

Krishnagar Government College
Krishnagar, Nadia
Program Outcome and Course Outcome

B.Sc. Chemistry Honours

Programme outcome (PO):

Chemistry as a subject is interdisciplinary in nature and has a broad scope. The CBCS syllabus is very enriching and full of versatile knowledge in chemical science. A student acquires basic knowledge in the key areas of organic, inorganic, and physical chemistry from the core papers (CC) of B.Sc. Chemistry Hons. Students also become familiarized with specialized areas of pharmaceutical chemistry and analytical chemistry from the Skill Enhancement courses (SEC). Chemistry Hons graduates become aware of the environmental aspects of chemical processes and realize the need to develop greener chemical reactions from the Discipline specific (DSE) course on green chemistry. Students gain knowledge about the applied chemistry useful in chemical industries. Students will learn to setup physicochemical experiments, analyse the data, draw plots, calculate physical constants and interpret the results. From the qualitative and quantitative practical courses included in core, SEC and DSE papers students learn to detect chemical species, to estimate different chemical entities, to synthesize and purify new compounds. Attending practical classes also develop skill for safe handling of chemicals and apparatus in a chemical laboratory. Chemistry graduates are enabled for higher studies (M.Sc) in the subject and to further engage themselves in different emerging areas of research in science and technology. Chemistry Hons graduates are equipped to join industries as well as academics in future. In fact, a Chemistry Hons graduate achieves communication skill, problem solving skill, team management and organization skill and can find a suitable position in any profession.

Course outcome (CO):

Semester	Paper	Course outcome
I	CC-1	<ul style="list-style-type: none">To know about the extranuclear structure of the atomTo know how the chemical properties of elements change with their position in periodic tableTo learn about the 1st and zeroth laws of Chemical Thermodynamics and the related terms; to get idea about thermo-chemistry and thermodynamic parameters related to chemical reactions.To understand the basic concept of kinetic theory of gases and differential behavior of ideal and real gasesTo learn experimentally to estimate salts in solution by acid -base titration methodTo learn experimentally to determine pH of buffer solution; To learn to determine heat change involved in a chemical process
	CC-2	<ul style="list-style-type: none">To know about basic concepts of organic chemistry specially physical properties, bonding, Molecular orbital approach of bonding.To know about classification of organic reactions from mechanistic aspects and the reaction intermediates.To understand the basic concepts of stereochemistryTo learn experimentally to detect some organic solid and liquid compoundsTo learn to determine melting and boiling pointTo learn experimentally to separate a solid binary mixture based on different solubility of the components
II	CC-3	<ul style="list-style-type: none">To know the basic concepts of redox reactionsTo understand acid base reactions and properties of solventTo know about 2nd law of thermodynamics, concept of entropy and thermodynamic relationsTo understand rate laws, rate equations of different types of reactions, determine rate constant values, order of reactions, effect of temperature and other factors on reaction rate and homogeneous catalysisTo learn experimentally to quantitatively estimate different metal ion in solution by titrationTo study experimentally the reaction kinetics of 1st order reactions
	CC-4	<ul style="list-style-type: none">To learn stereochemistry of chiral compounds arises due to presence of stereo-axis; concept of prostereoisomerism and concept of conformations of stereo isomers.To understand reaction kinetics, reaction thermodynamics and tautomerism of organic compounds.To know the concept, types, reaction mechanism and examples of elimination, free-radical and nucleophilic substitution reactions.To learn experimentally how to synthesize, calculate the yield and determine the melting point of pure organic compounds in the laboratory.
III	CC-5	<ul style="list-style-type: none">To understand the transport processes of fluid: viscosity and conductanceTo understand application of thermodynamics; to gain knowledge about chemical potential, chemical equilibrium, properties of ideal substances and condensed phaseTo study the fundamentals of Quantum MechanicsTo learn experimentally to determine viscosity of liquid; partition coefficient of a solute in different solvent and equilibrium constant; To study reaction kinetics by conductometric titration.
	CC-6	<ul style="list-style-type: none">To gain knowledge about ionic and covalent bond in detailTo know about extraction and purification of different metals from their oreTo learn to estimate different metal ions separately from their mixture by titrimetric methods.
	CC-7	<ul style="list-style-type: none">To know about addition reactions of alkene and alkyneTo learn about electrophilic and nucleophilic substitution reaction of aromatic compoundsTo know about addition reaction, nucleophilic substitution reaction and reactions exploiting acidity of α hydrogen of carbonyl compounds. To gain elementary idea about green chemistryTo learn about use of organometallic compounds in organic synthesisTo learn experimentally to detect the functional group of an organic compound and determine the melting point; To learn to prepare derivative of the compound and finally identify the compound from literature survey

