MASTER OF SCIENCE-CHEMISTRY

COURSE OUTCOMES (COs)

On completion of the course students will be able to

COURSE COMPONENT	COURSE	COURSE OUTCOME
CORE THEORY-I	**ORGANIC CHEMISTRY-I**	**CO1:** Understand the details of various aspects of Stereo Chemistry and identify stereo chemical notations **CO2:** Acquire knowledge on conformations and reactivity **CO3:** To understand various types of aliphatic and aromatic nucleophilc substitution reactions and mechanisms. **CO4:**To explain the mechanistic aspects in electrophilic substitution and Reaction conditions, products formation and mechanisms of some named reactions **CO5:** To study the synthesis of Terpenoids and Steroids and Conversion of cholesterol to progesterone, estrogen and testosterone and structural elucidation of cholesterol.
CORE THEORY-II	**INORGANIC CHEMISTRY –I**	**CO1 :** Correlate the structure and bonding nature of the complexes. **CO2:** Illustrate the crystal field stabilization and splitting patterns of complexes. **CO3:** Examine the reaction rate and the mechanism operates on the complex. **CO4:** Identify the spectral diagram of the complexes in different term states **CO5:** Differentiate the structural aspects of the different metal clusters
CORE THEORY-III	**PHYSICAL CHEMISTRY-I**	**CO1:** Get an overview about the thermodynamic properties in different chemical properties **CO2:** Measure the factor that influence the changes in rate of the reaction **CO3:** Analyze the activity of

		catalyst on the reaction sites **CO4:** Recognize the symmetry operation, point group and its construction of tables **CO5:** Interpret the hybridization of different molecules using character table.
CORE ELECTIVE-I	**POLYMER CHEMISTRY**	**CO1:** Classify synthetic and biological polymers and explain differences between addition and stepwise polymerization account for reaction mechanisms. **CO2:** Explain the types of polymerization techniques and different properties of polymers (Molecular weight and size, Glass Transition Temperature and Crystallinity in polymers).. **CO3:** Explain the polymer production processes and elucidate the synthesis and applications of various synthetic resins and plastics. **CO4:** Elucidate the synthesis and applications of various synthetic fibers and rubbers. **CO5:** Describe the role of additives in improving the mechanical properties of polymers and explain the polymer degradation.
CORE PRACTICAL-II	**ORGANIC CHEMISTRY PRACTICAL- I**	**CO1:** Plan and perform an organic synthesis and produce the maximum yield of an organic compound **CO2:** Understand the nature of solvents used in the organic synthesis. **CO3:** Choose the right solvent for the separation of a binary mixture of organic compounds **CO4:** Analyze and identify the functional groups in the given components. **CO5:** Develop their ability to handle the organic compounds in the protective manner
CORE THEORYIV	**ORGANIC CHEMISTRY-II**	**CO1:** Explain the mechanism of substitution reactions and to understand chemistry of Ylides, carbenes and carbenoids and related

		naming organic reactions. **CO2:** Learn about mechanism of E1, E2 and E1CB reactions and generation and addition of free radicals and related naming reactions **CO3:** Know the concepts of aomaticity of benzenoid and non-benzenoid compound and annulunes and explain the various reactions take in photo chemistry of ketones. **CO4:** Explain brief mechanism of various molecular rearrangements. **CO5:** Understand the mechanism of oxidations reactions and hydroxylations reactions and some important reduction reactions.
CORE THEORYV	**INORGANIC CHEMISTRY –II**	**CO**1: Predict the structure, bonding and discuss the reaction of solids with emphasis on some of the most important classes of inorganic materials and also describe the importance and properties of defects in solids. Also analyze the physical-chemical, electrical and magnetic properties of solids. **CO2:** Explain the synthetic route, structure and bonding involved in organometallic compounds **CO3:** n Understand the reactivity of organometallic compounds including their industrial application in synthesis. **CO4:** Explain what happens when inorganic compounds are excited by irradiation **CO5:** Describe about the importance of nuclear chemistry and its applications.
CORE THEORYVI	**PHYSICAL CHEMISTRY-II**	**CO1:** Apply statistics to understand the thermodynamic properties of macroscopic systems. **CO2:** Understand the interrelationship between the properties of equilibrium and nonequilibrium process in thermodynamics. **CO3:** Implement the concept of kinetics in the homogeneous and

		heterogeneous catalysis. **CO4:** Get the overview of the fundamentals mathematical formalism of quantum Chemistry. **CO5:** Apply the concept of determine the wave function of different atoms.
CORE ELECTIVEII	**NANO CHEMISTRY**	**CO1:** Elucidate the Scientific revolutions of nanotechnology and also to learn about the properties of nanomaterials. **CO2:** Describe about the synthesis of nanomaterials and also to familiarize the classification of nanostructures, size dependency in nanostrucutures and quantum size effects in nanostructures. **CO3:** Explain about the various techniques used for the characterization of nanomaterials and their application and the impact of nanomaterials on environment **CO4:** Explain about the theories and techniques used for characterization of nanomaterials **CO5:** Outline the applications of metal nanoparticles in technologically imperative fields.
CORE PRACTICAL –II	**INORGANIC CHEMISTRY PRACTICAL-I**	**CO1:** Explain the qualitative analysis of a given salt mixture by semi micro method and know how to estimate the Inorganic cations. **CO2:** Explain the quantitative determination and know how to estimate the metal cations using the colorimetric method. **CO3:** Prepare the standard solutions.
CORE THEORY VII	**ORGANIC CHEMISTRY-III**	**CO1:** Understand the detail about the magnetic resonance. **CO2:** Learn about the applications of UV,IR and NMR spectroscopy to the structural characterization of molecules. **CO3:** Predict the fragmentation of a molecule in a mass spectroscopy **CO4:** Applications of Spectroscopy for the structural determination. **CO5:** Combined spectroscopic

