

Department of Chemistry.  
Course objectives and Outcomes

**F.Y.B.Sc.**

<b>Sem.-I</b>		
<b>Paper</b>	<b>Objectives</b>	<b>Outcome</b>
CH-101 Physical and Inorganic Chemistry	Develop the knowledge of basic principles of physical chemistry and to introduce mathematical preparations. Introduction to periodic properties with reference to S-Block elements	Students are able to understand the basic principles of physical chemistry and the skills of mathematical preparations. Students understood periodic properties of S-Block elements and were able to co-relate the same.
CH-102 Organic and Inorganic Chemistry	Give introduction of organic chemistry with reference to hydrocarbon, halogen derivatives, alcohol phenol ether. Knowledge of ionic Equilibria, Knowledge of shapes of covalent molecules with reference to VSEPR.	Students understood organic chemistry with reference to hydrocarbon, halogen derivatives, alcohol phenol ether. Students came to know various terms, equations and ability to solve numerical of ionic Equilibria, They learnt to draw shapes of electronic structures of covalent molecules.
CH-103 Chemistry Practical	Develop the skill to handle instruments, preparation of solutions and analytical experiments. Introduction to basic inorganic qualitative analysis.	Students were able to develop the skill to handle instruments, preparation of solutions and analytical experiments. Students understood basic inorganic qualitative analysis.
<b>Sem.-II</b>		
CH-201 Physical and	Develop knowledge of	Students were able to understand

Inorganic Chemistry	physical properties of matter. Develop knowledge of metals and metallurgy as well as P-Block elements	physical states of matter. They are able to understand metallurgical processes and properties of P-Block
CH-202 Organic and Inorganic Chemistry	Introduction to various organic compounds like aldehydes, ketones, carboxylic acids and their derivatives. Basic knowledge of volumetric analysis and bond and structure of molecules.	Students gained the knowledge of various organic compounds like aldehydes, ketones, carboxylic acids and their derivatives with reference to their preparation and properties. Students understood volumetric analysis and bond and structure of molecules.
CH-203 Chemistry Practical	Develop skill to perform simple physical chemistry experiments and analytical chemistry experiments. Introduction to basic organic qualitative analysis.	Students were able to develop skill to perform simple physical chemistry experiments and analytical chemistry experiments. Students were introduced to basic organic qualitative analysis.

### S.Y.B.Sc.

Sem.-III		
CH-301 Physical and Inorganic chemistry	To know Physical properties of solutions, colligative properties of solution. Introduction to D-Block elements.	Students came to know the physical properties of solutions, and understand colligative properties and able to solve the numerical. They understood various terms of the D-Block Elements.
CH-302 Organic and Inorganic Chemistry	Introduction to stereochemistry with reference to projection formula, optical and geometrical isomers, conformational isomers, stereochemistry of cyclohexan.	Students gained the knowledge of stereochemistry with reference to projection formula, optical and geometrical isomers, conformational isomers, stereochemistry of cyclohexan. They developed knowledge of heterocyclic and polycyclic compounds, solvents, solutions, acids and bases.

	To develop knowledge of heterocyclic and polycyclic compounds, solvents, solutions, acids and bases.	
CH-303 Chemistry Practical	Develop skill to perform physical chemistry experiment, volumetric and chromatographic analysis. Prepare organic compounds.	Students are able to perform practical based on physical and organic chemistry, chromatography and volumetric analysis.
CH-304 Advanced Analytical Chemistry(Skill enhancement course)	Introduction to analytical chemistry and volumetric analysis with reference to acid base titration and precipitation titration and chromatographic methods.	Students were able to understand principle and of acid base titration and precipitation titration and chromatographic methods. Students were able to understand sampling, accuracy, errors and good laboratory practices.

