

DEPARTMENT OF CHEMISTRY

Goalpara College

Course outcomes: B.Sc. in Chemistry

Chemistry Honours (CBCS):

https://goalparacollege.ac.in/upload/dept_syllabus/1644055735.pdf

Chemistry (Regular) CBCS:

https://goalparacollege.ac.in/upload/dept_syllabus/1644055784.pdf

Chemistry Major & General (Non-CBCS):

https://goalparacollege.ac.in/upload/dept_syllabus/1646722822.pdf

The expected outcomes of the courses provided by the Department of Chemistry, Goalpara College, are listed below:

1. The course will definitely improve the skill of the students. The students will learn different techniques and standard operating procedures.
2. It will enhance the quality of the learning and teaching processes to inspire original thinking through concrete exposure to experimental work and participation in different innovative courses in other institutes. Consequently, it will encourage networking and bonding with neighbouring institutions.
3. Students will be familiarized with modern techniques, processes and terminologies of decent equipments and software in chemistry.
4. The course will certainly strengthen the academic and physical infrastructure with advanced learning techniques.
5. The course will create an awareness of the impact of chemistry on the environment, society, and development outside the scientific community with specialized training programmes which can illustrate versatile applications of Chemistry with significant implications on the students and the faculties,.
6. The course will definitely increase the potential of core instrumentation resources by procuring new equipment and obviously will upgrade the existing facilities.
7. The course will help to generate the green route for chemical reaction for sustainable development which will offer a direct application of Chemistry towards society, and environment.

8. The course will help to learn how to demonstrate, solve and understand the major concepts in all disciplines of chemistry.
9. The course will assist to inculcate the scientific temperament in the students and outside the scientific community.
10. On completion of the course, students should be able to solve the problem and also think methodically, independently and can draw a logical conclusion.

Course Outcomes

B.Sc. 1st Semester (Honours)

Course: Inorganic Chemistry-I

Course Code: CHE-HC-1016

SL No.	Course Outcome	Bloom's level
1	Clear understanding of the concepts related to atomic and molecular structure, and basic quantum chemistry treatment.	Understand
2	Clear understanding of the concepts related to atomic and molecular structure, and basic quantum chemistry treatment.	Understand
3	Comprehensible idea about periodic classification of elements in the periodic table and changes in properties along the periods and groups.	Remember Understand
4	Basic idea on chemical bonding including ionic bond, covalent bond, metallic bond, weak chemical forces and redox behavior of chemical species.	Understand
5	Laboratory skills of basic quantitative analytical techniques related to volumetric titrations through acid-base and redox reactions.	Apply Analyse

Course: Physical Chemistry-I

Course Code: CHE-HC-1026

SL No.	Course Outcome	Bloom's level
1	The kinetic theory of gases, ideal gas and real gases. In this chapter they will learn the most important physical chemistry equation "the equation of state". They will learn to construct a model of the departures of real gases from perfect gases and learn to construct, interpret and use of van der Waals equation of state.	Understand
2	In liquid state unit, the students are expected to learn the qualitative treatment of the structure of liquid along with the physical properties of liquid, viz. vapour pressure, surface tension and viscosity.	Understand
3	In the molecular and crystal symmetry unit, they will be introduced to the elementary idea of symmetry which will be	Understand Apply

	useful to understand solid state chemistry and group theory in some higher courses. In solid state unit the students will earn the basic solid-state chemistry application of X-ray crystallography for the determination of some very simple crystal structures.	
4	The students will also learn another important topic, i.e. ionic equilibrium. In this chapter, they will earn about ionic equilibria involving dissociation of weak acids and weak bases in aqueous solutions, dissociation of sparingly soluble salts in aqueous solutions, dissociation of water, p^H -scale and also about the importance of buffer solution.	Understand
5	In the lab, on successful completion of this course, students will be able to measure the surface tension and viscosity of a given solution using certain method specified in the course and to study the variation of the both property of the solution with concentration of the solute. They will also learn the indexing of a given power diffraction pattern of a cubic crystalline system, about buffer solution, preparation of buffer solution, p^H metric and to measure the dissociation constant of a weak acid.	Apply Analyse

B.Sc. 1st Semester (Generic/Regular Chemistry)

