B. Sc. CHEMISTRY

PROGRAMME OUTCOME:

The students perusing this course can have ability to:

- Demonstrate an understanding of major concepts in all disciplines of chemistry.
- Employ critical thinking and the scientific method to design, carry out, record and analyse the results of chemical experiments.
- Get an awareness of the impact of chemistry on the environment, society, and other cultures outside the scientific community.
- Explain chemical nomenclature, structure, reactivity, and functions in their specific field of chemistry.
- Design and execution of the experiments should demonstrate the understanding of good laboratory and the proper handling of chemicals
- Explain how the applications of Chemistry related to the real world

B Sc Part One—Code-004

COURSE OUTCOME-- CHEMISTRY [code-06 & 26]

Paper	Co Code	CO
Inorganic		After successfully completing this course students will be able to:
	CO 1	predict the shape and also the angles between the bonds of a molecule with the knowledge of the hybridisation used by the central atom of the molecule
	CO 2.	Understand the shapes of different orbitals.
	CO 3.	Understand different principles for filling electrons.
	CO 4 .	Understand how to draw energy diagrams, how to calculate bond order, how to calculate lattice energy through Born Haber Cycle.
	CO 5 .	Write electronic configuration of given atomic number and calculate effective nuclear charge using Slaters Rule
	CO 6 .	Tell the name of orbitals by recognizing shapes of orbitals.

	CO 7 .	Draw MO diagrams of different molecules , calculate bond order of different molecules, structures of different ionic solids.
	CO 8	Describe the periodic table as a list of elements arranged so as to demonstrate trends in their physical and chemical properties.
	CO 9.	State the principle resemblances of elements within each main group in particular alkali metals, alkaline earth metals , halogens and noble gases
Organic		After successfully completing this course students will be able to:
	CO 1	Understand the core concepts of organic chemistry i.e. resonance, hyperconjugation, inductive effect etc. and their application
	CO 2.	Study about the isomerism and types of isomerism.
	CO 3.	Understand optical isomerism, geometric isomerism and conformational isomerism.
	CO 4 .	Acquire basic knowledge of reactive intermediates and mechanism of organic reactions.
	CO 5 .	Study about nomenclature, synthesis, isomerism and physical properties of alkanes and cycloalkanes.
	CO 6 .	Recognize and draw constitutional isomers, stereoisomers, including enantiomers and diastereomers, racemic mixture and meso compounds .
	CO 7 .	Know the fundamental principles of organic chemistry and predict outcomes and derive mechanism of various types of organic reactions.
	CO 8	Understand various types of reactive intermediates and factors affecting their stability .
	CO 9	Understand the nomenclature, synthesis, isomerism and physical properties of alkanes and cycloalkanes

Physical		After successfully completing this course students will know to
	CO 1	Describe the concept of pressure from a macroscopic and microscopic perspective.
	CO 2.	Explain the quantitative relationship between T,V, n & P as described by kinetic molecular theory.
	CO 3.	Compare and contrast the chemical behaviour and physical properties of common substances.
	CO 4 .	Classify matter by its state and bonding behaviour using the periodic table as a reference.
	CO 5 .	Describe a reaction rate in terms of a change in concentration divided by a change in time (at constant volume) and a general form of a (differential) rate law.
	CO 6 .	Write a general form of the rate law for any chemical reaction and define the order of a chemical reaction.
	CO 7 .	Determine integrated rate expression for zero order, first order, second and third order reaction and their respective half-life period expressions.
	CO 8	Study the various factors which affect the rate of a chemical reaction such as concentration ,temperature, solvent, catalyst etc. And theories of chemical kinetics.
Practical		After successfully completing this course students will able to:
	CO 1	Gain hands on experience in identification of organic compounds
	CO 2.	To study Qualitative analysis of mixture containing 4 radicals with removal of interfering radicals

	CO 3.	Use double burette method and burette –pipette methods for titration Prepare standard solutions
	CO 4 .	Know handling of glassware's and care to be taken, handling of organic flammable as well as toxic solvents in laboratory
	CO 5 .	Know use of safety goggles, shoes and gloves, fire extinguisher and its use and action to be taken in accidental cases
	CO 6	Get awareness of safety techniques and handling of chemicals..

