

## Course Outcomes of Programme Offered by the Department

**Name of the Programme : M.Sc. Chemistry**

The main areas of Chemistry such as Organic, Inorganic and Physical are included in the chemistry course curriculum for the undergraduate students. The purpose of the curriculum is to provide and enhance the basic knowledge platform that supports an inventive culture. The course curriculum educates future leaders of the nation about how chemistry underlies in the nature and in all natural processes.

The experiments set for laboratory work are designed such that they both instruct and inspire the students to develop a firm foundation in the fundamentals and application of principles of chemistry. The students are taught how to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments. The course is so designed that the students understand the pivotal role of chemistry in our society and become potent enough to explore new areas of research both in chemistry and in allied fields of research and technology.

Semester	Course Code/Title	Course Outcomes
<b>SEMESTER - I</b>	<b>Paper I (Inorganic Chemistry General)</b>	<p>CO1 Describe advanced symmetry concepts of chemical molecules and its applications.</p> <p>CO2 To identify the axis, plane, center and point group, polarity, dipole moment, product of symmetry operation and character table of chemical compounds.</p> <p>CO3 Describe the bonding and stereochemistry in covalent compounds, characteristics of bonding in covalent compounds viz. Bent's rule, Walsh diagrams, <math>d\pi-p\pi</math> bonding.</p> <p>CO4 To discuss the substitution reactions of covalently bonded molecules boron, silicon and nitrogen.</p> <p>CO5 To know about the metal equilibria in solutions.</p> <p>CO6 To describe the factors affecting stability of metal ligand complexes.</p> <p>CO7 To use the various methods for the determination of stability constant.</p>

		<p>CO8 To know about the substitution reactions in square planar complexes with special reference to trans effect.</p> <p>CO9 Know about the limitations of crystal field theory and its effects in coordination complexes.</p> <p>CO10 To apply the concept of molecular orbital theory to tetrahedral square planar and octahedral complexes.</p>
	<b>Paper II (Physical Chemistry General)</b>	<p>CO1 Recapitulation of thermodynamic laws, concept of fugacity and its determination.</p> <p>CO2 Concept of activity and its determination using emf measurement, vapour pressure method and some other methods.</p> <p>CO3 To know about Partial molar quantities, chemical potential and Gibbs-Duhem equation and its variation with temperature and pressure.</p> <p>CO4 To explain thermodynamic functions of mixing (free energy, entropy, volume and enthalpy), concept of escaping tendency and chemical potential.</p> <p>CO5 To describe the concept of potential energy surfaces.</p> <p>CO6 To explain Collision theory of reaction rates, steric requirement, Arrhenius equation and activated complex theory (ACT).</p> <p>CO7 To demonstrate thermodynamic formulations of activated complex theory.</p> <p>CO8 To explain Lindemann-Christiansen and Hinshelwood mechanisms of unimolecular reactions.</p> <p>CO9 To discuss Debye-Hückel theory of ion-ion interaction and activity coefficient, its applicability, limitations and its modification for finite-sized ions, effect of</p>

		<p>ion-solvent interaction on activity coefficient.</p> <p>CO10 Able to derive D-H-O equation - its applicability and limitations, Pair-wise association of ions (Bjerrum treatment) and its modifications for ion-pair formation.</p> <p>CO11 To know the Concept of electrical double layer and its structure.</p> <p>CO12 To know about Helmholtz-Perrin, Gouy-Chapman, and Stern models, electrokinetic phenomena and the determination of zeta potential.</p> <p>CO13 To discuss the Langmuir adsorption isotherm and its kinetic derivation for non-dissociative and dissociative adsorption.</p> <p>CO14 To know about surface catalyzed unimolecular and bimolecular reactions, temporary and permanent catalytic poisons.</p> <p>CO15 To carry out a comparison between homogeneous and heterogeneous reaction rates.</p>
I	<b>Paper III (Organic Chemistry General)</b>	<p>CO1 Describe reaction intermediates, energy profile diagrams and establish mechanism of organic reaction simultaneously understand effect of structure on reactivity and application of Hammett /Taft equations, Curtin-Hammett principles, Hammond postulates in theoretical treatment of organic reactions.</p> <p>CO2 Understand mechanistic details of different types of and factors affecting aliphatic nucleophilic substitution reactions and the terminology involved therein.</p> <p>CO3 Know mechanistic details of different types of elimination reactions, Saytzeff and Hoffman rules and application of these</p>

