

## MSC CHEMISTRY

### Course Outcomes

Name of the course	Course code	Course outcomes
QUANTUM MECHANICS AND COMPUTATIONAL CHEMISTRY	CHE1C01	CO1: To learn the fundamental principles of the properties of matter and energy quantization. CO2: To understand the application of energy quantization and symmetry properties of molecules . CO3: To understand the different approximation techniques used in molecular quantum mechanics CO4: To describe and identify the various methods' advantages / disadvantages for simulating/modeling various scientific problems.
ELEMENTARY INORGANIC CHEMISTRY	CHE1C02	CO1: To understand the chemistry of main block elements, structure and bonding concepts , systematic CO2: To understand the systematic chemical reactivity. CO3 : To understand the relationship between the electronic structure and physical and chemical properties of transition and inner transition elements and their compounds. CO4: To identify and define various types of nuclear changes or processes including fission, fusion and decay reactions.
STRUCTURE AND REACTIVITY OF ORGANIC COMPOUNDS	CHE1C03	CO1: To provide a comprehensive information about the basic principles to understand the structure and reactivity of organic molecules. CO2: To understand substitution and elimination reactions of aliphatic and aromatic compounds. CO3: To understand the conformations analysis of

		<p>different molecules and various concepts such as stereochemistry and fundamental principles of stereoselectivity in organic chemistry</p> <p>CO4: To understand the general strategy of asymmetric synthesis and the classification into chiral substrate, auxiliary, reagent and catalyst controlled processes.</p>
THERMODYNAMICS, KINETICS AND CATALYSIS	CHE1C04	<p>CO1: To understand the concepts in fundamentals laws of thermodynamics .</p> <p>CO2: To understand the concepts of reaction rates of reaction involving free radicals .</p> <p>CO3: To understand the theoretical models describing molecular collision- and reaction dynamics.</p> <p>CO4: To understand the principles of surface chemistry , its applications adsorption and adsorption isotherms and types of catalysts and their importance in the industry.</p>
GROUP THEORY and CHEMICAL BONDING	CHE2C05	<p>CO1: To determine symmetry operations and to determine spectroscopic selection rules based on molecular symmetry.</p> <p>CO2 :To understand the connection between symmetry and electronic and spectroscopic properties of molecules</p> <p>CO3: To provide a systematic treatment of symmetry in chemical systems within the mathematical framework known as group theory.</p>
CO-ORDINATION CHEMISTRY	CHE2C06	<p>CO1: To understand the properties of coordination compounds ,relate VBT and hybridization , CFT and MOT</p> <p>CO2:To understand the characterization techniques of coordination complexes</p>

		<p>CO3: To understand the mechanisms for reactions of transition metal complexes</p> <p>CO4: To understand the fundamentals and types of photochemical reaction in metal complexes.</p>
REACTION MECHANISM IN ORGANIC CHEMISTRY	CHE2C07	<p>CO1: To understand the mechanism and stereochemistry, to recognize, classify, explain, and apply fundamental organic reactions such as SN2, SN1, E2, E1, alkene addition, electrophilic aromatic substitution, 1,2/1,4-additions.</p> <p>CO2: To understand the reactions of carbon Hetero multiple bonds and mechanism of ester hydrolysis and esterification.</p> <p>CO3: To understand the concepts and applications in concerted organic reactions and organic photochemistry.</p> <p>CO4: To understand the different types of alkaloids, flavonoids &amp; terpenoids, their chemistry and medicinal importance.</p>
ELECTROCHEMISTRY, SOLID STATE CHEMISTRY AND STATISTICAL THERMODYNAMICS	CHE2C08	<p>CO1 : To understand the behaviour of ions in solution phase under different conditions and its application towards different energy storage devices.</p> <p>CO2: To apply the Nernst, Butler-Volmer and Tafel equations to electrochemical systems</p> <p>CO3: To understand the structure of solids and the importance of chemical and physical bonds, crystal (dis)order and defects for materials properties.</p> <p>CO4: To understand the physical interpretation of partition functions and be able to calculate thermodynamic properties of model systems with using Boltzmann -, Fermi-</p>