<p style="text-align: center;">III</p>	<p style="text-align: center;">SEC</p>	<p><u>IT Skill for Chemist</u></p> <ul style="list-style-type: none"> • Helps to understand functions, differential equations, probability, matrices and determinants • To learn about qualitative and quantitative aspects of analysis and helps to understand how to present a data after analysis • To learn numerical differentiation, integration, and root of the equations • Helps to understand about the basics of computer programming (FORTRAN), creating and application of spreadsheet software (MS Excel) • Helps to know about statistical data analysis. • To learn how to prepare graphs by using spreadsheet, help to determine rate constant, equilibrium constant, molar extinction coefficient value, concentration of ions at equilibrium and molar enthalpy of vapourisation. • To study about the Acid-Base Titration Curve, Plotting of First and Second derivative Curve for pH metric and Potentiometric titrations, Calculation and Plotting of a precipitation titration Curve with MS Excel • To learn numerical differentiation and integration, and root of the equations using MS Excel <p><u>Basic Analytical Chemistry</u></p> <ul style="list-style-type: none"> • To study about the strategies of analytical chemistry, protocol of sampling, variability and validity of analytical measurement. • To know the complexometric titrations and use of different indicators. • To gain an in-depth knowledge of soil analysis, water analysis and different cosmetic analysis. • To learn about the different chromatographic processes including TLC, paper chromatography, ion-exchange chromatography etc.
<p style="text-align: center;">IV</p>	<p style="text-align: center;">CC-8</p>	<ul style="list-style-type: none"> • Helps to understand about the applications of Thermodynamics in Colligative Properties and Phase Equilibrium • To know experimentally how to study phase diagram of a Phenol-Water system, kinetic study of inversion of cane sugar, determination of partition co-efficient value, pH of an unknown solution and pH metric titration of an acid against strong base. • To study the fundamentals of Quantum Mechanics • Helps to understand the fundamental concept, basic terms, derivation and application of Quantum Mechanics • To know about the necessary laws, rules, terms, expressions and derivations statistical thermodynamics • To learn in detail about the first and second laws of Chemical Thermodynamics and the related terms; to get idea about thermo-chemistry and thermodynamic relationships and system of variable compositions. • To gain vast knowledge on chemical equilibrium and electrochemistry. • To learn experimentally how to do the potentiometric and conductometric titrations of different compositions, determine the K_a of weak acid and heat of neutralization of a strong acid by a strong base.
	<p style="text-align: center;">CC-9</p>	<ul style="list-style-type: none"> • To study the radiation chemistry of different radioactive nucleus. • To gain an in-depth knowledge of different nuclear models, classification of nucleus and different types of nuclear reactions. • Helps to understand several important applications of radioactive isotopes. • To learn the basic coordination chemistry of transition metals including IUPAC nomenclature and isomerism of coordination complexes. • To learn experimentally the quantitative estimation method of different metal ions in a given mixture by redox titration.