		<p>in prediction of product formation in various elimination reactions.</p> <p>CO4 Master stereo-chemical terms, inter-convert stereo-structural formulae of organic molecules, analyze configurations, create stereo-structures and correlate configuration by applying the concept of chemical correlation.</p> <p>CO5 Realize the concepts of prochirality, topicity related terms, asymmetric synthesis, its main categories vis-à-vis application of Cram's, Prelog and Horeaus rule.</p> <p>CO6 Describe stability of different configurations and conformations of acyclic and cyclic organic compounds, sugars, decalins.</p>
	<p><b>Paper IVA (Chemistry of Life Science)</b></p>	<p>CO1 To describe the prokaryotic and eukaryotic cell Structure, metabolic processes occurring in cell. Able to discuss the Carbohydrate metabolism-glycolysis, Kreb's cycle, glycogenolysis, glycogenesis pentose phosphate pathway and gluconeogenesis.</p> <p>CO2 To explain the Structure and functions of important derivatives of monosaccharides like glycosides, deoxy sugars, myoinositol, structural polysaccharides - cellulose and chitin. Storage polysaccharides-starch and glycogen.</p> <p>CO3 To analyze the structure and functions of fatty acids, triacylglycerols, glycerophospholipids, sphingolipids, cholesterol, bile acids. <math>\beta</math>-oxidation of fatty acid, Fluid mosaic mode of cell membrane.</p>

		<p>CO4 To know the concept of the amino acids, peptides and proteins. Able to describe the primary, secondary structure of proteins and forces responsible for holding these structures.</p> <p>CO5 To understand enzymatic and chemical cleavage of polypeptide chain, sequencing of amino acids in a polypeptide segment, Sanger method, Edman degradation method, concept of denaturation of proteins.</p> <p>CO6 To explain the Structure of nucleotides, nucleosides, DNA (Watson-Crick model) RNA and their conformation.</p> <p>CO7 Able to explain the DNA replication, translation and transcription.</p>
	<p><b>Paper IVB (Mathematics for Chemists )</b></p>	<p>CO1 To explain definitions of vectors, representation and properties of vectors.</p> <p>CO2 To perform vector mathematical operations.</p> <p>CO3 To explain scalar and vector products of vectors.</p> <p>CO4 To discuss definition and properties of matrices and determinants.</p> <p>CO5 Be able to perform matrix mathematics.</p> <p>CO6 To solve linear equations using matrices.</p> <p>CO7 To discuss need, theory and applications of logarithms.</p> <p>CO8 To execute the knowledge in solving general and chemical problems.</p> <p>CO9 Be able to represent equations graphically and perform curve fitting for least squares method.</p> <p>CO10 To perform binomial expansion.</p>

		<p>CO11 To prove and apply trigonometric identities and explain polar coordinates in trigonometric functions.</p> <p>CO12 To explain rules of differentiation and be able to find out the derivative of a function by applying various methods of differentiation.</p> <p>CO13 To perform partial differentiation.</p> <p>CO14 To discuss exact and inexact differentials and their applications to chemistry.</p> <p>CO15 To explain rules and methods of integration.</p> <p>CO16 To perform integration between limits and its application in chemistry.</p>
<b>SEMESTER-II</b>	<b>Paper V (Inorganic Chemistry)</b>	<p>CO1 To discuss the various possible arrangements of electrons in terms of term symbols.</p> <p>CO2 Able to draw the vector diagrams of orbital coupling and spin orbital coupling in p<sup>2</sup>, p<sup>3</sup>, d<sup>2</sup> configurations.</p> <p>CO3 To calculate the spectral terms for d<sup>2</sup> and d<sup>8</sup> metal ions.</p> <p>CO4 To derive the term symbol for closed subshell.</p> <p>CO5 To interpret the Orgel diagrams, Tanabe-Sugano diagrams for transition metal complexes (d<sup>1</sup>-d<sup>9</sup> states).</p> <p>CO6 To apply the spectroscopic methods for assignment of absolute configuration in optically active metal chelates and their stereochemical information.</p> <p>CO7 To know the concept of Circular Dichroism and Optical Rotatory Dispersion and its application to determine configuration of Tris-chelated complexes.</p>

