Programme: M.Sc

Programme Outcomes

1. Provide the students a comprehensive understanding about the fundamentals of chemistry covering all the principles and perspectives.
2. The branches of Chemistry such as Organic Chemistry, Inorganic Chemistry and Physical Chemistry expose the diversified aspects of chemistry.
3. Create awareness and sense of responsibilities towards environment and apply knowledge to solve the issues related to Environmental pollution
4. The practical exercises done in the laboratories impart the students the knowledge about various chemical reagents and reactions

M.Sc. Chemistry	After successful completion of two year degree program in chemistry a student should be able to;
M.Sc. Organic Chemistry-Programme Outcomes	1. Determine molecular structure by using UV, IR and NMR. 2. Study of medicinal chemistry for lead compound. 3. Synthesis of Natural products and drugs by using proper mechanisms. 4. Study of Asymmetric synthesis. 5. Determine the aromaticity of different compounds. 6. Solve the reaction mechanisms and assign the final product. 7. Apply various aspects of chemistry in natural products isolations. 8. Students are also imparted knowledge about separation of organic mixtures, Characterization of organic compounds by chemical tests and spectral analysis, preparation of organic compounds and purification by advanced methods.
M.Sc. Organic Chemistry-Programme Specific Outcomes	1. Know the structure and bonding in molecules/ ions and predict the Structure of molecule/ions. 2. Understand the various type of aliphatic, aromatic, nucleophilic substitution reaction. 3. Understand and apply principles of Organic Chemistry for understanding the scientific phenomenon in Reaction mechanisms. 4. Learn the familiar name reactions and their reaction mechanisms. 5. Understand good laboratory practices and safety. 6. Study of organometallic reactions. 7. Study of free radical,bycyclic compound, conjugate addition of Enolates and pericyclic reactions. 8. Study of biological mechanisms using amino acids.
Course Outcomes M. Sc Organic Chemistry Semester-I	
Courses	**Outcomes**

Semester I	Students will be able to :
Course I- Inorganic Chemistry	1. Understand the concept of Group, Symmetry elements and Symmetry operation and its application to chemical bonding. 2. Understand the chemistry of Non-Aqueous Solvents 3. Explain the different types of hydrides and their applications 4. Understand the chemistry of Organic Reagents in Inorganic chemistry 5. Explain the Supramolecular Chemistry.
Course II Organic Chemistry	1. Understand addition compounds. 2. Study of stereochemistry of six member ring. 3. Learn the stereochemistry of rings other than six members. 4. Explain optical isomerism of compounds that do not contain an asymmetric carbon atom. 5. Learn resolution of racemic modification. 6. Determine geometrical isomerism and stereochemistry of olefins. 7. Explain the effect of conformation on reactivity in acylic and cyclohexane systems. 8. Understand the principle and application of asymmetric synthesis. 9. Study of cram‟s rule, felkin-Anh rule, Cram‟s asymmetric synthesis using chiral reagent 10. Effect of structure on reactivity 11. Methods of determining reaction mechanism 12. Learn SN1, SN2 and SNi Mechanism and stereochemistry. 13. Study of non- classical carbocations and common carbocation rearrangements. 14. Understand the NGP. 15. Study Bimolecular mechanisms- SE2 and SEi. 16. Understanding free radical substitution mechanism
Course III: Physical Chemistry	1. Explain the principle , theory and applications of various spectroscopy viz. ^{1}HNMR, ESR, Mossbaur spectroscopy: 2. Explain the conceptof NMR spectra of solids (dipole-dipole Interactions) 3. Describe the hyperfine and Fine structure of ESR (electron-electron coupling / Zero – field splitting of ESR signal. 4. Discuss isomer – shift, quadrupole interaction and magnetic hyperfine interaction. 5. Represent the rate law of the elementary and chain reaction 6. Understand the theories for the determination of the rate of the reactions