Course: Chemistry-1

Course Code: CHE-RC/HG-1016

SL No.	Course Outcome	Bloom's level
1	The students will learn the atomic structure through basic concept of quantum mechanics. They will understand the chemical bonding through VB and MO approaches.	Understand
2	In organic part, the students are expected to learn basic ideas used in organic chemistry, stereochemistry, functional groups, alkanes, alkenes and alkynes.	Understand
3	In the laboratory, students will have hands on experience on volumetric analysis of some inorganic salts and metal ions. In organic chemistry part, students will learn to detect extra element present in the given organic sample through systematic analysis. They will also learn to carry out chromatographic separation of a given organic mixture.	Apply Analyse

Course Outcomes**B.Sc. 2nd Semester (Honours)****Course: Organic Chemistry I****Course Code: CHE-HC-2016**

SL No.	Course Outcome	Bloom's level
1	To identify different classes of organic compounds and learn their nomenclature.	Remember
2	To identify different types of reagents and reaction intermediates.	Remember
3	To understand the shape of the molecules using hybridisation concept.	Understand
4	To explain/analyze their reactivity, mechanism based on different electronic displacement factors in addition to their stereo chemical aspects.	Understand
5	In lab course, students will have hands on experience on checking the calibration of the thermometer, purification of organic compounds by crystallisation, checking of the purity of organic compound by measuring melting point, determination of boiling point of liquid compounds, chromatographic separation of organic mixtures.	Apply Analyse

Course: Physical Chemistry II**Course Code: CHE-HC-2026**

SL No.	Course Outcome	Bloom's level
1	In this course the students are expected to learn laws of thermodynamics, thermochemistry, thermodynamic functions, relations between thermodynamic properties, Gibbs Helmholtz equation, Maxwell relations etc.	Understand
2	The students are expected to learn partial molar quantities, chemical equilibrium, solutions and colligative properties.	Understand
3	After completion of this course, the students will be able to understand the chemical systems from thermodynamic point of view.	Understand
4	In laboratory, on successful completion of this course students will have hand on experience on determination of heat capacity of a calorimeter, enthalpy of neutralization, enthalpy of ionization, integral enthalpy, enthalpy of hydration, basicity/protocity of a polyprotic acid by the thermochemical method and study of solubility of benzoic acid in water.	Apply Analyse

B.Sc. 2nd Semester (Generic/Regular Chemistry)**Course: Chemistry-2****Course Code: CHE-RC/HG-2016**

SL No.	Course Outcome	Bloom's level
1	The students will learn periodic properties of main group elements and transition elements.	Understand
2	They will also learn the crystal field theory in coordination chemistry unit.	Understand
3	In physical chemistry part, the students are expected to learn kinetic theory of gases, ideal gases and real gases, surface tension, viscosity, basic solid-state chemistry and chemical kinetics	Understand
4	In laboratory, working through this course, students are expected to develop their skills and knowledge for semi-micro qualitative analysis of at least mixture of four ionic species and quantitative measurement of various ions in a given solution. They will also learn to measure surface tension and viscosity of a liquid, kinetics of certain reactions.	Apply Analyse

Course Outcomes**B.Sc. 3rd Semester (Honours)****Course: Inorganic Chemistry-II****Course Code: CHE-HC-3016**

SL No.	Course Outcome	Bloom's level
1	To apply theoretical principles of redox chemistry in the understanding of metallurgical processes.	Understand
2	To identify the variety of s and p-block compounds and comprehend their preparation, structure, bonding, properties and uses.	Remember
3	To explain the use of terms Hard and Soft in relation to metal ions and ligands terms of hard and soft interactions and discuss the stability of complexes.	Understand
4	To explain chemistry of noble gases and their compounds; application of VSEPR theory in explaining structure and bonding to know about Inorganic polymers and their uses.	Remember
5	Laboratory experiments in this course will boost their quantitative estimation skills and introduce the students to preparative methods in inorganic chemistry.	Apply Analyse

Course: Organic Chemistry-II**Course Code: CHE-HC-3026**

SL No.	Course Outcome	Bloom's level
1	To learn and differentiate between various organic functional groups and method of their synthesis.	Remember
2	To classify organic compounds in terms of their functional groups and reactivity.	Remember
3	To explain, analyse and design transformations between different functional groups.	Understand
4	To learn about the different reaction mechanism involves in the given functional group transformations.	Understand
5	In laboratory students will have hands on experience on test of functional groups present in a given organic sample by systematic analysis, preparation of some organic compounds using conventional method or green approach.	Apply Analyse