		<p>CO8 To discuss the synthesis, structure characteristic and chemical properties of metal carbonyls, metal nitrosyls.</p> <p>CO9 To explain the synthesis and structural characteristics and important reactions of dinitrogen and dioxygen complexes.</p> <p>CO10 To know the various classifications of metal cluster compounds.</p> <p>CO11 To categories the metal boranes carboranes, metalloboranes and metallocarboranes and their various aspects.</p> <p>CO12 To discuss the existence, stability and formation of metal-metal multiple bonds.</p>
	<p><b>Paper VI (Physical Chemistry)</b></p>	<p>CO1 To discuss the various postulates of quantum mechanics.</p> <p>CO2 To learn about operators and their properties.</p> <p>CO3 To be able to perform operator mathematics including commutation of operators.</p> <p>CO4 To discuss Heisenberg's Uncertainty Principle.</p> <p>CO5 To understand and form Schrödinger equation for various systems.</p> <p>CO6 To be able to setup and solve Schrödinger equation for a particle in a box and for a one-dimensional box with a finite barrier and its application to quantum mechanical tunnelling.</p> <p>CO7 Able to setup and solve Schrödinger equation for linear harmonic oscillator and its solution.</p>

		<p>CO8 To know about angular momentum operators their commutation relations and Ladder operators.</p> <p>CO9 To explain the shapes of atomic orbitals upto d-level.</p> <p>CO10 To explain the basic concepts of polymers and polymerization.</p> <p>CO11 To discuss the Mechanism and Kinetics of chain growth and step growth polymerization.</p> <p>CO12 To determine the molecular mass by osmometry and viscometry methods.</p> <p>CO13 To know the basic concept of nuclear and radiochemistry.</p> <p>CO14 To discuss the structure and functioning of various detectors use in radiochemistry.</p> <p>CO15 To explain the radiotracer technique, activation analysis and its applications in various aspects.</p>
	<p><b>Paper VII (Organic Chemistry)</b></p>	<p>CO1 To know the concept of Aromatic Electrophilic Substitution and their applications.</p> <p>CO2 To understand the mechanisms of Aromatic Nucleophilic Substitution by diazonium salts, arynes.</p> <p>CO3 To understand the concept of aliphatic electrophilic substitution reaction.</p> <p>CO4 To know the Bimolecular aliphatic electrophilic substitutions mechanisms - SE<sub>2</sub>, SE<sub>1</sub> and SE<sub>i</sub>.</p> <p>CO5 To understand the neighbouring group participation, classical and non-classical carbocation.</p> <p>CO6 Role of non-bonding electrons, sigma and <math>\pi</math>-bonds.</p> <p>CO7 To understand the concept of carbocations rearrangements and migratory aptitudes.</p>



		<p>CO8 To describe the generation, structure, stability and reactivity of free radicals.</p> <p>CO9 To know the mechanisms of addition alkenes and alkynes.</p> <p>CO10 To study addition to C=O group of aldehydes, ketones and acids.</p> <p>CO11 To understand and reactivity of carbonyl compounds in various reactions.</p> <p>CO12 To learn various name reactions related to ketones and aldehydes.</p>
	<b>Paper VIII (Computer for Chemist)</b>	<p>CO10 Basic understanding about Computer Understanding the basic concept associated with C- Language and program designing.</p> <p>CO11 Students will develop different programs, Run and Retrieve results.</p>
	<b>Paper IX (Inorganic Chemistry Practical)</b>	<p>CO1 To know the concept of quantitative analysis and qualitative analysis and its application.</p> <p>CO2 To analyse the given mixture for the presence of two acidic radicals, two rare earth metal ions and one insoluble salt.</p> <p>CO3 To know the cerimetric / Iodometric titrations.</p> <p>CO4 To demonstrate the various cerimetric and iodometric titrations in laboratory.</p> <p>CO5 To separate and quantify the presence of two metal ions in a solution.</p> <p>CO6 To prepare a sample of various coordination complexes and their spectroscopic study.</p> <p>CO7 To perform experimentation and evaluate the results.</p> <p>CO8 To develop the ability to compile interpreted information in the form of lab record.</p> <p>CO9 To face viva-voce.</p>
	<b>Paper- X (Physical Chemistry Practical)</b>	<p>CO1 To know the concept of viscosity and its determination.</p>