	7. Explain the concept of activation energy and its effects on the rates of chemical reactions 8. Describe the kinetics of the explosive photochemical and unimolecular reactions. 9. Describe the Kinetics in solutions: diffusion controlled reactions, their rates and influence of the solvent. 10. Explain the Kinetics of polymerization reactions. 11. Explain catalytic activity at surfaces: adsorption and catalysis. 12. Explain the fast reactions; Flash photolysis and Stopped flow method
Course IV: Mathematics for Chemists & Application of Computer in Chemistry	a. Study differential calculus, vectors, normalization, orthogonality. b. Know Integral calculus, differential equations, & application to simple chemistry problems. c. Learn matrices and determinants. d. Study the FORTRAN Programming and arrays and replitive computation.
Semester II	Students will be able to
Course V Inorganic Chemistry	1. Understand and explain the chemistry of Metal-Ligand Bonding. 2. Deal with Atomic Spectra and Electronic Specta of atoms 3. Understand and deal with the analytical problems of Magnetochemistry.
Course VI Organic Chemistry	1. Understand aromatic, nucleophilic and electrophilic substitution with mechanism. 2. Study the various name reaction with mechanism. 3. Learn the use of synthetic reagent in organic synthesis. 4. Learn SNAr, SN1, Benzyne, SRN1 mechanism. 5. Learn E_1, E_2, E_1CB, E_2C mechanism, orientation and reactivity. 6. Understand the evidences, reactivity and mechanism of various elimination and substitution reactions. 7. To understand the competition between substitution and elimination reactions according to the conditions of reagents and substrate 8. Understand various Pericyclic reactions: Electro cyclic, Cycloaddition, Sigmatropic and Ene Reaction, analysis by correlation diagram, FMO approach and PMO concept.
Course VII Physical Chemistry	1. Understand the laws of thermodynamics and their applications. 2. Explain Laws of thermodynamics of chemical processes 3. Explain the microscopic picture of surfaces, fundamental basis of thermodynamics.

	4. Describe the thermodynamic criteria for the feasibility of the process in terms of entropy change, internal energy change, enthalpy and free energy (Gibb's and Helmholtz) change in daily life. 5. Explain the chemical equilibrium constant and its temperature dependence. 6. Explain the application of colligative properties in determining molecular mass 7. Describe Nernst heat theorem 8. Prepare the solution of the desired concentration and the desired volume. 9. Construct phase diagram & determine the eutectic composition and eutectic temperature: Naphthalene-biphenyl system, Naphthelene-diphenyl amine system, Biphenyl– diphenylamine system. 10. Determine the miscibility temperature of phenol–water system 11. Explain the causes and types of corrosion and its measurement.
Corse VIII (Chemistry of Life & Enviromental Chemistry)	e. Learn metabolic processes and energy transfer processes f. Understand nucleic acids, their chemical and enzymatic hydrolysis and replication of DNA, transcription, translation and genetic code. g. Study chemical and photochemical reactions in the atmosphere, air pollution and analytical methods for monitoring air pollution h. Understand the soil pollution, Water pollution and waste water treatment. i. Study analytical methods for measuring DO, BOD, COD, fluoride, , biochemical effects of As, Cd, Hg, Pb, Cr, CN and pesticides
Course IX A	
Course IX B- Organic Chemistry Practical	1. Perform the Binary mixtures – An ability to separate the mixture of organic compounds. An ability to analyse the compounds separated from the mixture by chemical analysis Ability to find out the melting and boiling points of the compounds 2. Ability to prepare organic compounds by two or three steps
Course IX C	3.
Semester III	
Course X Inorganic Chemistry	1. Understand the structure and bonding in Metal complex 2. Deal with the analytical problems of Data Analysis and analytical problems of Food and Drug Analysis

	3. Understand the basic principle of Photoelectron Spectroscopy 4. Understand the spectra and magnetic properties of Lanthanides and Actinides. Explain Nuclear binding energy stability and Radioactive techniques
Course XI Organic Chemistry	1. Understand the factors affecting UV-absorption spectra, Interpret IR spectra on basic values of IR-frequencies, NMR and Mass Spectra. 2. Study 1H NMR Spectroscopy: Chemical Shift, deshielding, correlation for protons bonded to carbon and other nuclei. 3. Study of 13C NMR spectroscopy: FT- NMR, Fourier transform technique, nuclear Overhauser effect (NOE). 4. Discuss the problem of UV, IR and NMR. 5. Learn instrumentation of mass spectrometry, fragmentation, structure determination. 6. Understand different detectors rules of fragmentations of different functional groups. 7. Study of photochemistry: Carbonyl compounds, alkenes, dienes, polyenes and aromatic compounds. 8. Students will demonstrate an advanced level of knowledge in Organic photochemistry. 9. Improve their theoretical knowledge about chemical reactions which are carried out by light.
Course XII Physical chemistry	1. Explain Maxwell Boltzman statistics. 2. Explain classical and quantum theories of heat capacities of solids and Einstein's theory of atomic crystals. 3. Explain the relationship between Maxwell-Boltzman, Bose-Einstein and Fermi Dirac statistics. 4. Describe the molecular partition function and its factorization. Evaluation of translational, rotational and vibrational partition functions, the electronic and nuclear partition functions for monatomic, diatomic and polyatomic gases. 5. Einstein theory and Debye theory of heat capacities of monatomic solids 6. State the postulates of Quantum Mechanics 7. Apply Schrodinger wave equation to particle in 1 D box and 3 D box and H atom 8. Apply and solve the Schrodinger equation for multi electron atoms, rigid rotor and harmonic oscillator. 9. Describe the Jablonski Diagram, fluorescence and phosphorescence.
Course XIII A-Inorganic Chemistry –Special Theory-I	
Corse XIII B-Organic Chemistry-Special Theory-I	1. Study types of naturally occurring sugars. 2. Able to determine the structure of carbohydrates. 3. Understand carbohydrates reactions