#### Sem.-IV

CH-401 Physical and Inorganic chemistry	To give knowledge of electro chemistry and chemical thermodynamics. Introduction to coordination chemistry.	Students gained the knowledge of electrochemistry and chemical thermodynamics and gained the ability to solve the numerical. Students understood coordination chemistry, complexes, their nomenclature, Ligands and chelates
CH-402 Organic and Inorganic Chemistry	Introduction to organic synthesis with reference to AAE, ME and organo metallic compounds. Introduction to molecular orbital theory	Students knew synthetic reagents and organo metallic compounds, their preparation and uses. Students developed the ability to understand combination of orbitals, molecular orbital treatment LCAO
CH-403 Chemistry Practical	To develop skill to handle instruments and perform physical chemistry experiments. To identify organic compounds, to prepare inorganic compounds	Students developed skill to handle instruments and perform physical chemistry experiments. Students learnt to identify organic compounds, to prepare inorganic compounds and gravimetric analysis

	and gravimetric analysis	
CH-404 Advanced Analytical Chemistry(Skill enhancement course)	To know the volumetric analysis with reference to redox and complexometric titration, methods and gravimetric analysis.	Students gained the knowledge of the volumetric analysis with reference to redox and complexometric titration, methods and gravimetric analysis.

### T.Y.B.Sc.

Sem.-V		
CH-501 - Principles of Physical Chemistry-I	<p>To acquire knowledge about rates of chemical reactions and distinguishing the reaction of different order and their characteristics.</p> <p>To understand the basic principles of phase rules and phase diagrams.</p> <p>To learn the underlying principles of electrode reactions, electrochemical cells and applications of EMF</p>	<p>After successful completion of this course, students are expected to:</p> <p>Understand the significance of wave function and postulates of quantum mechanics.</p> <p>Deduce rate equations and half-life equations for first and second order reactions</p> <p>Draw and explain the one and two component system phase diagrams.</p> <p>Explain the principles of electrode processes and apply them during Practicals.</p>
CH-502 Subject-Inorganic Chemistry	<p>To describe the VSEPR theory to predict shape of molecules from electron pairs.</p> <p>To describe the bonding in simple compounds using VBT.</p> <p>To describe the principles of VBT to predict hybridization of orbitals.</p> <p>To understand how CFT explains electronic</p>	<p>Learn about the VSEPR theory and how it can be used to explain molecular shapes.</p> <p>Learn about the VBT to describe the formation of covalent bonds in terms of atomic orbital overlap.</p> <p>Learn about stability of complexes using CFSE.</p> <p>Learn about MOT to draw energy diagrams and to predict bond order</p>

	<p>structure, colour and magnetic properties of co-ordination compounds.</p> <p>To introduce the basic principles of MOT and electronic geometry of molecules</p>	
CH-503- Organic Reaction Mechanism	<p>To study different types of organic reactions.</p> <p>To understand the mechanisms of different types of reactions.</p> <p>To distinguish between types of substrates and types of reagents.</p> <p>To understand ways of attack of reagent, breaking and formation of bonds in different reaction mechanisms.</p> <p>To study kinetics, evidences and factors affecting different types of reactions.</p> <p>To study stereochemistry of different reactions.</p> <p>To understand role of different reagents in different reactions</p>	<p>Students will learn organic reactions like nucleophilic substitution, electrophilic substitution, nucleophilic addition, electrophilic addition and elimination.</p> <p>Students will be able to write/ explain mechanisms of those types of reactions.</p> <p>Students will understand how a reaction takes place in one or more steps.</p> <p>Students will understand the types of intermediates formed in different reactions.</p> <p>Students will learn how reagent attacks the substrate molecule and accordingly how bonds break and formed.</p> <p>Students will learn how change in structure of substrate, reagent and solvent changes the product formed and its stereochemistry.</p> <p>Students will be able to predict the products and to suggest the mechanisms</p>
CH-504 - Industrial Chemistry	<p>To produce graduates with enhanced skills, applied knowledge, aptitude to carry out higher studies or research and development in the various industrial areas.</p> <p>To make the student cognizant about important aspects of Chemical Industries, Industrial work culture</p>	<p>Student will be able to understand:</p> <p>Basic requirements of Chemical Industry, different terms, operations and processes involved in chemical Industry.</p> <p>Describe Copy Right Act, Patent Act and Trade Marks, Bureau of Indian Standards (BIS) and International Organization for Standardization (ISO).</p> <p>Basic requirements, raw materials, different processes and operations involved in Sugar Industry and also different grades of sugar and uses of</p>