		<p>CO2 To determine the viscosity averaged molar mass of a polymer.</p> <p>CO3 To study the pH metric titration for the determination of normality of acids.</p> <p>CO4 To determine the partition coefficient of a solute between two immiscible solvents by using distribution law.</p> <p>CO5 To study the specific and molecular rotation of sucrose or glucose by polarimetry.</p> <p>CO6 Study the kinetics of inversion of cane-sugar (sucrose) in presence of an acid by polarimetry.</p> <p>CO7 To determine the refractive index of various organic solvents and its variation with concentration.</p> <p>CO 8 To understand and master the fundamentals of conductometric titrations in aqueous media.</p> <p>CO 9 To study and conduct experiments related to chemical kinetics for the determination of the order and rate constant of the reaction.</p> <p>CO 10 To understand and master the fundamentals of potentiometric experiments.</p> <p>CO 11 To determine extent of adsorption and verify Freundlich and Langmuir adsorption isotherms.</p> <p>CO12 To perform experimentation and evaluate the results.</p> <p>CO13 To develop the ability to compile interpreted information in the form of lab record.</p> <p>CO14 To face viva-voce.</p>
	<p><b>Paper- XI, Organic Chemistry Practical</b></p>	<p>CO1 To introduce and demonstrate the basic principle and techniques of separation of binary organic mixture.</p>

		<p>CO2 To analyse qualitatively the presence of extra elements and functional groups in the binary organic mixture along with understanding of chemical reaction involved.</p> <p>CO3 To make them able to differentiate between aromatic/aliphatic, saturated/unsaturated, hydrocarbon/heterocycles.</p> <p>CO4 To understand and develop the capabilities of preparing derivatives of different organic compounds bearing various organic functionalities.</p> <p>CO5 To understand significance of melting point, mixed melting point, boiling point in identification of organic compounds.</p> <p>CO6 To develop the skill of performing experiments and analysing data to evaluate results.</p> <p>CO7 To develop the ability to compile interpreted information in the form of lab record.</p> <p>CO8 To make them mentally and academically sound to face viva-voce.</p> <p>CO9 To perform the experimentation and evaluate the results.</p> <p>CO10 To develop the ability to compile interpreted information in the form of lab record.</p> <p>CO11 To face viva-voce after completion of course.</p>
<b>Semester III</b>	<b>Paper- XII (Inorganic Chemistry General)</b>	<p>CO1 To introduce various basic concepts of bioinorganic chemistry to the students.</p>

		<p>CO2 To discuss the various dioxygen carriers proteins present in various organisms.</p> <p>CO3 To explain the electron transfer processes in living organisms with reference to iron sulphur proteins and cytochromes. To know the fundamentals of polarography and its applications.</p> <p>CO4 To discuss the various theories applicable in polarography.</p> <p>CO5 To apply the symmetry and group theory in elucidation of structural features with the help of vibrational spectra.</p> <p>CO6 To study the resonance Raman spectroscopy for the study of active sites of metalloproteins.</p> <p>CO7 To discuss the basic principles, spectral parameters and display in Mossbauer spectroscopy to explain the oxidation states, coordination number and nature of metal ligand bond.</p> <p>CO8 To apply the Mossbauer technique for the determination of structure and bonding in iron and tin complexes.</p> <p>CO9 To know the basic principle of Photoelectron spectroscopy and study of simple molecules.</p> <p>CO10 To study the chemical information from ESCA.</p>
	<b>Paper- XIII (Physical Chemistry General)</b>	<p>CO1 To know the basic concept of microwave spectroscopy and able to interpret the rotational spectra of rigid diatomic and polyatomic linear molecules and symmetric top molecules.</p> <p>CO2 To discuss the raman and infrared spectroscopy and its application in physical chemistry.</p> <p>CO3 To explain the NMR spectroscopy and its significance in chemistry.</p> <p>CO4 Know about NQR and ESR spectroscopy and their applications in chemistry.</p> <p>CO5 To identify symmetry elements in crystals and know the classification of crystals</p>