IV	CC-10	<ul style="list-style-type: none"> To gain knowledge about the synthesis of aliphatic and aromatic amine, nitro compounds, nitrile, diazonium salts and their utility in organic synthesis. To acquire knowledge about mechanistic details and stereochemical features of organic rearrangement reactions. To learn retrosynthetic analysis of small organic molecules and to design the synthetic route To determine the structure of a organic molecule in detail by UV, IR, NMR spectroscopy To learn experimentally measure different organic compound (such as Glucose, Phenol, aniline, formaldehyde etc.) by quantitative method.
	SEC	<p><u>Pharmaceutical Chemistry</u></p> <ul style="list-style-type: none"> To learn about the use and retrosynthetic path of different representative pharmaceutical molecule of different class such as antibiotic, antiviral, analgesic etc. To know about fermentation process and fermentative production of different commercially important compounds, drugs and vitamins. To learn experimentally to prepare aspirin and magnesium bisilicate. <p><u>Analytical Clinical Biochemistry</u></p> <ul style="list-style-type: none"> To study the basic concepts of carbohydrates, proteins, enzymes and lipids. To learn the diagnostic approach of disease by blood or urine analysis. To Identify and to estimate various substances like carbohydrates, lipids, iodine number and saponification number of oil, cholesterol, proteins, nucleic acids etc.
V	CC-11	<ul style="list-style-type: none"> To study the effect of ligands around a transition metal ion in terms of splitting of degenerate d-orbitals in different energy levels with respect to the number of incoming ligands, their strong and weak electronic field effect to explain the color and magnetic properties of the metal complexes with the light of CFSE. To understand the mechanistic pathways of ligand substitution reactions in metal-ligand complexes of different geometry and the characterization of mechanistic pathways. To get an idea of the basic complexation chemistry of d- and f-block elements. To get a core knowledge of magnetic properties of several magnetic substances. To study the available chlorine in bleaching powder and available oxygen in pyrolusite experimentally. To study the estimation of Cu in brass and Fe in cement and Ni(II) and chlorine gravimetrically.
	CC-12	<ul style="list-style-type: none"> To learn details about molecular spectroscopy such as UV-Visible, IR, NMR, and Raman spectroscopy in detail. To understand about the basic principles and laws of Photochemistry and also get idea about the theory of reaction rate. To know details about surface energy and surface tension; Classification, Adsorption Isotherms and applications of Adsorption; Classification, rules and properties of Colloids. To know how to determine surface tension of a liquid; Indicator constant of an acid base indicator; pH of an unknown buffer solution and CMC of a micelle experimentally. To study the kinetics of $K_2S_2O_8 + KI$ reaction and Verification of Beer and Lambert's Law for $KMnO_4$ and $K_2Cr_2O_7$ solution experimentally.

	DSE-1	<p><u>Polymer Chemistry</u></p> <ul style="list-style-type: none"> • To learn about the history, classification of polymeric materials. • To acquire knowledge about functionality of polymeric materials. • To know about the kinetics of polymerization. • To get idea about details on crystallization and morphology of crystalline polymers. • To understand the structure-property relationships of polymer. • To understand the nature and structure of polymers, determination of molecular weight of polymers and thermodynamics of polymer solution. • To get knowledge about glass transition temperature. • To learn about thermodynamics of polymer solution. • To know how to prepare polymers by using free radical polymerization, redox polymerization, interfacial polymerization, precipitation polymerization, addition polymerization and condensation polymerization process. • To get knowledge experimentally about the polymer synthesis via different methods. • To characterize polymer and to determine the molecular weight by viscometry experimentally. • To learn experimentally how to estimate polymer by sodium sulphite method. <p><u>Inorganic Materials of Industrial Importance</u></p> <ul style="list-style-type: none"> • To understand about the manufacture, properties, compositions, classes and applications of industrially important materials such as ceramics, glasses, cements, fertilizers, surface coating materials and batteries. • To know about alloys, manufacture of steel, composition and properties of different types of steels. • To learn about the general principles, properties, classification, industrial use, deactivation and regeneration of catalysis. • To understand about the preparation and explosive properties of organic and inorganic explosives and the basic idea of rocket propellant. • To learn how to analyze the composition of cement, composition of percentage of metals in alloy, electroless metallic coatings on ceramic and plastic. • To know how to determine free acidity in ammonium sulphate fertilizer, estimation of Calcium in Calcium ammonium nitrate fertilizer and phosphoric acid in superphosphate fertilizer.
V	DSE-2	<p><u>Analytical Methods in Chemistry</u></p> <ul style="list-style-type: none"> • To study about the principle of sampling, evaluation of analytical data, errors, accuracy and precision. • To learn about different optical methods of analysis. • To know about the electro-analytical methods and thermal methods of analysis including thermogravimetry. • To gain an in-depth knowledge of solvent extraction method. <p><u>Instrumental methods of chemical analysis</u></p> <ul style="list-style-type: none"> • To study the fundamental laws of spectroscopy and Selection rules • To study UV-Visible, IR, Mass spectroscopy, Flame photometry, Atomic adsorption spectroscopy and NMR spectroscopy in detail and their practical uses. • To learn about the gas and liquid Chromatographic separation techniques. • To know the basic idea of X-ray analysis and Electroanalytical techniques. • To understand the safety practices in the chemistry laboratory. • To gain an in-depth knowledge of analysis of illicit drugs and fiber, detection of steroids and pollutants from wastes, determination of the void volume of a gel filtration column and caffeine in beverages by HPLC, Cyclic voltammety of the Ferrocyanide/Ferricyanide couple, use of fluorescence to identify blood and other body fluids, collection, preservation, and control of blood evidence being used for DNA testing, use of capillary electrophoresis with laser fluorescence detection for nuclear DNA, use of sequencing for the analysis of mitochondrial DNA. <p><u>Green Chemistry</u></p> <ul style="list-style-type: none"> • To learn about green chemistry and its necessity. • To study about the principles of green chemistry & designing the green synthetic routes. • To learn about microwave-assisted and ultrasound-assisted green reactions; and to know about alternative greener synthesis of commercially important compounds • To know about the examples of green reactions and future trends in green reaction. • To learn experimentally to carry out organic reaction in greener solvents, using alternating source of energy, using enzyme as catalysts and avoiding waste.