Course: Physical Chemistry-III**Course Code: CHE-HC-3036**

SL No.	Course Outcome	Bloom's level
1	Phase equilibrium and its application in some specific systems. They will also learn the most important thermodynamic property "chemical potential", the Clausius-Clapeyron equation phase diagram for one component system, solid-liquid equilibria involving eutectic, congruent and incongruent melting points etc.	Understand
2	They will learn rate laws of chemical transformation, experimental methods of rate law determination, steady state approximation, rate determining state approximation etc.	Understand
3	Students will be able to understand different types of surface adsorption processes and basics of catalysis including enzyme catalysis, acid base catalysis and particle size effect on catalysis.	Understand
4	To learn about the different reaction mechanism involves in the given functional group transformations.	Understand
5	In laboratory, students will be able to conduct the physical experiments of phase equilibria viz., construction of phase diagram, determination of critical solution temperature and composition of the phenol-water system, study the effect of impurities on critical solution temperature and composition of the phenol-water system, determination of distribution coefficient, study the equilibrium and kinetic of a reaction. They will also able to study a given absorption isotherm.	Apply Analyse

B.Sc. 3rd Semester (Generic/Regular Chemistry)**Course: Chemistry-3****Course Code: CHE-RC/HG-3016**

SL No.	Course Outcome	Bloom's level
1	To understand the chemical system from thermodynamic points of view.	Understand
2	They will also learn two very important topics in chemistry-chemical equilibrium and ionic equilibrium.	Understand
3	The students are expected to learn various classes of organic molecules-alkyl halides, aryl halides, alcohols, phenols, ethers, aldehydes and ketones.	Remember
4	In laboratory, students will learn the practical applications of thermochemistry and ionic equilibria. The students will be taught to handle p ^H meter. Purification of organic compounds by crystallization and organic preparation techniques will be learned.	Apply Analyse

Skill Enhancement Course (For 3rd Semester)**Course: Basic Analytical Chemistry****Course Code: CHE-SE-3034**

SL No.	Course Outcome	Bloom's level
1	Students shall be able to explain the basic principles of chemical analysis.	Apply
2	They will be able to design/implement micro scale and semimicro experiments, record, interpret and analyze soil, water, food products cosmetics etc. via different techniques such as Paper chromatography, TLC etc.	Apply

Course Outcomes**B.Sc. 4th Semester (Honours)****Course: Inorganic Chemistry-III****Course Code: CHE-HC-4016**

SL No.	Course Outcome	Bloom's level
1	Name coordination compounds according to IUPAC, explain bonding in this class of compounds, understand their various properties in terms of CFSE and predict reactivity, d-orbital splitting in complexes, chelate effect, polynuclear, labile and inert complexes.	Remember
2	Understanding the nomenclature of coordination compounds/complexes, Molecular orbital theory, d-orbital splitting in	Remember

	tetrahedral, octahedral, square planar complexes, chelate effects.	
3	To appreciate the general trends in the properties of transition elements in the periodic table and identify differences among the rows, and chemistry of first row transition elements.	Understand
4	Understanding the separation of Lanthanides and Actinides, its colour, spectra and magnetic behaviour.	Remember
5	Understanding the transition metals stability in reactions, origin of colour and magnetic properties.	Understand
6	Understanding the bioinorganic chemistry of metal ions in biological systems, Hemoglobin-storage and transfer of iron, Na/K pump, Carbonic anhydrase and Carboxypeptidase, about trace metals.	Remember
7	Toxicity of various metals and mechanism of metal-biological interactions, use of chelating agents in medicine.	Remember
8	In laboratory, through the experiments, students will be able to prepare, estimate or separate metal complexes/compounds but also will be able to design experiments independently which they should be able to apply if and when required.	Apply Analyse

Course: Organic Chemistry-III**Course Code: CHE-HC-4026**

SL No.	Course Outcome	Bloom's level
1	To identify and classify different types of N-based derivatives, alkaloids, terpenes, heterocyclic compounds and polynuclear hydrocarbons.	Remember
2	To explain their structure and reactivity.	Understand
3	To critically examine their synthesis and reaction mechanisms. About the synthetic applications of diazonium salts.	Understand
4	To identify the natural source of alkaloids and terpenes and systematic elucidation of their structure.	Remember
5	In laboratory, students are expected to learn to detect the extra elements and function groups present in a given organic sample.	Apply Analyse