		Dirac and Bose-Einstein statistics.
INORGANIC CHEMISTRY PRACTICALS- I & II	CHE1L01 & CHE2L04	CO1: To prepare the exact solutions for quantitative analysis. CO2: To apply the knowledge of quantitative analysis for the determination of metals from ores/alloys. CO3: To synthesize Inorganic complexes and also find their purity. CO4: To understand Ion-exchange chromatography for separation of metal ions. CO5: To understand the principle and working of different instruments like colourimeter, conductometer, spectrophotometer .
ORGANIC CHEMISTRY PRACTICALS – I & II	CHE1L02 & CHE2L05	CO1:To synthesize organic molecules. CO2: To maintain reaction conditions. CO3: To arrangement of assembly. CO4: To understand the methods of purification of samples.
PHYSICAL CHEMISTRY PRACTICALS – I & II	CHE1L03 & CHE2L06	CO1: To prepare the solution of the desired concentration and the desired volume CO2: To know the principle and handling of pH meter, Potentiometer, conductivitymeter, colorimeter, viscometer, etc. CO3: To plot accurate graphs of the desired scale for the calculations
MOLECULAR SPECTROSCOPY	CHE3C09	CO1: To understand basic aspects of microwave, IR, Raman and UV spectroscopy. CO2: To know how to solve problems based on H1 and C13 NMR CO3: To know applications of mass spectroscopy in determination of structures. CO4: To understand methods of solving combines problems

		on all spectroscopic techniques.
ORGANOMETALLIC AND BIOINORGANIC CHEMISTRY	CHE3C10	CO1: To understand the applications of organometallic compounds in organic reactions. CO2: To understand the mechanisms of organometallic reactions. CO3: To understand metal-metal bonds and metal clusters. CO4: To understand the importance of inorganic elements in vital systems.
REAGENTS AND TRANSFORMATIONS IN INORGANIC CHEMISTRY	CHE3C11	CO1: To understand various ways of attack on electrophilic species by a nucleophile CO2: To understand hetrocyclic and supramolecular chemistry. CO3: To understand mechanisms in asymmetric reaction. CO4: To understand the synthetic applications of reagents. CO5: To understand the rearrangements occurring through carbocations , carbanions ,carbenes and nitrenes .
GREEN AND NANO CHEMISTRY	CHE3E03	CO1: To understand the importance of green synthesis in reactions CO2: To understand microwave mediated organic synthesis. CO3: To understand the alternative synthesis, reagents and reaction conditions in green reactions. CO4: To understand the importance of nanomaterials and their synthetic methods. CO5: To understand the techniques for characterisation of nanoscale materials. CO6: To understand the importance and applications of carbon clusters and nanostructures.
INSTRUMENTAL METHODS OF ANALYSIS	CHE4C12	CO1. To understand the treatment of analytical data. CO2. To understand

		<p>conventional analytical procedures.</p> <p>CO3. To understand potentiometry and amperometry.</p> <p>CO4. To understand theory, instrumentation and application of different spectrophotometry.</p> <p>CO5. To understand thermal and radiochemical methods and chromatography.</p>
INDUSTRIAL CATALYSIS	CHE4E05	<p>CO2 :To understand adsorption/desorption and the kinetics of catalytic reactions on a surface.</p> <p>CO2: To understand the preparative methods of catalyst, deactivation method and phase transfer catalysis.</p> <p>CO3: To understand how enzyme works and biocatalysis.</p> <p>CO4: To understand oil based chemistry in industrial catalysis.</p>
ORGANOMETALLIC CHEMISTRY	CHE4E08	<p>CO1: To understand classification, synthesis structure and application of organometallic compounds.</p> <p>CO2: To understand organometallic reactions.</p> <p>CO3: To understand homogeneous catalysis.</p> <p>CO4: To understand polymers with organometallic moieties in the main groups.</p>
INORGANIC CHEMISTRY PRACTICALS III & IV	CHE3L07 & CHE4L10	<p>CO1: To understand estimation involving quantitative separation of binary mixtures of ions in solution.</p> <p>CO2: To understand colorimetric estimation.</p> <p>CO3: To understand the preparation of inorganic complexes.</p>
ORGANIC CHEMISTRY PRACTICALS III & IV	CHE3L08 & CHE4L11	<p>CO1: To understand estimation of equivalent weight of acid, nitrogen, acid value and iodine value.</p> <p>CO2: To understand column chromatography and TLC.</p>

		CO3: To understand colorimetric estimation of antibiotics – penicillin streptomycin.
PHYSICAL CHEMISTRY PRACTICALS III & IV	CHE3L09 & CHE4L12	CO1: To understand the determination of specific reaction rate of acid hydrolysis, Arrhenius parameters and other chemical kinetics . CO2: To understand adsorption experiments. CO3: To understand the phase equilibrium.
RESEARCH PROJECT	CHE4P01	CO1: To understand the scientific methods of research project. CO2: To apply the scientific method in life situations. CO3: To analyse scientific problems systematically.