	<p>and environment.</p> <p>To prepare the students for immediate entry to the workplace with sound theoretical knowledge and some basic experimental concepts in the area of various industries viz. Sugar Industry, Fermentation Industry, Petroleum and Petrochemicals.</p> <p>To offers the synergism between basic concepts of Chemistry with Industrial applications.</p> <p>To equip the students with knowledge of some industrial organic synthesis as requirement of diverse chemical industries.</p> <p>Empower the students to understand the concepts in chemical</p>	<p>by-products of sugar industry.</p> <p>Importance of fermented products, basic requirements, theory and process of alcohol making, fractional distillation and various terms involved in Fermentation Industry.</p> <p>Understand Occurrence of Petroleum, theories of formation of Petroleum and different terms Viz. Knocking, Anti-Knock Compounds, Octane number, Cetane number, Gasohol and Power alcohol etc.</p> <p>Manufacturing processes involved in Industrial Organic Synthesis such as Methanol, Isopropanol, Glycerol, Acetylene and Aromatic hydrocarbon i.e. Toluene from petroleum with their uses.</p>
CH-505 Subject- Analytical Instrumentation	<p>To develop an understanding of the range and uses of analytical methods in chemistry.</p> <p>To understand and establish the role of chemistry in quantitative analysis.</p> <p>To enhance the Analytical instrumental skill of the students.</p>	<p>Explain the fundamentals of analytical methods and instruments for qualitative and quantitative Analysis.</p> <p>Express the role of analytical chemistry in science.</p> <p>Students will be able to function as a member of an interdisciplinary problem solving team.</p>
CH-506(A) - Biochemistry	<p>To study different types of biomolecules.</p> <p>To study structure of biomolecules.</p> <p>To study classification of</p>	<p>Students will study biomolecules like carbohydrates, amino acids, proteins, enzymes, lipids and nucleic acids.</p> <p>Students will understand definitions, classifications and examples of these</p>

	<p>each type of biomolecules.</p> <p>To study reactions of the biomolecules.</p> <p>Study of metabolism and thus, study of metabolic processes and reactions involved.</p> <p>To study energetics of the metabolic processes.</p> <p>Students should understand: Structure and role of Carbohydrates, Amino acids, Proteins, Enzymes, lipids, Nucleic Acids and energy rich compounds in biochemical reactions</p>	<p>biomolecules.</p> <p>Students will learn the detailed structure of these biomolecules along with types of bonds or linkages present in their molecules.</p> <p>Students will learn the chemical properties of these biomolecules and the action of some reagents on them in the form of reactions or graphical presentation.</p> <p>Students will understand biochemical energetics of common energy rich compounds along with hydrolytic reactions. Students will learn metabolisms like Glycolysis, TCA cycle, Transamination, deamination and <math>\beta</math>- oxidation through reactions, enzymes involved, outlines and energetics</p>
CH-507 Physical Chemistry Practical	<p>To develop skills required in chemistry such as the appropriate handling of apparatus, instruments and chemicals.</p> <p>The student will learn the laboratory skills needed to design, safely conduct and interpret chemical research.</p> <p>To expose the students to an extent of experimental techniques using modern instrumentation.</p> <p>The student will develop the ability to effectively communicate scientific information and research results in written and oral formats</p>	<p>Students will get basic analytical and technical skills to work effectively in the various fields of chemistry.</p> <p>Students will be able to calibrate and handle instruments like conductometer, potentiometer, pH meter, colorimeter, spectrophotometer, polarimeter.</p> <p>They have the ability to perform accurate quantitative measurements with an understanding of the theory and use of contemporary chemical instrumentation, interpret experimental results, perform calculations on these results and draw reasonable, accurate conclusions.</p> <p>They get skills required in chemistry such as the proper handling of apparatus and chemicals.</p> <p>They will have the ability to present scientific and technical information resulting from laboratory experimentation in both written and oral formats. Students will apply conductometer, potentiometer, pH</p>