Course: Physical Chemistry-IV**Course Code: CHE-HC-4036**

SL No.	Course Outcome	Bloom's level
1	Students will learn theories of conductance and electrochemistry.	Understand
2	Students will also understand some very important topics such as solubility and solubility products, ionic products of water, conductometric titrations etc.	Understand
3	The students are also expected to understand the various parts of electrochemical cells along with Faraday's Laws of electrolysis.	Understand
4	The students will also gain basic theoretical idea of electrical &	Understand

	magnetic properties of atoms and molecules.	
5	In laboratory, the student will be able to determine a cell constant, equivalent conductance, degree of dissociation and dissociation constant of a weak acid, to perform various conductometric and potentiometric acid-base titrations.	Apply Analyse

B.Sc. 4th Semester (Generic/Regular Chemistry)

Course: Chemistry-4

Course Code: CHE-RC/HG-4016

SL No.	Course Outcome	Bloom's level
1	The students learn solutions, phase rule and its application in specific cases.	Remember
2	Understanding the nomenclature of coordination compounds/ complexes, Molecular orbital theory, d-orbital splitting in tetrahedral, octahedral, square planar complexes, chelate effects.	Remember
3	They will be taught basics of conductance and electrochemistry.	Understand
4	Students will also learn some important topics of organic and biochemistry- carboxylic acids, amines, amino acids, peptides, proteins and carbohydrates.	Remember
5	Synthesis and reaction mechanisms of organic compounds containing –COOH, -NH ₂ functional groups will be studied.	Remember
6	In laboratory, the students will learn the experimentation of distribution law, phase equilibria, conductance, and potentiometry.	Apply Analyse
7	They will also learn systematic qualitative analysis of Organic Compounds possessing monofunctional groups (-COOH, phenolic, aldehydic, ketonic, amide, nitro, amines) and preparation of derivatives.	Apply Analyse
8	They will acquire knowledge regarding some important experiments like separation of amino acids by paper chromatography, determination of the saponification value of an oil/fat, extraction of DNA from onion/ cauliflower, etc.	Apply

Skill Enhancement Course (For 4th Semester)

Course: Green Methods in Chemistry

Course Code: CHE-SE-4024

SL No.	Course Outcome	Bloom's level
1	Understand importance of green methods in chemistry.	Understand
2	They will be able describe and evaluate chemical products and processes from environmental perspective, define and propose	Apply

	sustainable solutions and critically assess the methods for waste reduction and recycling.	
3	They will be able to use tools of Green chemistry, and will be made familiar with twelve principles of Green Chemistry.	Apply

Course Outcomes

B.Sc. 5th Semester (Honours)

Course: Organic Chemistry-IV

Course Code: CHE-HC-5016

SL No.	Course Outcome	Bloom's level
1	Students will be able to explain/describe the important features of nucleic acids, amino acids and enzymes and develop their ability to examine their properties and applications.	Remember
2	Students will have concept of Energy in Biosystems.	Remember
3	Students will become familiar with Pharmaceutical Compounds: Structure and Importance.	Remember
4	In laboratory, students will learn to analyses sensitive bio compounds.	Apply

Course: Physical Chemistry-V

Course Code: CHE-HC-5026

SL No.	Course Outcome	Bloom's level
1	The students are expected to understand the application of quantum mechanics in some simple chemical systems such as hydrogen atom or hydrogen like ions.	Understand
2	The students will also learn chemical bonding in some simple molecular systems.	Understand
3	Students will also be able to understand the basics of various kinds of spectroscopic techniques and photochemistry.	Understand Apply
4	In laboratory, they will learn to handle UV-vis spectroscopic and Colourimetry tool.	Apply Analyse

Discipline Specific Elective (DSE) [For 5th Semester]**Course: Analytical Methods in Chemistry****Course Code: CHE-HE-5026**

SL No.	Course Outcome	Bloom's level
1	Students will have theoretical understanding about choice of various analytical techniques used for qualitative and quantitative characterization of samples.	Understand
2	Students will have theoretical understanding of Optical methods of analysis such as UV-Visible Spectrometry, Infrared Spectroscopy, Flame Atomic Absorption and Emission Spectrometry etc.	Understand Apply
3	Students will also have idea of electroanalytical method, different Separation techniques, thermal methods of analysis, etc.	Understand Apply
4	At the same time through the experiments, students will gain hands on experience of the discussed techniques. This will enable students to take judicious decisions while analyzing different samples.	Apply Analyse