B Sc Part Two—Code-005

COURSE OUTCOME-- CHEMISTRY [code-06& 26]

Paper	Co Code	CO
Inorganic		After successfully completing this course students will be able to:
	CO 1	Understand general trends in the chemistry behind p-block elements.
	CO 2.	The students will be able to know the important compounds and important applications of compounds of boron and carbon.
	CO 3.	The students will understand the biological significance of sodium, potassium, magnesium and calcium.
	CO 4 .	The students will be able to explain large scale preparation and properties of industrially viz., cement, plaster of paris, sodium hydroxide, sodium carbonate

		and bicarbonate etc.
	CO 5 .	The students will be able to describe the salient features of alkali and alkaline earth metals.
	CO 6 .	Study transition metals to understand the trends in properties and reactivity of he d-block elements.
	CO 7 .	Explain the typical physical and chemical properties of the transition metals.
	C O 8	Identify simple compound classes for transition metals and describe their chemical properties.
Organic		After successfully completing this course students will be able to
	CO 1	Develop green methodologies for the synthesis of nitrogen containing heterocyclic.
	CO 2.	Aware about most of drugs in the present market are the compounds containing various heterocyclic moieties.
	CO 3.	Understand the reaction mechanism of carbonyl compound, alcohol, phenol and carboxylic acid
Physical		After successfully completing this course students will be able to:
	CO 1	Acquire basic knowledge of electrode conduction.
	CO 2.	Determine the solubility of sparingly soluble salts.
	CO 3.	Explain the various methods for the determination of transport number
	CO 4 .	State the basic principles electrochemistry
	CO 5 .	Mention and explain various methods for the

		determination of transport number
	CO 6 .	Explain the concepts of electrolytic conduction and dilution
	CO 7 .	Understand thermodynamic terms: system, surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their differentials.
	CO 8	Understand Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's law
	CO 9	Understand the concept of equilibrium constant, free energy, chemical potential
	CO 10	Understand of the laws of thermodynamics and their applications
	CO 11	know the phase diagram of single component systems and binary mixtures
	CO 12	Understand of the applications statistical thermodynamics
Practical		After successfully completing this course students will able to:
	CO 1	Ability to use instruments for chemical analysis and separation.
	CO 2.	Follow reaction by using thin layer chromatography
	CO 3.	Ability to perform experiments, analyse data and interpret results and observe scientific conduct.
	CO 4 .	Ability to identify presence or absence of number of cations or anions in solution, using tests based on acid –

		base and solubility.
	CO 5.	Ability to work effectively in diverse teams in laboratory

B Sc Part Three—Code-006

COURSE OUTCOME-- CHEMISTRY [code-06 & 26]

Paper	CO Code	CO
Inorganic		After successfully completing this course students will know,
	CO 1	Understand the role of metal ions in biological system.
	CO 2.	Understand the role of metal ions in oxygen transport.
	CO 3.	Understand the concept of acid and bases.
	CO 4 .	Understand the uses of inorganic polymers.
	CO 5 .	Understand the nature of bonding of different metals with carbon atom.
	CO 6 .	Describe role of different metal ions in biological system.
	CO 7 .	Recognize role of porphyrin ring in haemoglobin.
	C O 8	Count total of electrons in organometallic compound
Organic		After successfully completing this course students will be able to:
	CO 1	Study the NMR spectroscopy to understand the important role of nuclear magnetic resonance spectroscopy in the study of the structures of organic compounds.
	O 2.	Develop an understanding of the significance of the number, positions, intensities and splitting of signals in

