistry Practical (11 Experiments)

Sec-II: Organic Chemistry (11 Experiments)

Semester-II

CCTP-4: CHP-210, Physical Chemistry-II,

Semester - II (Molecular Spectroscopy and Nuclear Chemistry) (4 Credits)

SECTION - I (2 Credits, 24 L, 6T) Molecular Spectroscopy

SECTION – II (2 Credits, 24 L, 6T) Nuclear and Radiation Chemistry

1. The goal of this course is to introduce students to fundamental concepts in Molecular Spectroscopy and Nuclear Chemistry and Radiation Chemistry
2. After completion of this course, successful students will: 1) Students will be able to explore new areas of research in both chemistry and allied fields of science and technology.
3. Students will be able to function as a member of an interdisciplinary problem solving team.
4. Develop skills to critically read the literature and effectively communicate research in a peer setting.

CCTP-5: CHI-230, Inorganic Chemistry,

Semester – II (Coordination and Bioinorganic Chemistry) (4 Credits)

SECTION-I (2 Credits, 24 L, 6T) Coordination Chemistry

1. Student should able to find out the no of microstates and meaningful term symbols, construction of microstate table for various configuration
2. Hund's rules for arranging the terms according to energy.
3. Student should understand interelectronic repulsion.
4. Student should know the concept of weak and strong ligand field.
5. Student able to find out splitting of the free ion terms in weak ligand field and strong ligand field.
6. To draw correlations diagram for various configurations in Td an Oh ligand field.
7. Student should know basic instrumentation and selection rules and relaxation in rules.
8. Student should know basic d-d transition, d-p mixing, charge transfer spectra.
9. Interpretation of electronic spectra for spin allowed oh and td complexes using Orgel diagram.
10. Understand the concept of spectro chemical series and Nephelauxetic series.
11. Should able to solve numerical based on crystal field parameters.
12. Understand the various terms involved in magnetochemistry.
13. Various phenomenons of magnetism and their temperature dependence.
14. Various experimental methods to find out magnetic moment.
15. Understand the various Quenching of orbital angular momentum.

Section-II: (2Credits, 24 L, 6 T) Bioinorganic Chemistry

1. Importance of bioinorganic chemistry.
2. Role of metals in Metalloprotein and metalloenzymes.
3. Similarities in coordination theory for metal complexes and metal ions complexed with biological ligands.
4. Importance and transport of metal ions.
5. Passive transport metal ions by ionophores and gramicidin.
6. Mechanism for active transport of Na+ and K +
7. Nerve impulse generation in rod cell of retina.
8. Importance and function of Ca, Fe and Mg in metalloprotein
9. Catalytic role of Mn in photosynthesis.

Semester-II CCTP-6:CHO – 250, Organic Chemistry-II, Semester–II (4 Credits)

SECTION-I (2 Credits, 24 L, 6T) Photochemistry and Pericyclic Reactions

SECTION-II (2 Credits, 24 L, 6T)

Spectroscopic Methods in Structure Determination of Organic Compounds

1. Students should able to understand free radicals' formation, stability and reactivity and should also be able to use the basic understanding in writing probable reaction mechanisms.
2. Students should able to write MO diagram for various olefinic compounds and should able to predict the products, the stereochemistry as well as should able to understand the preferred reaction pathways.

3. Students should able to calculate λmax of organic compounds containing more than one and less than four conjugated systems. Students should able to correlate IR bands with functional groups using numerical data as well as spectral data.
4. Students should able to solve 1H-NMR problems and should also able to draw the 1H-NMR spectrum for simple organic compounds mentioning multiplicity pattern and coupling constant with the help of "Tree Diagram" Should able to predict and analyze the multiplicity patterns with more than one coupling constants.
5. Students should able to use 13C-NMR data to interpret the structure NMR problems and should also able to draw the 1H-NMR spectrum for simple organic compounds mentioning multiplicity pattern and coupling constant with the help of "Tree Diagram" Should be able to predict and analyze the multiplicity patterns with more than one coupling constants.
6. Students should know various key factors responsible for the spectroscopic data acquisition and should able to solve Problems based on UV, IR, MS, 1H-NMR,13CNMR.

Semester-II CBOP-2: CHG – 290, General Chemistry -II, (4 Credits)

SECTION-I: Theory Course (2 Credits, 24 L, 6T) (Any one option is to be selected by candidate)

Elective Option-A: Material Characterization Technique

At the end of course student will understand / able to explain

1. Different characterization technique of solids.
2. Principle of XRD, instrumentation of powder XRD, Brags law, applications of XRD for crystal structure determination, numerical problems.
3. Principle of SEM, instrumentation of SEM and interpretation of surface morphology of solid from SEM.
4. Principle of TEM, instrumentation of TEM and interpretation of TEM images.
5. Basics of X-rays, Principle of XRF, types of XRF, instrumentation, qualitative and quantitative analysis, numerical

Elective Option - B: Organometallic and Inorganic Reaction Mechanism

At the end of course students will able to explain

1. Valence electron count, back bonding in organometallics, spectral characterization of organometallic compounds.

2. Catalytic reaction involving organometallic compounds and mechanism of these reactions 3. Types of reaction involving organometallic compounds

4. Types of reactions in coordination compounds, inert and labile complexes, substitution reactions in coordination complexes and their mechanism, stereochemistry of reaction, kinetics of reactions.