Course: Instrumental Methods of Chemical Analysis**Course code: CHE-HE-5066**

SL No.	Course Outcome	Bloom's level
1	Students shall be able to explain the theoretical basis of different analytical techniques, such as Molecular spectroscopy, separation techniques, elemental analysis etc.	Understand Apply
2	Students will also be able to identify the experimental requirements and compare/analyze the data/results thereof.	Understand Apply Analyse

Course Outcomes**B.Sc. 6th Semester (Honours)****Course: Inorganic Chemistry-IV****Course Code: CHE-HC-6016**

SL No.	Course Outcome	Bloom's level
1	The students will be expected to learn about how ligand substitution and redox reactions take place in coordination complexes.	Understand
2	Students will also learn about organometallic compounds, comprehend their bonding, stability, reactivity and uses.	Remember
3	They will be familiar with the variety of catalysts based on	Remember

	transition metals and their application in industry.	
4	On successful completion, students in general will be able to appreciate the use of concepts like solubility product, common ion effect, pH etc. in analysis of ions and how a clever design of reactions, it is possible to identify the components in a mixture.	Remember Understand
5	With the experiments related to coordination compound synthesis, calculation of 10Dq, controlling factors etc. will make the students appreciate the concepts of theory in experiments.	Understand Apply

Course: Organic Chemistry-V**Course Code: CHE-HC-6026**

SL No.	Course Outcome	Bloom's level
1	Students will be able to explain/describe basic principles of different spectroscopic techniques such as UV Spectroscopy, IR Spectroscopy, NMR Spectroscopy and Electron Spin Resonance (ESR) spectroscopy.	Understand Apply
2	Students will also know the importance of those techniques in chemical/organic analysis.	Understand Apply
3	Students shall be able to classify/identify/critically examine carbohydrates, polymers and dye materials.	Understand Apply

Discipline Specific Elective (DSE) [For 6th Semester]**Course: Green Chemistry****Course code: CHE-HE-6016**

SL No.	Course Outcome	Bloom's level
1	Apart from introducing learners to the principles of green chemistry, this course will make them conversant with applications of green chemistry to organic synthesis.	Understand Apply
2	Students will also be prepared for taking up entry level jobs in the chemical industry. They also will have the option of studying further in the area.	Understand Apply

Course: Research Methodology for Chemistry**Course Code: CHE-HE-6046**

SL No.	Course Outcome	Bloom's level
1	Students will be given training on scientific literature review.	Understand Apply
2	Students will be able to write scientific research paper.	Understand

		Apply
3	Students should be able to construct a rational research proposal to generate fruitful output in terms of publications and patents in the field of chemical sciences.	Understand Apply

Course Outcome of Non-CBCS Course

(Current semesters in practice)

Course Outcomes

B.Sc. 5th Semester (Honours)

Course: Quantum Chemistry

Course Code: PAPER M 501

SL No.	Course Outcome	Bloom's level
1	To account for the basic principles and concepts of quantum mechanics, solve the Schrödinger equation for model systems of relevance within chemistry and physics.	Understand
2	To describe many-electron atoms with the independent particle model, describe the structure of the periodic system and the connections between the properties of the elements and their electron configurations.	Understand
3	To describe the chemical bonding quantum mechanically with molecular orbital theory, describe the bases behind interaction between light and matter.	Understand

Course: Physical Chemistry

Course Code: PAPER M 502

SL No.	Course Outcome	Bloom's level
1	In the reaction dynamics chapter, they will learn details of what happens to molecules at the climax of reaction encounter, collision theory, transition state theory and their application to derive rate laws.	Understand
2	In the photochemistry chapter they will learn the various mechanisms involved in photochemical reactions along with the concept of fluorescence, phosphorescence and consequences of light absorption with the help of Jablonski diagram.	Understand
3	In the Phase equilibrium they will learn Phase equilibrium and its application in some specific systems. They will also learn the most important thermodynamic property "chemical potential", the	Understand

	Clausius-Clapeyron equation phase diagram for one component system, solid-liquid equilibria involving eutectic, congruent and incongruent melting points etc.	
4	In the surface chemistry they will learn various adsorption processes, adsorption isotherms, determination of surface area and catalytic activity at the surface.	Remember