		nuclear magnetic resonance spectra.
	CO 3.	Assign structures to simple molecules on the basis of nuclear magnetic resonance spectra.
	CO 4 .	Study carbohydrates will develop the skills to recognize and draw particular carbohydrate structures.
	CO 5 .	Know general structural elements of cyclic monosaccharide and disaccharides and their implications for structure and function.
	CO 6 .	Ability to identify organic compounds by analysis and interpretation of spectral data.
	CO 7 .	Ability to explain common terms in NMR spectroscopy such as chemical shift ,coupling constant and anisotropy and describe how they are affected by molecular structure.
	C O 8	Perform the most commonly used NMR experiments and to interpret and document their results.
Physical		After successfully completing this course students will be able to:
	CO 1	Recognize the basic rules of electronic spectroscopy.
	CO 2.	Predict the term symbols of diatomic molecules
	CO 3.	Understand the concept of black body radiations.
	CO 4 .	Understand the concept of wave functions.
	CO 5 .	Understand different properties of molecular structure.
	CO 6 .	Understand the basic features of spectroscopy
	CO 7 .	Understand the Harmonic Oscillator.

	C O 8	Recognize different regions for different spectroscopy.
	C O 9	Explain the concept of Electromagnetic Waves.
	C O 10	Explain the concept use in Black Body Radiation
Practical		After successfully completing this course students will know,
	C O 1	Understand the principle and working of different instruments like colourimeter, conductometer, spectrophotometer, etc.
	C O 2	How to synthesize organic molecules
	C O 3	How to maintain reaction conditions.
	C O 4	Arrangement of assembly

M. Sc. CHEMISTRY [SEMESTER]

Program Outcome of M Sc Chemistry:

After completing M.Sc. Chemistry programme, students will be able to:

PO1: Demonstrate and apply the fundamental knowledge of the basic principles in various fields of Chemistry

PO2: Create awareness and sense of responsibilities towards environment and apply knowledge to solve the issues related to Environmental pollution.

PO3: Apply knowledge to build up small scale industry for developing endogenous product.

PO4: Apply various aspects of chemistry in natural products isolations, pharmaceuticals, dyes, textiles, polymers, petroleum products, forensic etc.

PO5: Collaborate effectively on team-oriented projects in the field of Chemistry or other related fields.

PO6: Communicate scientific information in a clear and concise manner both orally and in Writing.

PO7: Inculcate logical thinking to address a problem and become result oriented with a positive attitude.

PO8: Explain environmental pollution issues and the remedies thereof.

PO9: Apply the knowledge to develop the sustainable and eco-friendly technology in Industrial Chemistry. Generic Outcomes:

PO10: Have developed their critical reasoning, judgment and communication skills.

PO11: Augment the recent developments in the field of green and eco-friendly reactions, pharmaceutical, Bioinorganic Chemistry and relevant fields of research.

PO12: Enhance the scientific temper among the students so as to develop a research culture and implementation of the policies to tackle the burning issues at global and local level

Course Outcome of M Sc Chemistry- Code [

First Semester

Paper	CO Code	CO
Inorganic Chemistry		After successfully completing this course, students will be able to:
	CO 1	To impart advanced knowledge on fundamental aspects of classifying molecules based on various symmetry elements, point groups and relate their vibrational spectroscopic feature. Additionally, qualitative molecular energy construction employing group theoretical principles will be comprehended.
	CO 2.	To explore some of the consequences of molecular shape in terms of VSEPR theory and refine that concept into the powerful concept of molecular symmetry and the language of group theory, using Walsh diagrams and Bent's theory.
	CO 3.	To be able to use Crystal Field Theory to understand the magnetic properties (and in simple terms the colour) of coordination compounds.
	CO 4 .	To be able to describe the shapes and structures of coordination complexes with coordination numbers ranging from 4 to 12
	CO 5 .	To be able to describe the stability of metal complexes by the use of formation constants and to calculate thermodynamic parameters from them.
	CO 6 .	To be able to recognize the types of isomers in coordination compounds.
	CO 7 .	To be able to name coordination compounds and to be able to draw the structure based on it's name.