		<p>under various point groups and space groups.</p> <p>CO6 To understand the basic concept of reciprocal lattice related to X-ray crystallography and interpretation of powder X-ray diffraction patterns.</p> <p>CO7 To determine interplanar spacing for different crystal systems and structure factors for different types of lattices.</p> <p>CO8 To know about phase problem in crystallography and methods for phase determination.</p> <p>CO9 To know about various crystal structure refinement procedures.</p>
	<b>Paper- XIV (Organic Chemistry General)</b>	<p>CO1 To know the basic concept of Ultraviolet and Visible Spectroscopy.</p> <p>CO2 To discuss the Beer-Lambert law, effect of solvent on electronic transitions.</p> <p>CO3 To apply Fieser-Woodward rules for calculating <math>\lambda_{\max}</math> for conjugated dienes and carbonyl compounds.</p> <p>CO4 To introduce mass spectrometry and difference with spectroscopy.</p> <p>CO5 To discuss the methods of fragmentation of organic compounds - EI, CI, FD and FAB, factors affecting fragmentation, ion analysis, ion abundance.</p> <p>CO6 To apply the concept of mass spectrometry for the determination of structure of organic compounds based on fragmentation.</p> <p>CO7 To explain the basic concept behind NMR spectroscopy and its application for the structure elucidation.</p>

		<p>CO8 To introduce and discuss the chemical shift and coupling constant in relation to stereochemical structure of the organic compound.</p> <p>CO9 To explain the difference between First order and second order NMR spectra and Tools used for simplification of complex NMR spectrum (instrumental and chemical).</p> <p>CO10 To know the difference between <sup>1</sup>H-NMR and <sup>13</sup>C-NMR and their applications in structure determination of organic compounds.</p> <p>CO11 To introduce the concept of 2D-NMR.</p> <p>CO12 To explain the principle of IR spectroscopy and its application in determining different functional groups present in organic compounds.</p> <p>CO13 To apply various spectroscopic techniques discussed above for solving/determining the structure of organic compounds (composite problems).</p>
	<p><b>Paper- XV (Organic Chemistry Special)</b></p>	<p>CO1 To understand the principle of Organometallic Reagents and their applications in organic synthesis.</p> <p>CO2 To know about the role of various Organometallic Reagents of Li, Mg, Cd, Zn, Cu, S, Si, B, I, Pd, Ni, Fe, Co, Rh, Cr and Ti compounds in organic synthesis along with their preparations, properties and applications of these reagents with mechanistic details.</p> <p>CO3 To understand the principle of oxidation, oxidative processes related to Hydrocarbons- alkenes, aromatic rings, activated and unactivated saturated C-H groups, alcohols, diols, aldehydes,</p>

		<p>ketones, ketals and carboxylic acids. Amines, hydrazines, and sulphides</p> <p>CO4 To learn about applications of ruthenium tetroxide and thallium (III) nitrate in oxidation of various types of compounds.</p> <p>CO5 To understand the general pathways of reduction reactions. Reduction of Hydrocarbons – alkanes, alkenes, alkynes, substituted and unsubstituted aromatic rings.</p> <p>CO6 To be able to understand the reduction of carbonyl compounds – aldehydes, ketones, acids and their derivatives, Epoxides. reduction of compounds containing nitro, nitroso, azo and oxime groups.</p>
	<b>Paper- XVI (Organic Chemistry Special)</b>	<p>CO1 Appreciate the role of Molecular Orbitals in analysing Pericyclic Reactions.</p> <p>CO2 Interpret the stereochemical course of a Pericyclic Reaction and identify the product.</p> <p>CO3 Predict the course of an organic photochemical reaction and identify the product with the type of functional group present on the molecule.</p>
<b>Semester IV</b>	<b>Paper- XVII (Organic Chemistry Special)</b>	<p>CO1 After completion of course the students will be able to apply the concepts of Disconnection approach and Green chemistry for the synthesis of different target molecules in organic chemistry.</p> <p>CO2 To have knowledge about various terms used in disconnection approach like synthons, synthetic equivalents, functional group interconversions and importance of order of events.</p>