Course: Organic Chemistry**Course Code: PAPER M 503**

SL No.	Course Outcome	Bloom's level
1	To change the connectivity of an existing organic backbone by using reactions that result in skeletal rearrangements.	Understand
2	To identify different types of oxidising and reducing agents as well as the properties of the reagents.	Remember
3	To make use of those different reagents in organic synthesis and they can do it in different pathways.	Understand
4	To identify different pericyclic reactions and to predict the condition for allowance of pericyclic reactions.	Understand
5	To draw the MOs for polyenes, identify the FMO's (HOMO & LUMO) participating in the pericyclic reaction & explain the importance of MO's in pericyclic reactions.	Understand
6	To predict the products & the stereochemistry of the product of the Pericyclic reactions.	Understand
7	To explain the structure, bonding and physical and chemical properties of polynuclear aromatic hydrocarbons and heterocyclic compounds.	Remember
8	To critically examine their synthesis and reaction mechanisms.	Remember
9	To learn the synthetic method, physical properties and reactivity of organic nitro and amino compounds, organo S and organo P compounds.	Remember
10	To recognize the active methylene compounds, to learn the method of their synthesis and applications in organic synthesis.	Understand

Course: Inorganic Chemistry**Course Code: PAPER M 504**

SL No.	Course Outcome	Bloom's level
1	The symmetry elements and operations, point group classification, Symmetry of octahedron, tetrahedron and square planar complexes.	Understand Apply
2	Structure and symmetry of inorganic compounds, shape and symmetry of s, p and d-orbitals.	Understand
3	The concepts of metal ligand bonding in transition complex compounds, the thermodynamics and kinetic aspects of metal	Understand

	complexes.	
4	To identify the basic concept, terms and importance and the chemistry of organometallic compounds, homogeneous hydrogenation and carbonyls, the 18-electron rule and its violation.	Understand
5	To learn about the common organometallic reactions and to be able to draw reasonable reaction mechanisms.	Remember
6	Be able to use knowledge about structure and bonding issues to understand the stability and reactivity of simple organometallic complexes.	Understand
7	To understand the importance of Na/K salts and calcium in biology.	Remember
8	To understand the bioinorganic chemistry of haemoglobin, myoglobin, etc.	Remember
9	To recognize role of porphyrins ring in haemoglobin.	Remember

Course name: Practical

Course Code: PAPER M 505

SL No.	Course Outcome	Bloom's level
1	Students are expected to learn the utilization of quantitative estimation of inorganic ions by volumetry, complexometry, gravimetry, colorimetry, redox and precipitation methods in laboratory.	Apply Analyse
2	They are also expected to learn the chromatographic method of separation of cations by paper/TLC.	Apply Analyse

Course: Practical

Course Code: PAPER M 506

SL No.	Course Outcome	Bloom's level
1	In this course, students are expected to learn to prepare organic compounds and the quantitative organic analysis.	Apply Analyse

B.Sc. 5th Semester (General Chemistry)

Course Code: PAPER E 501

SL No.	Course Outcome	Bloom's level
1	The student should be able to account for the Bonding in solid: Band theory.	Understand
2	Electronic properties of solids relating electrical conductivity, conductors, insulators semiconductors, Intrinsic and extrinsic semiconductors.	Understand

3	Ferroelectric and Piezoelectric material and preparation of electronic grade pure silicon.	Understand
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Course: Practical**Course Code: PAPER E 502**

SL No.	Course Outcome	Bloom's level
1	In this course, students are expected to learn to prepare different compounds and their quantitative analysis.	Apply Analyse

Course Outcomes**B.Sc. 6th Semester (Honours)****Course: Spectroscopy****Course Code: PAPER M 601**

SL No.	Course Outcome	Bloom's level
1	Learn the most common spectroscopic methods and their possibilities and limitations for studies of molecules in the IR and UV/Vis, MW, IR and UV-Vis regions.	Understand Apply
2	Calculate different molecular parameters for simple molecules from their NMR, IR, Raman and UV-Vis spectra.	Understand Apply
3	Account for how spectroscopic methods can be used to determine molecular structures, with focus on the identification of characteristic groups in polyatomic molecules on the basis of their IR and UV-Vis spectra.	Understand Apply
4	Account for different types of electronic transitions and de-excitation process and interpret absorption and fluorescence spectra.	Understand Apply
5	Use UV-Vis absorption and emission spectrometers and be able to account for their function.	Understand Apply