	CO 8 .	To become familiar with some applications of coordination compounds.
Organic Chemistry		After successfully completing this course, students will be able to:
	CO 1	To impart advanced knowledge of reactive intermediates, stereochemistry oforganic compounds, pericyclic and photochemical reactions.
	CO 2.	To gives the student the theoretical basis of this kind of reaction and also helps them to find away to carry out these types of reaction. Pericyclic reactions are used in a vast way in nature and also by organic chemist.
	CO 3.	To give the knowledge of the principles of organic , reagents used in organic synthesis and different Molecular rearrangements
	CO 4 .	Students can make use of different reagents in organic synthesis and they can do it in different pathways.
	CO 5 .	To Know about three dimensional structures of alicyclic compounds.
	CO 6 .	To learn about the concept of Conformation.
	CO 7 .	To understand Baeyer strain theory for predicting stability of ring compounds and its incorrectness.
	CO 8 .	To identify different types of strains in conformations of Cycloalkanes.

Physical Chemistry		After successfully completing this course, students will be able to:
	CO 1	
	CO 2.	To impart basic and fundamental knowledge of quantum chemistry and mathematical methods in chemistry.
	CO 3.	To practice problem solving through the understanding of mathematical methods and principles of atomic, molecular and ionic systems.
	CO 4 .	To develops basic skill for understanding of chemical systems and its phenomena at the atomic and molecular level through the principles of quantum chemistry.
	CO 5 .	To Apply the first law of thermodynamics. To Use appropriate equation of state for representing the P-V-T behaviour of gases.
	CO 6 .	To Calculate the heat of reaction at any temperature.
	CO 7 .	To Calculate the ideal and actual efficiencies of heat engines and performance of heat pumps.
	CO 8 .	To Calculate changes in U, H, S and G for ideal and non-ideal gases.
	CO 9.	To Perform refrigerator and heat pump calculations
Spectroscopy & chemistry for Maths/Biology		After successfully completing this course, students will be able to:
	CO 1	to provide basic knowledge of surface- and colloid chemistry from a physical-chemical perspective.
	CO 2.	To deals with structure and characteristics of the

		self-associated amphiphilic molecules, so-called surfactants.
	CO 3.	To make Familiar with the concepts of surface chemistry.
	CO 4 .	To analyse principles of kinetics and mechanisms of surface reactions.
	CO 5 .	To understand the reaction kinetics and effect of catalyst on it.
	CO 6 .	To define methods for the characterization of surfaces.
	CO 7 .	To explain the principle and instrumentation of microwave, infrared vibration-rotation Raman and infra-red spectroscopy.
	CO 8 .	To interpret microwave, vibration-rotation Raman and infra-red spectra for chemical analysis
	CO 9.	To explain the principle and instrumentation of electronic spectroscopy and analyse the electronic spectra of different species
	CO 10 .	To explain the principle and instrumentation of nuclear magnetic and electron spin resonance spectroscopy and apply the knowledge in characterizing the molecules and also their use in medical diagnostics.
	CO 11 .	To explain the principle, instrumentation, and application of Mössbauer spectroscopy to study bonding in iron derived complexes.
Analytical Practical		After successfully completing this course, students will be able to:
	CO 1	To analyses the chemical structure using UV, IR

		and mass spectra
	CO 2.	To determines the chemical environment 1H and 13C NMR spectra
	CO 3.	To impart advanced knowledge on the analytical chemistry aspects of complexometric titrations .
	CO 4 .	To comprehend the stability, reactions of supra molecular complexes of alkali metal and other univalent ions.
	CO 5 .	To equip the learner on the analytical applications of complexometric determination of metal ions along with the various ways of analysing data derived from different experiments.
	CO 6.	To analyse water sample for different parameter which affect the quality of water.
Organic Practical		After successfully completing this course, students will be able to:
	CO 1	To know meaning of safety signs on container of chemicals, safety in handling of chemicals.
	CO 2.	To understand different purification techniques in organic chemistry like recrystallization, distillation, steam distillation and extraction
	CO 3.	To know handling of glassware's and care to be taken, handling of organic flammable as well as toxic solvents in lab and , use of safety goggles, shoes and gloves, fire extinguisher and its use and action to be taken in accidental cases
	CO 4 .	To get awareness of safety techniques and handling of chemicals..
	CO 5 .	To understand how to carry out different types of