VI	CC-13	<ul style="list-style-type: none"> To learn about Bioinorganic Chemistry and Organometallic Chemistry To know about the catalytic role of organometallic compounds in different types of industrial processes. To study experimentally the qualitative detection of known and unknown radicals and insoluble materials in a mixture. To understand the basic concept of molecular symmetry and point group Helps to understand about the role of metal ions in living system To get idea about proteins, enzymes and ionophores To understand about the basic principles & classifications of organometallic compounds. To learn about the synthesis and application of catalyst
	CC-14	<ul style="list-style-type: none"> To acquire knowledge about the structure, synthesis and reactivity of carbocycles, five and six membered heterocyclic compounds. To get knowledge about stereochemistry of alicyclic compounds and their reactivity in different organic reactions of various mechanism. To learn about mechanism, regioselectivity and stereochemistry of different pericyclic reaction such as electrocyclic reaction, cycloaddition reaction and sigmatropic reaction. To get knowledge about the linear and ring structure of monosaccharide, disaccharide and polysaccharide and to learn about their reactions. To get knowledge about structure, synthesis and reaction of amino acid, peptides and nucleic acids. To learn separation of different organic compounds by TLC experimentally. To learn experimentally spectroscopic analysis of organic compounds.
	DSE-3	<ul style="list-style-type: none"> Helps to know the Bravais Lattice and Laws of Crystallography, Crystal Planes and Specific Heat of Solid To learn in detail about the third law of Thermodynamics and the related terms Helps to understand about Boltzmann distribution, thermodynamic probability and partition function. To learn about the history, classification and functionality of polymeric materials. To know about the kinetics of polymerization, details on crystallization and morphology of crystalline polymers, determination of crystalline melting point of a crystalline material and the factors effecting crystalline melting point. To understand the nature and structure of polymers, determination of molecular weight of polymers and thermodynamics of polymer solution. To study the preparation, structure, properties and application of different types of addition and condensation polymers. To know how to prepare polymers by using free radical polymerization, redox polymerization, interfacial polymerization, precipitation polymerization, addition polymerization and condensation polymerization process. To learn experimentally how to find roots of equations, entropy change from heat capacity data, potentiometric titration, change in pressure for small change in volume of a van der Waals gas. To develop the practical concept of using of software such as Chemdraw.
VI	DSE-4	<ul style="list-style-type: none"> To know how to do research work and write a review article on a particular topic as assigned by the teacher. To know how to handle the technical devices for presenting research works.

Program Outcome and Course Outcome

B.Sc. Chemistry General

Program Outcome:

Students with honors in science subjects other than chemistry studies chemistry as their generic subject (GE) and program course students also studies this syllabus. This generic elective course in chemistry will help students to have in depth knowledge and understanding of their honors subjects and they will realize the inter related nature of science subjects.

On completion of this course students will understand the basic concepts and principles of physical, organic and inorganic chemistry. Students will acquire knowledge on the wide application of chemistry in the fields of all industries e.g. fuel, pesticide, paint, glass, ceramics, and pharmaceuticals. From this course students will become aware of the environmental aspects of chemical industries and know about environmental pollution, pollution control measures and proper waste disposal methods. Students will learn to setup physicochemical experiments, analyse the data, draw plots, calculate physical constants and interpret the results. Students will learn to estimate inorganic compounds both qualitatively and quantitatively and learn the use of analytical methods. Students will be enabled to prepare, purify and estimate organic compounds. Students will learn the basics of computer programming. Overall, from the laboratory work students will learn the safety precautions and maintenance protocols of a chemistry laboratory and work cohesively in a group.