		meter, colorimeter, spectrophotometer, polarimetry techniques for analysis and measurement.
CH-508 -Inorganic Chemistry Practical	To analyze the inorganic mixtures. To determine metal from ore and alloy analysis. Using colorimetric analysis to determine amount of metal.	Student will able to determine cation & anion from inorganic mixtures by using qualitative analysis. Student will able to determine metal from ore & alloys. Students will be able to design & carry out scientific experiments as well as accurately record & analyze the results of experiments. Students will be able to handle colorimeter for estimation of metal ions
CH-509 - Organic Chemistry Practical	To develop skills required in chemistry such as the appropriate handling of apparatus and chemicals. The student will learn the laboratory skills needed to design, safely conduct and interpret chemical research. To expose the students to an extent of experimental techniques using modern instrumentation. The student will develop the ability to effectively communicate scientific information and research results in written and oral formats	Separate and analyze binary water insoluble mixture. Separate and analyze binary water soluble mixture. Estimate - Acetamide, Glucose and Glycine by volumetric method, Estimate basicity of various acids. Synthesis of various organic compounds through greener alternatives. Understand Thin Layer Chromatographic techniques and physical constant. Understand the purification technique use in organic chemistry.

## Sem.-VI

CH-601 - Principles of Physical Chemistry-II	To learn the basics of molecular spectroscopy and rotational spectra. To understand the basic principles and	After successful completion of this course, students are expected to: Analyze the rotational spectra of diatomic molecules and determine the bond length.
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	<p>applications of nuclear chemistry.</p> <p>To learn the consequences of light absorption by atoms and molecules and photochemical reactions.</p> <p>To learn the laws of crystallography and basics of crystal structure</p>	<p>Explain and apply the radioactivity principles for various chemical and biological investigations. Describe the mechanism of fluorescence, phosphorescence and photochemical reactions.</p> <p>Analyze the given crystal structure and determine the indices of planes, interplaner distances and type of crystal structure</p>
CH-602 - Chemistry of Inorganic Solids	<p>To describe the VSEPR theory to predict shape of molecules from electron pairs.</p> <p>To describe the bonding in simple compounds using VBT.</p> <p>To describe the principles of VBT to predict hybridization of orbitals.</p> <p>To understand how CFT explains electronic structure, colour and magnetic properties of co-ordination compounds.</p> <p>To introduce the basic principles of MOT and electronic geometry of molecules.</p>	<p>Learn about basic principles and synthesis of nanomaterials.</p> <p>Learn about classification, composition and processing of cement.</p> <p>Learn about classification and composition of alloys.</p> <p>Learn about types manufacture and applications of fertilizers.</p>
CH-603 - Spectroscopic Methods of Structure Determination	<p>To study principle of spectroscopy and to understand wave parameters and terms involved in spectroscopy.</p> <p>To study different types of spectroscopy.</p> <p>To understand principle, concept and the terms used in each type of</p>	<p>Students will learn interaction of radiations with matter. They will understand different regions of electromagnetic radiations. They will know different wave parameters.</p> <p>Students will learn principle of mass spectroscopy, its instrumentation and nature of mass spectrum.</p> <p>Students will understand principle of UV spectroscopy and nature of UV spectrum. They will learn types of</p>