		reactions and their workup methods.
	CO 6 .	To Gain hands on experience in identification of organic compounds
	CO 7 .	To synthesise and estimate drugs and knowledge about the techniques and principles of experiments.
	CO 8 .	To Develop hands on expertise to design and conduct the experiments independently
	CO 9.	To Learns principle of organic estimation
	CO 10 .	To Gains the procedure for organic separation and derivation
	CO 11	To Understands the method of organic preparation
	CO 12	To Develops the various routes for recrystallization
	CO 13	To Identifies the way for identification of components

Second Semester

Paper	CO Code	CO
Inorganic Chemistry		After successfully completing this course, students will be able to:
	CO 1	To demonstrate knowledge of Organometallic Chemistry. Metal carbonyls, hydrocarbon and carbocyclic ligands,
	CO 2.	To explain 18-electron rule (saturation and

		unsaturation), synthesis and properties, patterns of reactivity (substitution, oxidative-addition and reductive elimination, insertion and de-insertion, nucleophilic attack on ligands, isomerization, stereochemical nonrigidity).
	CO 3.	To describe the fundamental requirement for interpretation of electronic spectra of metal compound for prediction of their properties.
	CO 4 .	To describe the studies of metal carbonyls, metal clusters , metal nitrosyls and its preparation, structures and properties.
	CO 5 .	To explain the classification of metal clusters and compound and Chemistry of dioxygen, dinitrogen complexes and non-carbonyl metal clusters.
	CO 6 .	To correlate a wide range of properties of first-row transition metal complexes. This includes structure, electronic spectra, magnetic properties and some aspects of thermochemistry.
	CO 7 .	To be able to describe the stability of metal complexes by the use of formation constants and to calculate thermodynamic parameters from them.
Organic Chemistry		After successfully completing this course, students will be able to:
	CO 1	To get a clear picture about the nucleophilic and electrophilic groups
	CO 2.	To learn the addition reactions which are happening through the nucleophiles and electrophiles and addition reactions between a hetero atom and double bonded carbon compounds.
	CO 3.	To gain knowledge about some specific compounds

		like Grignard reagents, nitrenes etc
	CO 4 .	To obtain an outline about elimination reactions and rules used to study elimination reactions and learn about some specific examples of elimination reactions
	CO 5 .	To learn the basic mechanism of oxidation in organic compounds and the reagents which causes oxidation in various compounds
	CO 6 .	To learn about the two types of reduction reactions like complete reduction and selective reduction and reagents that causes selective and complete reduction
	CO 7 .	To give an example of a radical substitution reaction and identify the three steps (initiation, propagation and termination) that occur in a typical radical substitution reaction.
	CO 8 .	To write out the steps involved in a simple radical substitution reaction, such as the chlorination of methane.
	CO 9.	To explain why the halogenation of an alkane is not a particularly useful method of preparing specific alkyl halides.
Physical Chemistry		After successfully completing this course, students will be able to:
	CO 1	To understand the quantum mechanical formulation of statistical mechanics
	CO 2.	To define and relate mathematically basic physical and thermodynamic concepts related to electrochemical cells such as electric potential,

		electric field, cell potential , potential, electrochemical potential, and activity
	CO 3.	To account for sign conventions
	CO 4 .	To account for the electrochemical series and representation of electrochemical thermodynamics in Pourbaix diagrams
	CO 5 .	To define and describe mathematically diffusion, migration, and convection
	CO 6 .	To define transport, kinetic and ohmic overpotential
	CO 7 .	To calculate the combined transport and kinetic overpotential for electrodes at which a one-electron reaction takes place and for which transport can be described through mass transfer coefficients
	CO 8 .	To calculate ohmic overpotential for dilute solutions for macro- and microelectrodes such as trough electrodes, hemispherical electrodes, and disk electrodes
	CO 9.	To study the theory of Debye Huckel rule, limitations and its applications.
	CO 10 .	To know the structure of electrical double layers of Helmholtz, perrin-guoy-chapman.
	CO 11 .	To know the adsorption of electrolyte interface.
	CO 12.	To study the Butler Volmer equation for one step and multi-step electron transfer reaction
Spectroscopy & chemistry for Maths/Biology		After successfully completing this course, students will be able to:
	CO 1	To learn the Einstein's theory of transition