Course outcome (CO):

Semester	Paper	Course outcome
I	CHEMGT-1 & CHEMGP-1	<p><u>Inorganic Chemistry-1</u></p> <ul style="list-style-type: none">• To know about the extranuclear structure of the atom• To know how the physical and chemical properties of elements change with their position in periodic table• To learn about different theories of acidity and basicity, understand acid base reactions and properties of solvents• To know the basic concepts of redox reactions <p><u>Organic Chemistry-1</u></p> <ul style="list-style-type: none">• To know about basic concepts of organic chemistry, structure of organic molecules, electron displacement in covalent molecule and reactive intermediates• To understand the basic concepts of stereochemistry• To gain knowledge about nucleophilic substitution and elimination reaction• To get knowledge about preparation and chemical reactions of aliphatic hydrocarbons-alkane, alkene and alkyne <p><u>Practical</u></p> <ul style="list-style-type: none">• Students learn experimentally to quantitatively estimate different metal ions (eg. Fe²⁺, Cu²⁺), acid and base by permanganometry, dichromatometry and iodometry.• Students learn experimentally to detect the special element and functional group in an organic molecule.

<p style="text-align: center;">II</p> <p>Semester</p>	<p style="text-align: center;">CHEMGT-2 & CHEMGP-2</p> <p style="text-align: center;">Paper</p>	<p style="text-align: center;"><u>Physical Chemistry-1</u></p> <ul style="list-style-type: none"> • To understand the basic concept of kinetic theory of gases and differential behavior of ideal and real gases • To learn about surface tension and viscosity of liquid as well as dependence of these properties on different parameters • To gain knowledge about crystal structure of solid (eg. NaCl, KCl), laws of crystallography, Miller indices, Bragg's law and defects in crystal structure • To understand rate laws, rate equations of different types of reactions, determine rate constant values, order of reactions, effect of temperature and other factors on reaction rate. <p style="text-align: center;"><u>Inorganic Chemistry-II</u></p> <ul style="list-style-type: none"> • To acquire detail knowledge about the characteristics of ionic bond, lattice energy calculation, polarization of ionic bond, valance bond approach and Molecular orbital approach to understand covalent bonding, predicting shapes of covalent molecules and concept of resonance. • To get detail knowledge about the electronic configuration, common oxidation states, and important compounds of p block elements of the periodic table. <p style="text-align: center;"><u>Practical</u></p> <ul style="list-style-type: none"> • Students learn to measure surface tension and viscosity of liquid and to study experimentally the reaction kinetics of different chemical reactions. • Students learn to detect different acid radicals and basic radicals from inorganic salt mixture by semi-micro analysis. <p>Course Outcome</p>
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III	CHEMGT-3 & CHEMGP-3	<p><u>Physical Chemistry-II</u></p> <ul style="list-style-type: none"> To gain knowledge about the concept of heat , work, internal energy, enthalpy. To know about the 1st and 2nd law of thermodynamics To learn about the criteria for spontaneity of a reaction and its equilibrium and Le Chatelier's principle To know about strong and weak electrolyte, degree of ionization, buffer solution, salt hydrolysis , solubility and solubility product of a sparingly soluble salt <p><u>Organic Chemistry –II</u></p> <ul style="list-style-type: none"> To know about the preparation and chemical reactions of aromatic hydrocarbon benzene To learn about preparation and synthetic utility of Grignard Reagents To know about the preparation of aryl halide by Sandmeyer reaction and nucleophilic aromatic substitution of aryl halide To get knowledge about the preparation and important chemical reactions of primary, secondary and tertiary alcohols; diols, phenol and ether. To acquire knowledge about the preparation of carbonyl compounds (aldehyde and ketones) . To get knowledge about the nucleophilic addition reactions, condensation reactions and different reduction reactions of carbonyl compounds. <p><u>Practical</u></p> <ul style="list-style-type: none"> To learn experimentally to measure enthalpy change in neutralization and ionization reaction by calorimetric method; To prepare buffer solution of known pH and finding the pH of unknown buffer solution by colour matching method; To study solubility of benzoic acid in water To learn experimentally to detect some solid and liquid organic compounds by performing specific chemical tests.
IV	CHEMGT-4 & CHEMGP-4	<p><u>Physical Chemistry-III</u></p> <ul style="list-style-type: none"> To know about ideal solution, non ideal solution, Azeotropes, Nerst distribution law, principles of solvent extraction and steam distillation, miscibility of liquids To get knowledge about components and degrees of freedom of a system, phase rule, Clausius Clapeyron equation and phase diagram of one –component and two component system. To learn about conductance of electrolytes, variation of conductance with different parameters, Kohlrausch's law of ion migration, conductometric titration. To know about transport number. To acquire knowledge about laws of electrolysis, cell reaction, electromotive force of cell, standard electrode, electrochemical series, and thermodynamics of a reversible cell. To get idea about concentration cell, liquid junction potential
Semester	Paper	Course Outcome