		<p>CO3 To know about one group C-X and two group C-X disconnections, one group C-C disconnection.</p> <p>CO4 To understand the practical aspects of chemoselectivity, regioselectivity, regiospecificity, stereoselectivity and stereospecificity.</p> <p>CO5 To understand the concept of reversal of polarity and amine synthesis.</p> <p>CO6 To know the application of wittig reagents and acetylene for the synthesis of alkenes.</p> <p>CO7 To understand application of aliphatic nitro compounds in organic synthesis.</p> <p>CO8 To learn about different strategies for the synthesis of three, four, five and six membered rings.</p> <p>CO9 To explore the use of ketenes in organic synthesis.</p> <p>CO10 To explore two group C-C disconnection utilizing Diels Alder reactions, 1,3-difunctionalized compounds, unsaturated carbonyl compounds, 1,5-difunctionalized compounds, Michael addition and Robinson Annellation.</p> <p>CO11 To know the strategy about control in carbonyl condensations.</p> <p>CO12 To understand the principles of protection and deprotection approach in synthetic organic chemistry with special reference of alcoholic, amino, carbonyl and carboxylic groups.</p> <p>CO13 To apply the tools of retero-synthesis for the synthesis of natural products like Juvabione and Cortisone.</p> <p>CO14 To understand the need of green chemistry and its principles.</p>
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	<b>Paper- XVIII (Organic Chemistry Special)</b>	<p>CO 1 After completing this course, the student will know various name reactions, aspects of heterocyclic chemistry and flavonoids.</p> <p>CO 2 Get to know mechanistic details of Arndt-Eistert synthesis Beckmann, Hofmann, Curtius, Lossen, Schmidt, Favorskii, Neber, Fritsch-Butenberg-Wiechell, Baeyer-Villiger, Benzilbenzilic acid rearrangements.</p> <p>CO 3 To understand mechanistic details of Darzens synthesis, stroke enamine synthesis, Shapiro reaction; Sharpless asymmetric epoxidation, Prevost and Woodward hydroxylation.</p> <p>CO 4 To understand general aspects of isolation and degradative and synthetic aspects of structure elucidation of flavonoids.</p> <p>CO 5 To apply this knowledge for structure elucidation and synthesis of Cyanin, Quercetin, Diadzein and Chrysin.</p> <p>CO 6 To understand Biosynthetic Acetate and Shikimic acid pathway leading to production of Flavonoids and catechin.</p> <p>CO 7 To be familiar with systematic (Hantzsch-Widman) nomenclature for monocyclic and fused ring systems.</p>

		<p>CO 8 To understand the method of synthesis and the chemical reactions of three and four membered heterocyclic compounds such as oxirane, azirane, oxazirane, diaziridines, Oxetane and azetidine.</p> <p>CO 9 To understand basic character, methods of synthesis and Reactions with mechanistic details of pyrazole, imidazole, oxazole, isoxazole, thiazole, isothiazole.</p> <p>CO 10 To understand the general method of synthesis and chemical reactions of purines and pyrimidines.</p>
	<p><b>Paper- XIX (Organic Chemistry Special)</b></p>	<p>After completing this course the student will get to know about enzymes, coenzymes, terpenoids and cholesterol. The course outcomes are -</p> <p>CO1 To understand chemical and biological catalysis, nomenclature and classification, of enzymes, extraction and purification of enzymes, Fischer's lock and key and Koshland's induced fit hypothesis.</p> <p>CO2 To understand kinetics of Enzyme catalyzed reactions, Michaelis-Menten and Lineweaver-Burk plots and kinetics of reversible and irreversible inhibition.</p> <p>CO3 To be familiar with mechanisms of enzyme catalyzed reactions, Transition-state theory, orientation and steric effect, acid-base catalysis, covalent catalysis, strain or distortion. To understand mechanism of action of chymotrypsin, carboxypeptidase A and papain</p> <p>CO4 To get knowledge about Cofactors as derivatives of vitamins. knowledge of coenzymes, prosthetic groups, apoenzymes. structure and biological functions and mechanisms of reactions catalyzed by coenzyme A, thiamine</p>