		probability and rotation spectroscopy
	CO 2.	To know about the Vibrational spectroscopy, Vibrational coupling overtones and Fermi resonance. Raman Spectra
	CO 3.	To know the detail study of NMR Spectroscopy
	CO 4 .	To study the a brief discussion of Fourier transform resonance Spectroscopy
	CO 5 .	To Implement structure elucidation of new compound natural or synthetic
	CO 6 .	To Explain the Nuclear magnetic resonance spectroscopy. Proton chemical shift, spin- spin coupling, coupling constants and applications to organic structures 13C resonance spectroscopy.
	CO 7 .	To Explain the Mass, ESR, Mass spectroscopy and its applications.
	CO 8 .	To understand basic tools of computer science in relation with chemistry
Inorganic Practical		After successfully completing this course, students will be able to:
	CO 1	Study the gravimetric and volumetric analysis of ores and alloy.
	CO 2.	Prepare a various inorganic complexes and determine its % purity.
	CO 3.	To study Qualitative analysis of mixture containing 8 radicals with removal of interfering radicals
	CO 4 .	Use double burette method and burette –pipette methods for titration

	CO 5 .	Prepare standard solutions
	CO 6 .	Conduct acid base titrations, complexometric titrations and redox titrations like permanganometry, dichrometry and iodometric-iodimetry titrations.
	CO 7 .	Different indicators used in titrations
	CO 8 .	To know about the volumetric and gravimetric analysis of cations and anions.
Physical Practical		After successfully completing this course, students will be able to:
	CO 1	Calculate molar and normal solution of various concentrations.
	CO 2.	Determine specific rotations and percentage of to optically active substances by polarimetrically.
	CO 3.	Study the energy of activation and second order reaction.
	CO 4 .	Study the stability of complex ion and stranded free energy change and equilibrium constant by potentiometry.
	CO 5 .	Find out the acidity, Basicity and PKa Value on pH meter.
	CO 6 .	To the preparation for each experiment by studying lab handouts and links therein
	CO 7 .	To know about the safety requirements and lab skills to perform physico -chemical experiments
	CO 8 .	An appreciation for modern problems and scientific controversies in physical chemistry

	CO 9.	How to design and perform experiments to determine the rate, order, and activation energy of chemical reactions by varying concentrations and/or temperature
	CO 10 .	Methods to measure equilibrium concentrations and equilibrium constants for acid-base, solubility, and complexation reactions given initial concentrations of reactant
	CO 11 .	To the preparation of buffer solutions at a required pH, given a choice of solutions of acid/conjugate base pairs
	CO 12	To determination of the molar mass of an unknown nonelectrolyte and an unknown electrolyte from a freezing point depression experiment
	CO 13	To know the principle and mechanism of Conductometric and potentiometric titrations

Paper	CO Code	CO
Application of Spectroscopy		Upon successful completion of this course, the student should be able to:
	CO 1	To describe molecular vibrations with the interaction of matter ,and electromagnetic waves .
	CO 2.	To defines the electromagnetic spectrum, molecular vibrations, vibrations of diatomic molecules
	CO 3.	To lists substance in terms of electric and magnetic properties.