IV	CHEMGT-4 & CHEMGP-4	<p><u>Inorganic Chemistry-III</u></p> <ul style="list-style-type: none"> • To study about the general group trends, electronic configuration, oxidation numbers, colour, magnetic properties and stability of complexes of Manganese, iron, copper, lanthanoids and actinoids. • To know about coordination chemistry with emphasis on valence bond theory, inner and outer orbital complexes, structure and stereoisomerism of complexes with coordination number 4 and 6. • To acquire knowledge crystal field theory. Students learn about weak and strong field, splitting of d orbital in octahedral and tetrahedral complex, crystal field stabilization energy, spectrochemical series and Jahn-Teller distortion. <p><u>Practical</u></p> <ul style="list-style-type: none"> • To learn to perform conductometric and potentiometric titration; to study distribution law experimentally. • To learn experimentally to estimate metal ions by complexometric titration and to learn experimentally to prepare transition metal ion complexes.
V	CHEMGT DSE-1 & CHEMGP DSE-1	<p><u>Analytical and Environmental Chemistry</u></p> <ul style="list-style-type: none"> • To know the basic concepts of gravimetric analysis; To learn fundamental concepts of redox, acid base and complexometric titration with examples; To learn about the different chromatographic techniques including TLC, column chromatography. • To know about major air and water pollutants, their effect on animal/ plant life, air/water quality standards, reason of air/ water pollution, pollution control measures. To know about soil pollution, waste disposal and soil pollution control measures. <p><u>Analytical Industrial Chemistry</u></p> <ul style="list-style-type: none"> • To study about the principle of evaluation of analytical data, errors, accuracy and precision. To get idea about application of computer in analysis. To know about computer languages and programming. • To get basic idea about different types of fuels, their origin, composition, octane number and refining process; To learn about manufacture of different fertilizers including biofertilizer; To get knowledge about manufacture of glass, ceramics and portland cement. <p><u>Practical</u></p> <ul style="list-style-type: none"> • To learn to determine hardness of water, pH of a solution, rate constant of a chemical reaction and solubility of a sparingly soluble salt. • To learn experimentally to estimate the components of a alkali mixture and a acid mixture by acid base titration

Semester	Paper	Course outcome
VI	CHEMGT DSE-2 & CHEMGP DSE-2	<p><u>Advanced Organic Chemistry</u></p> <ul style="list-style-type: none"> To acquire knowledge about the preparation and reactions of aliphatic and aromatic carboxylic acids including hydrolysis of ester; To know about the synthesis and reactions of carboxylic acid derivatives, their interconversion and nucleophilicity of acyl derivative To know about the basicity of amines; preparation and reactions of aliphatic and aromatic amines, nitro compounds and diazonium salts. To learn about the preparation and general properties of amino acids; To get knowledge about classification, general properties, cyclic structure, and mutarotation of carbohydrates. <p><u>Industrial Chemistry</u></p> <ul style="list-style-type: none"> To know the basic concepts, structure, physical properties and manufacture and use of different types of polymeric material. To learn about primary constituents and formulation of different types of paints To get idea about Constituents and formulation of varnishes. To learn synthesis of different dyes To study the use and synthesis of different pharmaceutical molecules. To acquire knowledge about fermentative production of commercially important compound (eg citric acid, ethyl alcohol), vitamin and pharmaceutical Basic concepts about oil, fats, fatty acids, glycerides; production of edible fat. To know about the production of different types of soaps, detergents and enzyme-based detergents To get knowledge about production, application, and residual toxicity of common pesticides. To get knowledge about use and abuse of different food additives eg food colorant, flavoring agent, sweeteners etc. <p><u>Practical</u></p> <ul style="list-style-type: none"> To learn experimentally to synthesize and to purify organic compounds by performing different reactions e.g. nitration, condensation, hydrolysis. To learn to estimate chemical substances in commercially important products. e.g, chlorine in bleaching powder and acetic acid in vinegar