		approach for problem solving and structural analysis
CORE THEORY VIII	**INORGANIC CHEMISTRYIII**	**CO1:** Explain IR and Raman Spectroscopy of various metallic, olefinic, organo metallic complexes and isomerism involved in it. **CO2:** Able to get a brief idea on selction rules in electronic spectra, orgel and Tanabe sugano diagram in co-ordination compounds and also learn about John teller distortion in tetrahedral complexes **CO3:** Gain knowledge about NMR in 31P, 19F. Also know about NQR in nitrosyl compounds and Mossbauer spectroscopy in Fe and Sn system **CO4:** To know the detail study of the Electron Spin Resonance and its applications in various metal complexes and simple molecules and also learn about fundamentals of photo emission spectroscopy **CO5:** Familiar with x-ray diffraction, electron and optical microscopic methods and Xray fluorescent methods.
CORE THEORY IX	**PHYSICAL CHEMISTRY-III**	**CO1:** Understand the quantization of energy and the interaction of electromagnetic radiation with matter and also explain the fundamentals and principles of molecular spectroscopy **CO2:** Apply solutions of the Schrödinger equation for simple systems to real systems for use in determining the energy of stationary states. **CO3:** Understand the mathematical foundations of different branches of spectroscopy and know the application of spectroscopy to study the structure of molecules. **CO4:** Identify the unique features of the hydrogen atom that make it important for calculations in quantum mechanics. **CO5:** Recognize the most significant

		and elementary solutions of Schrodinger equation in molecular quantum mechanics through a study of time independent perturbation theory, valence bond and molecular orbital theories.
ELECTIVE III	**ELECTROCHEMISTRY**	**CO1:** Acquisition of basic knowledge of the electrode kinetics and some relevant thermodynamic aspects. **CO2:** Kinetic control of electrochemical reactions. Butler and Volmer equation. Tafel equation. Management and prediction of some important redox species to the equilibrium conditions. **CO3:** Knowledge of the main practical applications of electrochemistry for the production of species of interest. **CO4:** Energy storage systems: Primary batteries (or batteries): conventional cells (Pile Leclanché, Alkaline batteries, secondary batteries, fuel cells, batteries with intercalation, etc **CO5:** Construction and use of potential-pH diagrams (Pourbaix). Evans diagrams. Types of corrosion.
CORE PRACTICAL-III	**INORGANIC CHEMISTRY PRACTICAL-II**	**CO1:** understand the reaction involved in formation metal complexes and analyse it CO 2: Estimate the amount of metal ions in the given solutions. **CO3:** Acquire skills on Re-Crystallisation, Separation, Digestion and Coprecipitation method
CORE THEORY X	**ORGANIC CHEMISTRY-IV**	**CO1:** Interpret the symmetry orbital overlapping with the thermal/ photochemical condition. **CO2:** Apply the properties amino acids compounds for their higher education/ research aspects. **CO3:** Acquire knowledge on the role of modern synthetic reagents in organic transformation. **CO4:** Understand the introduction of

		Retro synthesis as well as role on disconnection approach **CO5:** Apply the techniques of Retro analysis to plan synthesis of given target molecule
CORE ELECTIVE IV	**RESEARCH METHODOLOGY**	**CO1:** Understand the basics, types and interpret current chemical research. **CO2 :**Employ the online tools to survey chemical literature and related Journals **CO3:** Learn the concept of formatting, statistical data analysis and ethical guidelines for research. **CO4:** Identify the accurate format of writing scientific report and thesis **CO5:** Acquire the skill of presenting the research work to public forums using modern software tools
CORE ELECTIVE V	**ANALYTICAL TECHNIQUES IN CHEMISTRY**	**CO1:** Understand on theories of instrumental methods in colorimetric analysis such as UV-Visible, IR and Raman Spectroscopy and its applications . **CO2:** Gain knowledge on instrumentation and structural determination of NMR. Also know about NQR in nitrosyl compounds and Mossbauer spectroscopy in Fe and Sn system. **CO3:** Extend skills in procedure and instrumental methods applied in ESR and also acquire knowledge on magnetic susceptibility measurement methods **CO4:** Describe the various stages of thermal degradation using TGA and DTA methods and also develop theoretical knowledge on instrumentation and applications in Mass spectrometer **CO5:** Obtain detail Knowledge about Atomic absorption and Flame emission spectroscopy
CORE PRACTICAL IV	**PHYSICAL CHEMISTRY PRACTICAL**	**CO1:** To impart practical knowledge on the theoretical subjects handled. **CO2:** To understand and verify the principles and theory of physical

		chemistry experiments.To learn and understand the working principles of the laboratory tools and techniques, and utilize them practically. **CO3 :** To evaluate, interpret and analyze the acquired data. To carry out conductometric and potentiometric experiments in order. **CO4 :** To acquire skill in the determination of equivalent conductance and solubility product etc. **CO5:** To help the student with innovative thoughts and scientific thinking and research.
PROJECT	**PROJECT**	**CO1:** To know, understand and able to do the literature survey for the selected topic. **CO2:** Acquire skills in practical work, experiments, laboratory techniques and field based studies with multidisciplinary work and tasks. **CO3:** Handle instruments for analysis and discuss their experimental results **CO4 :** To discuss, compare, evaluate and interpret the results and to prepare reports/presentation and defend their work. **CO5:** To facilitate students for taking up and shaping a successful careers in chemistry, biochemistry, material science /multidisciplinary fields.