	<p>spectroscopy.</p> <p>Interpretation of UV, IR, NMR spectra.</p> <p>Use of spectral data for determination of structure of unknown organic compounds.</p> <p>To study different applications of each type of spectroscopy</p>	<p>electronic excitations.</p> <p>Students will be able to calculate maximum wavelength for any conjugated system. And from the value of <math>\lambda</math>-max they will be able to find out extent of conjugation in the compound.</p> <p>Students will understand principle of IR spectroscopy, types of vibrations and the nature of IR spectrum. From IR spectrum, they will be able to find out IR frequencies of different functional groups. And thus, they will be able to find out functional groups present in the compound.</p> <p>Students will understand principle of NMR spectroscopy and will understand various terms used in NMR spectroscopy. They will learn measurement of chemical shift and coupling constants.</p> <p>Students will be able to interpret the NMR data and they will be able to use it for determination of structure of organic compound. Students will be able to determine structure of simple organic compounds on the basis of spectral data such as <math>\lambda</math> max values, IR frequencies, chemical shift (<math>\delta</math> values).</p>
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CH-604 - Chemistry of Industrially Important Products	<p>To make student perceptive about various commodity industries viz. Cosmetics and Perfumes, Dyes and Pharmaceuticals, Pesticides, Soaps and Detergents, related diversified and multidisciplinary fields of chemical industry.</p> <p>To produce graduates with enhanced skills, knowledge and research aptitude to carry out higher studies or research and development in the various industrial areas.</p> <p>To equip students with advance knowledge about various industrially important products.</p> <p>To makes students ready for immediate entry to the workplace with sound theoretical and basic experimental knowledge in the areas of various industries.</p> <p>To engender the substantial interest in the students to understand the concepts in chemical processing, engineering and industrial development of present era viz. Cosmetics and Perfumes Industry, Dyes and Pharmaceuticals, Pesticides, Soaps and Detergents, related</p>	<p>Student will be able to understand:</p> <p>Describe the industrial production of a number of important organic and inorganic compounds / chemicals and products of end use.</p> <p>Gain comprehensive knowledge of cutting-edge developments in a field of different chemical industries.</p> <p>Importance of Cosmetics Industry and a general study including preparation and uses of the Hair dye, hair spray, shampoo, suntan lotions, lipsticks, talcum powder, nail enamel, creams (cold, and shaving creams).</p> <p>Perfumes and identify the distinguishing features of its components and also an essential oils and their importance in cosmetic industries with reference to Eugenol, Geraniol, sandalwood oil, eucalyptus, rose oil, 2- phenyl ethyl alcohol, Jasmone, Civetone, Muscone etc.</p> <p>Know about pesticides both natural and synthetic, benefits and adverse effects of it, also synthesis, manufacture and uses of pesticides viz. Organochlorines (DDT, Gammexene,); Organophosphates (Malathion, Parathion); Anilides (Alachlor and Butachlor).</p> <p>Definition, classification, raw material used in soaps and detergents, reaction involved in it, Manufacture of Soaps and cleansing action of soaps and detergents. Definition, properties of good dyes, relation between colour and constitution, classification of dyes according to their mode of application and chemical constitution.</p> <p>Importance's, definition and meaning of the different terms involved in Drugs and Pharmaceuticals Industry and also synthesis, uses, properties and</p>
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	<p>multidisciplinary and diversified fields of chemical industry.</p> <p>To describe the industrial production of a number of important organic and inorganic compounds / chemicals and products of end use.</p> <p>To gain comprehensive knowledge of cutting-edge developments in a field of different chemical industries by discussions and exchange of experiences and knowledge.</p>	<p>industrial manufacture of Paracetamol, Aspirin, and Chloramphenicol.</p>
CH-605 Analytical Chemistry	<p>To provide knowledge of instruments which are used in Chemical, Pharma, Petroleum, and insecticide and pesticide industry</p> <p>To increase student technical skill as per industry need.</p> <p>To develop an understanding of the range and uses of analytical methods in chemistry</p>	<p>Students are able to gain the knowledge of instruments which are used in Chemical, Pharma, Petroleum, and insecticide and pesticide industry</p> <p>Technical skills of students were raised as per industry need.</p> <p>Develop an understanding of the range and uses of analytical methods in chemistry.</p>
CH-606(A) - Polymer Chemistry	<p>The course offers the basic concepts of polymer, polymerization, classes of polymers, important properties, and poly(lactic acid) as a biodegradable polymer.</p> <p>The course also offers to study preparation, properties, and applications of industrially important</p>	<p>Define terms like monomer, polymer, polymerization, polydispersity index, etc., classify polymers based on their origin, native backbone chain, and thermal response.</p> <p>Know glass transition temperature and its determination, various ways to express molecular weights of polymers and polydispersity index.</p> <p>Identify different mechanisms of polymerizations viz. free radical, ionic, and condensation polymerizations.</p>