Course: Physical Chemistry**Course Code: PAPER M 602**

SL No.	Course Outcome	Bloom's level
1	In this course the students will learn about solids state, macromolecules and colloids, statistical thermodynamics and data analysis.	Understand

Course: Organic Chemistry**Course: PAPER M 603**

SL No.	Course Outcome	Bloom's level
1	Have deep understanding on the theory and principle involved in the photochemical and photo physical processes.	Remember
2	Have understanding on the differences between photoreaction and thermal reaction, characteristics of photochemistry, application of photochemical reactions, fundamental laws of photochemistry, efficiency in photochemical reactions, significance of Jabolonski diagram.	Understand
3	Have clear understanding of fibre and polymer, the classification of polymers based on the mechanism of polymerization reaction, based on properties of the polymer and based on the source, their preparation, properties and applications.	Remember
4	Have a specialized knowledge on the structure of biopolymers have and their importance.	Remember
5	Have understanding on the structures and purposes of basic components of prokaryotic and eukaryotic cells.	Remember
6	Have good knowledge on concentration gradient, ion transport across the cell membrane.	Understand
7	Have clear understanding on the catalytic role of enzymes, importance of metalloenzyme, coenzymes and vitamins.	Remember Understand
8	Able to draw the structure of carbohydrates, lipids, proteins, amino acids, haemoglobin and myoglobin and have knowledge on their functions in biological systems.	Remember
9	Have learned the structure of nucleotides, nucleocides, DNA, RNA and the hydrogen bondings of purines and pyrimidines bases in their structure.	Remember
10	Have clear understanding on the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins. Able to recognize and categorise the classes of natural product.	Understand
11	Have good knowledge on the extraction, separation, isolation and structure elucidation of the natural products. Students must also have understanding on the importance of those natural products.	Remember
12	Have learnt to draw the structure of the carbohydrates, to predict the configuration carbohydrate molecules and knowledge on the methods of their synthesis.	Remember
13	Have deep good understanding of the chemistry of drugs with respect to their pharmacological activity, the drug metabolic pathways, adverse effect and therapeutic value of drugs, knowledge of the Structural Activity Relationship (SAR) of different class of drugs and the chemical synthesis of some drugs, the classification of chiral drugs, asymmetric drug synthesis and the importance of asymmetric synthesis.	Remember
14	Have understanding on the fundamentals of biological energy production that is how cells harvest chemical energy by oxidizing glucose to pyruvate and how the products of photosynthesis	Understand

	function as the inputs of cell respiration.	
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Course: Inorganic Chemistry**Course Code: PAPER M 604**

SL No.	Course Outcome	Bloom's level
1	To understand free ion terms and their splitting, Orgel diagram, selection rule, vibronic coupling and colour of complexes.	Understand Apply
2	To understand the electronic spectra of metal complexions.	Understand Apply
3	To understand the thermodynamics and kinetic aspects of metal complexes, formation constants, kinetic lability and inertness, Chelate effect	Understand
4	To explain the terms stepwise stability constant and overall constants.	Understand
5	To give appropriate definitions of the terms inert and labile and state which d- electron configurations are associated with inertness.	Understand
6	To know mechanism of ligand displacement reactions.	Understand
7	To determine of composition of ionic compounds by conductometry. Theory of redox and complexometric titrations. Students are able to describe role of different metal ions in biological system.	Understand Apply
8	Toxicity of metal ions, effect of gases and polluted environments	Remember
9	. Importance of metal salts in diet, diagnosis, chemotherapy and as medicines.	Remember
10	To identify and define various types of nuclear transmutation including fission, fusion reactions.	Remember
11	To understand about radioactivity radioactive emissions and decay reactions.	Understand
12	Use of proper isotopic notation to write down and balance a nuclear reaction.	Understand
13	State and compare the differences and similarities between a nuclear change and chemical change.	Remember
14	To calculate each for a given nucleus.	Apply
15	To define binding energy and mass defect and be able to calculate each for a given nucleus.	Understand
16	To understand the concept of rate of change and half-life in the context of nuclear decay.	Remember
17	To understand the basics of nuclear chemistry applications: nuclear power, medical treatment, isotopic labelling and carbon dating. Lanthanoids, Actinoids–separation, color, spectra and magnetic behavior.	Remember
18	Use of lanthanoids/actinoid compounds.	Remember
19	Understanding the separation of lanthanoids and actinoids, its	Remember

	color, spectra and magnetic behavior.	Understand
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Course: Practical**Course Code: PAPER M 605**