	CO 4 .	To describes the interaction of matter with electromagnetic waves.
	CO 5 .	To explain the rotational spectra of diatomic molecules. Examines rotational spectra of diatomic molecules with simple molecules
	CO 6 .	To explain the basic concepts in infrared spectroscopy. Defines regions according to the ınfrared spectroscopy wavelength, frequency or wave number
	CO 7 .	To defines the classical theory, quantum theory and Identifies vibration modes.
Chemistry of Bio Inorganic & Bio Organic		Upon successful completion of this course, the student should be able to:
	CO 1	Apply the basic principles in inorganic and general chemistry to interdisciplinary topics in the field of bioinorganic chemistry.
	CO 2.	Describe the main roles of metal ions in biological processes, and identify the chemical properties that are required to each particular function.
	CO 3.	Describe the role of metal ions in enzymes involved in acid-base reactions.
	CO 4 .	Describe the role of metal ions that are involved in electron-transfer reactions in biological systems.
	CO 5 .	Describe how oxygen is transported in different species and identify the metal centers involved in this task.
	CO 6 .	Describe the different metal-activation sites in enzymes that are involved in the activation of oxygen.
		Identify the main toxicological mechanisms of metals

	CO 7 . CO 8 . CO 9. CO 10	and the biological defenses against the toxic effects and List some medical applications of inorganic compounds. Determine enzymatic activity using spectrophotometry and appropriate software to analyze experimental data (Excel). Use experimental data to obtain information on the molecular structure of the metal center in metal proteins. Extract some metal proteins from natural sources.
Physical Organic Chemistry	 CO 1 CO 2. CO 3. CO 4 . CO 5 . CO 6 . CO 7 .	Upon successful completion of this course, the student should be able to: Outline the basic quantum-mechanical approach to deriving molecular orbitals from atomic orbitals Describe traits of bonding and anti-bonding molecular orbitals Calculate bond orders based on molecular electron configurations Write molecular electron configurations for H2 and He2 molecules and relate these electron configurations to the molecules' stabilities and magnetic properties Describe the formation of covalent bonds in terms of atomic orbital overlap Define and give examples of σ and π bonds Explain why bonds occur at specific average bond

		distances instead of the atoms approaching each other infinitely close.
	CO 8 .	Use valence bond theory to explain the bonding in F2, HF, and ClBr and overlap of the atomic orbitals involved in the bonds and Use valence bond theory to explain the bonding in O2
	CO 9.	identify nucleophiles and electrophiles in polar reactions and relate bond polarity to chemical reactivity
Heterocyclic Chemistry		Upon successful completion of this course, the student should be able to:
	CO 1	To acquire the knowledge and understanding of the basic experimental principles of heterocyclic chemistry.
	CO 2.	To draw the structures and synthesize simple pharmaceutically active organic compounds having five and six membered heterocyclic compounds.
	CO 3.	Know the use of heterocyclic compounds in our daily life.
	CO 4 .	Significance in our living system.
	CO 5 .	Explain the wide range of applications of heterocyclic compound in agrochemicals, pharmaceuticals, veterinary products , sanitizers, developers, anti-ordinates, corrosion inhibitors etc..
	CO 6	Know that heterocyclic compounds widely found in nature, e.g. pyramiding and purine are the parts of DNA, vitamins and enzymes. Heterocyclic compounds are very important for human survival too. They are important information carrier. These

		are used in neurotransmitter and pyrimidines; nucleoside is a part of genetic material that transfers information from one generation to other.
General Practical Chemistry		Upon successful completion of this course, the student should be able to:
	CO 1	Analyses the chemical structure using UV, IR and mass spectra
	CO 2	Determines the chemical environment 1H and 13C NMR spectra
	CO 3	To impart advanced knowledge on the analytical chemistry aspects of complexometric titrations .
	CO 4	To comprehend the stability, reactions of supra molecular complexes of alkali metal and other univalent ions.
	CO 5	equip the learner on the analytical applications of complexometric determination of metal ions along with the various ways of analysing data derived from different experiments.
	CO 6	Analyse water sample for different parameter which affect the quality of water