	<p>selected polymers.</p> <p>The course will give chance to study various mechanisms of polymerization and learn different techniques of polymerization.</p> <p>The student will be able to understand glass transition temperature and factors affecting on it and various ways to express molecular weight of polymers.</p>	<p>Distinguish techniques of polymerization based on physical conditions required for the preparation of polymers in laboratory or industry.</p> <p>Familiar with preparation, properties, and applications of industrially important selected polymers.</p>
CH-607 - Physical Chemistry Practical	<p>To develop skills required in chemistry such as the appropriate handling of apparatus, instruments and chemicals.</p> <p>The student will learn the laboratory skills needed to design, safely conduct and interpret chemical research.</p> <p>To expose the students to an extent of experimental techniques using modern instrumentation.</p> <p>The student will develop the ability to effectively communicate scientific information and research results in written and oral formats.</p>	<p>Students will get basic analytical and technical skills to work effectively in the various fields of chemistry.</p> <p>Students will be able to calibrate and handle instruments like conductometer, potentiometer, pH meter, colorimeter, spectrophotometer, polarimeter.</p> <p>They have the ability to perform accurate quantitative measurements with an understanding of the theory and use of contemporary chemical instrumentation, interpret experimental results, perform calculations on these results and draw reasonable, accurate conclusions.</p> <p>They get skills required in chemistry such as the proper handling of apparatus and chemicals. They will have the ability to present scientific and technical information resulting from laboratory experimentation in both written and oral formats</p>
CH-608 - Inorganic Chemistry Practical	<p>To determine metal from gravimetric estimations.</p> <p>To determine amount of metal by volumetric analysis.</p> <p>To determine preparation /synthesis of co-</p>	<p>Students will be able to prepare co-ordination compounds.</p> <p>Students will be able to determine amount of metal by using quantitative analysis.</p> <p>Students will be able to calculate Rf value of metal.</p>

	<p>ordination compound.</p> <p>To study separation techniques of metals.</p> <p>To use colorimetric analysis of metal</p>	<p>Students will be able to design &amp; carry out scientific experiments as well as accurately record &amp; analyze the results of experiments.</p> <p>Students will be able to explain why chemistry is an integral activity for addressing social, economic &amp; environmental problems.</p>
CH-609 - Organic Chemistry Practical	<p>To develop skills required in chemistry such as the appropriate handling of apparatus and chemicals.</p> <p>The student will learn the laboratory skills needed to design, safely conduct and interpret chemical research.</p>	<p>Separate and analyze binary water insoluble mixture.</p> <p>Separate and analyze binary water soluble mixture.</p> <p>Estimate - Acetamide, Glucose and Glycine by volumetric method,</p> <p>Estimate basicity of various acids.</p> <p>Synthesis of various organic compounds through greener alternatives.</p> <p>Understand Thin Layer Chromatographic techniques and physical constant.</p> <p>Understand the purification technique use in organic chemistry</p>

## M.Sc.-I

Sem.-I		
CH-110 Physical Chemistry	Introduction to quantum chemistry, nuclear chemistry and adsorption	Students understood quantum chemistry, Nuclear and radiation chemistry, Electrochemistry, Adsorption-principles, rules, theories and numerical problems based on this
CH-130 Inorganic Chemistry	Introduction to MOT, Organo metallic compounds, symmetry and group theory and transition metals.	Introduce to MOT, Organometallic compounds, Molecular symmetry-elements of symmetry, point groups, introduction to transition metals,
CH-150 Basic Organic Chemistry	Stereochemistry, reaction mechanisms	Introduction and revision of Stereochemistry, Basic Mechanisms of organic reactions like Nucleophilic

		substitution reaction, Electrophilic substitution reaction, Addition and elimination reactions.
<b>Sem.-II</b>		
CH-210 Physical Chemistry	Introduction to thermodynamics, spectroscopy	Thermodynamics, Statistical Thermodynamics, chemical, kinetics Molecular spectroscopy- students understood principles, theories, rules derivations and numerical problems based on this.
CH-230 Inorganic Chemistry,	Introduction to transition metal complex, ionic bonds, catalysis	Students understood Reaction mechanism in transition metal complexes, ionic bonds, Catalysis, spectra, preparation and applications of complexes.
CH-250 Name reaction, Synthetic Organic Chemistry& Spectroscopy	Introduction to some name reactions	Students understood Name reactions, Synthetic reagents, Rearrangement reactions which are useful for organic synthesis, introduce to spectroscopy.
General Chemistry	Introduction to basic analytical chemistry and maths related to chemistry	Introduced to basic analytical chemistry and maths related to chemistry
CH_P_I-Physical chemistry Practical-yearly	Handling of Instruments, perform of experiment, calculation	Develop a skill to handle instruments, preparation of solution and calculations.
CH-I-I- Inorganic chemistry practical-Yearly	Introduction to ore analysis, binary mixture analysis, drug analysis	Able to analyses ores like pyrolusite, Haematite, Chromite, Dolomite. Develop a skill to perform binary mixtures, analysis of drugs, chromatography
CH-O-I Organic Chemistry Practical Yearly	Organic preparations TLC, use of software to draw structures of organic compounds.	Develop a skill to prepare organic compounds in single stage monitored by TLC. Use of software like ISI draw, chem. Draw, Chem. Sketch to design reaction mechanism, IUPAC names etc.