Elective Option– C: Introduction to Chemical Biology-II

The goal of this course is to introduce students to fundamental concepts in Chemical Biology and methods of chemistry used to solve problems in molecular and cell biology.

After completion of this course, successful students will:

1. Students will be able to explore new areas of research in both chemistry and allied fields of science and technology.
2. Students will be able to function as a member of an interdisciplinary problem solving team.
3. To impart the students thorough idea in the chemistry of carbohydrates, amino acids, proteins and nucleic acids etc.
4. Be able to describe the chemical basis for replication, transcription, translation and how each of these central processes can be expanded to include new chemical matter.
5. Develop skills to critically read the literature and effectively communicate research in a peer setting.
6. Describe the importance of chemical biology research and interdisciplinary work

SECTION-II: Practical Course (2 Credits, 48 L, 12T) (Any one option to be selected by candidate)

Elective Option-A: Electrochemical Methods of Analysis

Elective Option-B: Chemical Biology Practical-II

Semester-II CCPP-2: CHP-227: Practical Course-II:

Semester -II Basic Practical Chemistry (Compulsory) (4 Credits, 96 L, 24T)

Section -II: Organic Chemistry (11 Experiments)

1. This course is designed to make students aware of how to perform organic compounds in laboratory.
2. The course includes synthesis of some derivatives and organic compounds, which will help them while working in research laboratory in future.
3. Making derivatives of organic compounds will help them in industry or while doing research in medicinal chemistry for Drug development.
4. This practical course is also designed to make student aware of green chemistry and role of green chemistry in pollution reduction.
5. The students learn how to avoid solvents and do solvent free reaction.
6. Also the work-up procedure in many experiments is made more eco-friendly to environment.

M.Sc. Part-II [Organic Chemistry]

CHO-350: Organic Reaction Mechanism

CO1: Understanding of reactive intermediates in organic reactions from synthetic point of view.

CO2: Economic use of organic strategies in synthesis

CO3: Applying knowledge of organic reaction mechanism for synthesis of important organic molecules

CO4: Understanding of behavior of organic intermediates in reactions under different reaction condition and making use in different named reactions

CO5: Significant importance of free radical reactions in polymerization reactions is important.

CO6: Extending the organic chemistry reaction mechanism to biological system is important for understanding role of vitamins, minerals. It is useful for drug discovery.

CHO-351: Spectroscopic methods in Structure determination.

CO1: Application of 1H-NMR spectroscopy for structure elucidation of organic molecules

CO2: Understanding the nature of carbons in organic compounds

CO3: Combination Advanced organic spectroscopic NMR techniques for structure elucidation of complicated organic molecules

CO4: Preliminary information for structure elucidation of molecules in Chemistry.

CO5: Applying All spectroscopic together is important for final structure elucidation of compounds.

CHO-352: Organic Stereochemistry

CO1: Understanding conformations of cyclic system in natural products.

CO2: Logical methods or tricks use for knowing stereochemistry's of cyclic systems.

CO3: Recognition of different cyclic systems in naturally occurring molecules.

CO4: Preliminary information for structure elucidation of molecules in Chemistry.

CO5: Understanding the interrelation of different optical isomers and applying separation ideas.

CO6: differentialtion of isomers of olefin

CHO-353: Photochemistry, Pericyclic reactions and Heterocyclic Chemistry

CO 1: To understand the mechanism of reactions which are carried out by light, heat or reagents which involves concerted or stepwise mechanism

CO 2: To understand the synthesis and different types of reactions of heterocyclic compounds.

CHO-450: Chemistry of Natural Products

CO 1: To understand the synthesis of compounds which are used as a drug or having medicinal values

CO 2: To understand the concept of biogenesis of terpenoids ,alkaloids and the compounds obtained from shikimate pathways

CHO-451: Advanced Synthetic Organic Chemistry.

CO 1: To understand the preparation of catalyst and their application in organic synthesis

CO 2: To understand the role of Organometallic compounds in organic synthesis.

CHO-452: Carbohydrates, Chiron Approach, Chiral drugs and medicinal Chemistry.

CO 1: To understand the chemistry of asymmetric compounds (carbohydrates and amino acids).To understand the applications of chiral auxillary in assymetric synthesis (biologically active compounds).

CO 2: To understand thorough analysis of recent trends in medicinal chemistry and evaluation of their significance for advancing productivity in drug discovery is presented

CHO -453:-Assymmetric synthesis.

CO 1: To understand the advance stereochemistry and retrosynthetic approach

CHO-347:- Single stage preparations

CO 1: To develop practical skill

CHO-447:- Double stage preparations

CO 1: To develop practical skill

CHO-448 Project/Industrial training/Green Chemistry Praqcticals

CO 1: To understand the importance of green chemistry and chemical processes that are more sustainable by reducing the amount of compounds used and reducing and/or eliminating the amount of toxic substances.

CO 2: To develop the research and industrial skill.