	4. Understand the peptide synthesis, sequence determination. 5. Knowledge of chemistry of different vitamins 6. Know about the biological importance of vitamins. 7. Study the mechanism of enzyme action and enzyme kinetics. 8. Understand the Structure and biological functions of coenzyme and Mechanisms of reactions catalyzed by the above coenzymes.
Course XIV A-	
Course XIV B-	1. Able to determination of the percentage/ number of hydroxyl groups in an organic compound 2. Ability to prepare organic compounds by multisteps synthesis. 3.
Semester-IV	
SEMESTER-IV (COURSE-XV A) (INORGANIC CHEMISTRY SPECIAL THEORY-II ADVANCED ORGANOMETALLICS)	Students will be able to : 1. Understand the chemistry of Organometallic Compounds 2. Understand the chemistry of Homogeneous Transition metal catalysis. Explain the chemistry of Metal – Metal bonding in carbonyl and halide clusters and the chemistry of Transition Metal-Carbon multiple bonded compounds
Course XVB - Special Theory-II - Synthetic Strategy	1. Study the different reagents used in organic synthesis. 2. Study of transition metal complexes in organic synthesis. 3. To enable the students to acquire proper knowledge for various oxidation and reduction methods. 4. How to use their understanding of organic mechanisms to predict the outcome of reactions 5. How to design synthesis of organic molecules. 6. Learn C=C formation reaction, multi compound reaction, ring formation reaction. 7. Study of different rearrangements reactions and disconnection approach.
Course XVIB- Special Theory-III- Natural products	1. Understand terpenoids and general methods for structure determination. 2. Study the biosynthesis and synthesis of some monoterpenoids, desquiterpenoids, diterpenoids. 3. Study the methods of structural determination of carotenoids and xanthophylls. 4. Understand the structure, synthesis and biosynthesis of alkaloids, steroids and flavanoids. 5. Isolation and synthesis of plant pigments.
Course XVIIB- Special Theory-IV- Medicinal Chemistry	1. Learn medicinal chemistry, the action and discovery. 2. Study the structure activity and drug targets. 3. Study of antimicrobial drugs, antibacterial, antifungal, antiviral, antimalerial etc

	4. Understand the concept of chiral templates and chiral drugs. 5. Understand the synthesis of various drugs. 6. Understand the mode of action of different anti-fungal, anti-bacterial and anti-viral drugs.
Course XVIIIB- Special Theory-V-Polymer Chemistry	1. Study the polymer synthesis by different techniques. 2. Explain the polymer characterization by Chemical analysis, Spectroscopic methods, Thermal Analysis, XRD and SEM. 3. Study the stereoisomerism in polymers and morphology of crystalline polymers. 4. Identify the repeat units of particular polymers and specify the isomeric structures which can exist for those repeat units. 5. Estimate the number- and weight-average molecular masses of polymer samples. given the degree of polymerisation and mass fraction of chains present. 6. Differentiate between natural and man-made polymers. 7. Explain polymerization methods and polymer reactions. 8. understand polymerization kinetics 9. Applications of polymers.
Course XIX(B) Organic Chemistry Practical –Special	1. Students will expertise the extraction of natural products. 2. Ability to prepare organic compounds by multisteps synthesis. 3. Students will be able to separate and identify the sugars present in the given mixture by paper chromatography.
	The master's specialization, Organic Chemistry, will give you in-depth knowledge about organic-chemical reactions with a focus on principles for effective synthesis strategies, stereo selectivity, catalysis, as well as organometallic chemistry.