## M.Sc.-II

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<b>Sem.-III</b>		
CH-350 Organic Reaction Mechanism	Physical approach to organic chemistry, reaction intermediates, neighbouring group effect, carbon nucleophile reactions, ester hydrolysis.	Students understood Strength of acids and bases, Determining mechanism of a reaction, Intermediated and concerted Reaction, linear free energy relationship, Aromaticity and neighboring group effect. Hydrolysis of ester and reactions of carbon nucleophile
CH-351 Spectroscopic methods in structure determination	Introduction to H1 NMR, C1NMR Mass spectroscopy. Problems related to this	Students introduce to H NMR, C NMR, Mass spectroscopy, and problems based on spectroscopy
CH-352 Organic Spectroscopy	Introduction to stereochemistry, Asymmetric synthesis, stereochemistry of six member and other then six member ring	Principle of spectroscopy, Asymmetric synthesis and applications, Stereochemistry of six member ring, other than six member ring, fused rings.
CH-353 Free radical, photochemistry, pericyclic reactions and their applications	Introduction to free radical and photochemistry, aromatic compound alkenes. Pericycle reactions, electrocyclic reactions	Students understood quantum yield and electronic state. Norrish –I and Norrish –Icharges. Paterno-Buchi reaction Photochemistry of olifines and arenes Free radical reactions Selection rule for thermal and photochemical reactions. Frontier molecular orbital approach.
<b>Sem.-IV</b>		
CH-450 Chemistry of natural products	Introduction to secondary metabolism natural products, synthesis and application vitamins, enzymes,	Students understood importance of vitamins B1,B2,B6,B-12,Folic acid, C,D-1,E,K1 and K2, sources, structure, stereochemistry and biogenesis of vitamins, Role of enzymes in reaction
CH-451 Synthetic methods in organic chemistry	Introduction to application of some elements in organic synthesis, Designing of organic synthesis, one and two stage	Students understood Transition metals in organic synthesis, Design the organic compounds, Role of Umpolung in organic synthesis, Polypeptide and poly nucleotides, principles of green chemistry, solvents, catalyst and

	disjunction, protection of group, advanced synthetic reactions.	reaction conditions.
CH_452Heterocyclic chemistry, Chiron approach, Chiral drugs and medicinal chemistry	Introduction to heterocycle chemistry and chiral approach. Drug discovery, synthesis	Students understood Synthetic routes, reaction and reactivity of heterocyclic compounds, important terms used in medicinal chemistry, structure of triose, pentose, hexose, stereochemistry and reactions. Synthesis and pharmacological activity of S-Lbuprofin, S- Metaprolol
CH-O2 Organic chemistry practical(Ternary mixture)	Introduction to various types of organic mixtures, their separation, identification and purification and chromatographic study	Students are able to separate organic compound in different phases, Qualitative analysis of organic compounds, distillation techniques, Detection of elements N, S, X, Purification techniques.
CH-O-3 Organic chemistry Practical(Three stage preparation)	Introduction to organic three stage preparation. Purification and chromatographic study of organic compounds	Students are able to perform three stage preparation, draw the reaction mechanism, purify the organic compounds by crystallization, perform chromatographic technique to check completion of reaction, apply the knowledge about different reaction conditions.
CH-O4 –Short Research Project	Introduction to research, survey literature review, synthesis of raw products, purification and analysis of products	Students understood literature survey for the topic of the project, Standardize reaction conditions for synthesis, new methods of synthesis, isolation of product and give mechanism, handle instruments for analysis and discuss their experimental results, Used ICT tools to prepare project reports and present it using power point presentation, work within a small team to achieve a common research goal.