Paper	CO Code	CO
Photochemistry and solid State Chemistry		Upon successful completion of this course, the student should be able to:
	CO 1	Explain that properties of solid surface is unique in nature. They can adsorb different chemicals and also this adsorbed solid can be used as catalyst. Micelle and reverse micelle are also two different

		name of substances where solids adsorbed different chemicals. This is very important in enzyme chemistry.
	CO 2.	Deal with molecular symmetry which is very fundamental in spectroscopic study.
	CO 3.	Give idea about the theoretical estimation of different physical and chemical properties of chemicals.
	CO 4	Explain that Exposure of light on different chemicals produce colour of chemicals and also can carry out chemical conversion and explain the theoretical basis of photochemistry as well as different types of spectroscopy.
	CO 5	To impart advanced knowledge on fundamental aspects of classifying molecules based on various symmetry elements, point groups and relate their vibrational spectroscopic feature. Additionally, qualitative molecular energy construction employing group theoretical principles will be comprehended.
Bio Physical &Environmental Chemistry		Upon successful completion of the course the student will be able to:
	CO 1	Demonstrate knowledge of chemical and biochemical principles of fundamental environmental processes in air, water, and soil.
	CO 2.	Recognize different types of toxic substances & responses and analySe toxicological information. Apply basic chemical concepts to analyze chemical processes involved in different environmental problems (air, water & soil).
	CO 3.	Describe water purification and waste treatment processes and the practical chemistry involved.

	CO 4	Describe causes and effects of environmental pollution by energy industry and discuss some mitigation strategies.
	CO 5 .	Explain energy crisis and different aspects of sustainability.
	CO 6 .	Discuss local and global environmental issues based on the knowledge gained throughout the course account for the different interactions that are important for the formation of structures in biological systems and for how thermodynamic parameters can be measured.
	CO 7 .	account for basic concepts within statistical thermodynamics and molecular simulation, and apply this to macromolecular systems.
	CO 8 .	account for structures and functions of biological membranes, as well as model systems and relevant methods for the study of these structures and functions.
	CO 9.	explain and apply methods for the determination of functional molecular mass of biological macromolecules in solution as well as determination of equilibrium - and rate constants for macromolecule-ligand interactions.
	CO 10.	account for and apply spectroscopic methods for the study of structures and functions in biological systems
Medicinal Chemistry		Upon successful completion of this course, the student should be able to:
	CO 1	To understand the chemistry of drugs with respect to their biological activity.
	CO 2.	To know the metabolism, adverse effect and therapeutic activity of drugs.

	CO 3.	To understand the different modern techniques of drug design.
	CO 4 .	To appreciate the SAR of some important drug classes.
	CO 5 .	To acquire knowledge in the chemotherapy for cancer and microbial diseases and different anti-viral agents. 6. To have been introduced to a variety of drug classes and some pharmacological properties.
Natural Product		After successfully completing this course, students will be able to:
	CO 1	Know the important therapeutic uses of terpenoids include antimicrobial, antifungal, antiviral, antihyperglycemic, anti-inflammatory, antioxidants, antiparasitic, immunomodulatory, and as skin permeation enhancer
	CO 2.	To know the basic classification and role of alkaloids
	CO 3.	To learn the structural elucidation and degradation of alkaloids 47
	CO 4 .	To gain knowledge about the synthesis and structure of alkaloids
	CO 5 .	To know about the stereochemistry of alkaloids
	CO 6 .	To understand the isolation and structural determination of alkaloids
	CO 7 .	To learn about terpenoids and its classification
	CO 8 .	To study isoprene rule

	CO 9. CO 10	To elucidate the structure of camphor , To learn carbohydrates and its types To elucidate the structure of starch and cellulose
Special Organic Chemistry Practical	 CO 1 CO 2. CO 3. CO 4 . CO 5 .	After successfully completing this course, students will be able to: Gain the ideas of analysis of an organic compound Identify organic compounds by detection of N, S, halogens and test for functional groups. Prepare a derivative Prepare different organic compounds such as benzanilide from aniline, dinitrobenzene from acetanilide, benzyl from benzoin, etc. Gain the ideas of determination of saponification equivalent f an ester, amount of glucose by titration with Fehling solution, estimation of urea by hypobromite method,