		<p>pyrophosphate, pyridoxal phosphate, NAD<sup>+</sup>, NADP<sup>+</sup>, FMN, FAD, by the above cofactors. Nomenclature and biological roles of prostaglandins, synthesis PGE<sub>2</sub> and PGF<sub>2α</sub>.</p> <p>CO5 To understand definition and classification of terpenoids, isoprene and special isoprene rule, general methods of structure elucidation of terpenoids.</p> <p>CO6 To apply the acquainted knowledge for structure elucidation and synthesis of Geraniol, α-terpineol, α-pinene, camphor, farnesol and squalene, biogenetic isoprene rule and biosynthesis of terpenoids.</p> <p>CO7 To know about steroids and their classification, Isolation and nomenclature, structure elucidation, synthesis and stereochemistry of cholesterol.</p> <p>CO8 To the understand synthetic pathways of testosterone, progesterone, 5α- and 5β- cholanic acids from Cholesterol. Johnson's hydrochrysene approach for the synthesis of androsterone.</p>
	<p><b>Paper- XX (Organic Chemistry Special)</b></p>	<p>CO1 Demonstrate understanding of the basic principles of drug action, design and the terminology involved therein.</p> <p>CO2 Apply the knowledge of drug design in developing new drugs using rational approach to drug design.</p> <p>CO3 Explain synthesis, general mode of action and medicinal uses of listed classes of drugs.</p> <p>CO4 Describe synthesis, structure elucidation and medicinal uses of penicillins and cephalosporins as cell wall biosynthesis and protein synthesis inhibitors.</p>

		<p>CO5 Relate physiological action of alkaloids and their classification based on nitrogen heterocyclic ring.</p> <p>CO6 Appreciate general aspects of isolation and structure elucidation of alkaloids for application in structure elucidation, synthesis and biosynthesis of listed alkaloids.</p>
	<b>Paper-XXI (Organic Chemistry Special Practical)</b>	<p>CO1 To understand the methods of separations of binary (liquid-liquid, liquid-solid or solid-solid) organic mixtures.</p> <p>CO2 Identification of different functional groups using qualitative analysis.</p> <p>CO3 To understand significance of melting point and boiling point in structure elucidation of organic compounds.</p> <p>CO4 To prepare derivatives of different organic functionalities.</p> <p>CO5 To characterize given organic compounds by interpreting their <sup>1</sup>H NMR and FT-IR spectra.</p> <p>CO6 To perform experimentation and evaluation the results.</p> <p>CO7 To develop the ability to compile information in the form of lab records.</p> <p>CO8 To defend Viva-voce examination.</p>
	<b>Paper- XXII (Organic Chemistry Special Practical)</b>	<p>CO 1 To understand the concept of stepwise synthesis of a product and their purification.</p> <p>CO 2 To explore various combinations of reactions that can be exploited to form a product.</p> <p>CO 3 To have a knowledge of multistep reactions the possibilities.</p> <p>CO 4 Evaluate, compile and present and explain the results.</p>

		<p>CO 5 To perform experimentation and evaluate the results.</p> <p>CO 6 To develop the ability to compile interpreted information in the form of lab record.</p> <p>CO 7 To face viva-voce.</p>
	<b>Paper-XXIII (Organic Chemistry Special Practical)</b>	<p>CO 1 Understand the basics of quantitative analysis and application in analysis of functional groups in organic compounds.</p> <p>CO 2 Analyze and estimate sugars, fats, amino acids in samples.</p> <p>CO 3 Evaluate, compile and present and explain the results.</p> <p>CO 4 To face viva-voce.</p>