SL No.	Course Outcome	Bloom's level
1	In this course, students will have hands on experience on various physical chemistry experiments viz., determination of coefficient of viscosity, surface tension, mutual solubility of two liquids, molecular mass of volatile liquid, specific rotation of an optically active substance, specific rotation rate, kinetic of a reaction, distribution coefficient and test of validity of Beer-Lambert's law. They will also learn to carry out conductometric titration and potentiometric titration.	Apply Analyse

Course: Project Work**Course Code: PAPER M 606**

SL No.	Course Outcome	Bloom's level
1	Understand the objectives of doing scientific research.	Apply Analyse
2	Learn how to identify the area of research to be conducted, how to proceed for literature survey using a variety of sources and how to write research project with well laid hypothesis and objectives.	Apply Analyse
3	Learn the skills of research design, nature of sample size as well as collection and analysis of data.	Apply Analyse
4	Also know the skills of writing research report and making oral presentations.	Apply Analyse

B.Sc. 6th Semester (General Chemistry)**Course Code: PAPER E 601**

SL No.	Course Outcome	Bloom's level
1	Have in depth knowledge of basic and applied area of Industrial Chemistry. Students will learn what is polymer, their classification, mechanism of polymerisation, manufacture of certain polymers and also learn their structure, properties and applications.	Understand
2	Have in depth knowledge of basic and applied area of Industrial Chemistry. Students will learn what is polymer, their classification, mechanism of polymerisation, manufacture of certain polymers and also learn their structure, properties and applications.	Understand
	Gain knowledge on how to prepared coal by Fisher-Tropsch	Understand

	process and isolate various chemicals from coal. They will also learn how various hydrocarbons can be obtained industrially from petroleum, industrial reactions involving those hydrocarbons, the synthetic process of methanol from natural gas, synthesis of petrol, LPG, CNG and biodiesel.	
	Learn details of the production of soap and detergents industrially from oils and fats, understand the principle of cleansing action of soap and detergents, industrial applications of enzymes in the production of alcohol by fermentation of sugars.	Remember
	Recognize the different types of air and water pollutant, sources of the pollutions, the toxic effects the pollutants. Students will get aware of the permissible limits of those pollutants in both air and water and measures to control the pollutions. Appreciate the ethical context of environmental issues and the links between human and natural systems.	Remember
	Get insight of the structures and purposes of basic components of prokaryotic and eukaryotic cells, cell membrane and have good knowledge on concentration gradient, ion and molecule transport across the cell membrane, the structure and functions of amino acids and proteins.	Remember
	Have learnt to draw the structure of the carbohydrates, to predict the configuration carbohydrate molecules and knowledge on the methods of their synthesis.	Remember
	Learn the details of the structure of DNA and RNA, have clear understanding on the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.	Remember
	Have good knowledge on the catalytic role of enzymes, the hypothesis of Lock-key model of enzyme-receptor interaction, importance of metalloenzyme, coenzymes and vitamins.	Remember
	Students will conceptualize how various biomolecules are metabolized inside the body in order to produce energy for various functions and how various metabolic pathways regulate growth and development of living beings. Students will know about role of high energy compounds, how carbohydrates serve as energy source to power various functions.	Remember
	Have good knowledge on the extraction, separation, isolation and structure elucidation of the natural products terpenes and alkaloids. Students must also have understanding on the physiological action of alkaloids.	Remember
	Learn details about the structure of hormone, their functions in biological system and the role of neurotransmitter in their action.	Remember
	Have good understanding of the chemistry of drugs with respect to their pharmacological activity, learn the structure of various antibiotic, antimalarial, anticancerdrugs, their uses and metabolic pathways.	Remember

Course: Practical

Course Code: PAPER E 602

SL No.	Course Outcome	Bloom's level
1	In this course students will able to determine the hardness of water by complexometric titration, equivalent mass by titrimetrically, study the kinetics of a reaction, carry acid-base conductometric titration. In the inorganic part, they will learn to prepare double salt and complex salt.	Apply Analyse

Signature of HoD