



# M.Sc. CHEMISTRY

## PROGRAMME SPECIFIC OUTCOME

**PSO1:** Inculcate interest in research

**PSO2:** Explore deep into various domains of Chemistry

**PSO3:** Develop expertise in interpreting results of instrumental analytical techniques

# COURSE OUTCOME

## SJCHE1C01 : QUANTUM MECHANICS AND COMPUTATIONAL CHEMISTRY

SJCHE1C01.1	To analyze limitations of classical mechanics while applying to sub-atomic level
SJCHE1C01.2	To understand how quantum mechanics is applied, starting from simple systems to hydrogen / like atom/s
SJCHE1C01.3	To understand the basic principles of computational chemistry
SJCHE1C01.4	To apply the principles of computational chemistry to solve simple systems.
SJCHE1C01.5	To evaluate the validity of quantum mechanical treatment with experimental observations, in explaining sub atomic processes
SJCHE1C01.6	To create a logical thinking habit in microscopic systems

## SJCHE1C02 : ELEMENTARY INORGANIC CHEMISTRY

SJCHE1C02.1	To understand the basic principles of bonding
SJCHE1C02.2	To understand the periodic table
SJCHE1C02.3	To understand the chemistry of elements
SJCHE1C02.4	To understand the nuclear chemistry
SJCHE1C02.5	To understand the concepts of acids and bases
SJCHE1C02.6	To study about nanomaterials

## SJCHE1C03 : STRUCTURE AND REACTIVITY OF ORGANIC COMPOUNDS

SJCHE1C03.1	To identify the bonding in organic molecules
SJCHE1C03.2	To identify the structure of organic molecules
SJCHE1C03.3	To predict the reactivity of organic molecules
SJCHE1C03.4	To understand the stereochemistry of the compounds
SJCHE1C03.5	To predict the synthetic routes for asymmetric compounds
SJCHE1C03.6	To study about the conformations of molecules

## SJCHE1C04 : THERMODYNAMICS, KINETICS, AND CATALYSIS

SJCHE1C04.1	To remember the basic principles of classical thermodynamics
SJCHE1C04.2	To understand the need for irreversible thermodynamics
SJCHE1C04.3	To apply the principles of irreversible thermodynamics in different irreversible processes
SJCHE1C04.4	To analyze the kinetics of complex chemical reactions
SJCHE1C04.5	To understand the higher level chemistry of molecular dynamics
SJCHE1C04.6	To understand and to apply various analysis techniques in studying surface chemistry and catalysis

## SJCHE2C05 : GROUP THEORY AND CHEMICAL BONDING

SJCHE2C05.1	To understand the basic principles of group theory
SJCHE2C05.2	To study some theorems in group theory
SJCHE2C05.3	To understand how group theory is applied in molecular spectroscopy
SJCHE2C05.4	To understand how group theory is applied in in chemical bonding
SJCHE2C05.5	To validate VBT and MOT in diatomic molecules

SJCHE2C05.6

To analyze the feasibility of MOT in polyatomic molecules

## **SJCHE2C06 : COORDINATION CHEMISTRY**

SJCHE2C06.1

To understand the basic concept in coordination chemistry

SJCHE2C06.2

To study the feasibility of MOT and CFT in coordination compounds

SJCHE2C06.3

To study the mechanism of substitution reactions

SJCHE2C06.4

To evaluate the magnetic properties of complexes

SJCHE2C06.5

To understand the photochemical reactions of complexes

SJCHE2C06.6

To analyze the Characterizations techniques in coordination chemistry

## **SJCHE2C07 : REACTION MECHANISM IN ORGANIC CHEMISTRY**

SJCHE2C07.1

To understand common substitution and elimination reactions

SJCHE2C07.2

To interpret structure and synthesis of various natural products

SJCHE2C07.3

To analyse the role of intermediates in common reactions

SJCHE2C07.4

To analyse the mechanistic aspects of various name reactions

SJCHE2C07.5

To apply the principles of pericyclic reactions

SJCHE2C07.6

To apply the photochemical reactions in various organic molecules

## **SJCHE2C08 : ELECTROCHEMISTRY, SOLID STATE CHEMISTRY, AND STATISTICAL THERMODYNAMICS**

SJCHE2C08.1

To understand the basic principles of ionic equilibria and electrochemistry

SJCHE2C08.2

To apply the basic principles of electrochemistry to electrochemical cells and fuel cells

SJCHE2C08.3

To understand the basic principles of crystal symmetry, stoichiometry and defects

SJCHE2C08.4

To analyse the electronic, optical and magnetic properties of solids

SJCHE2C08.5

To understand the fundamental concepts of statistical mechanics

SJCHE2C08.6

To evaluate partition functions and thermodynamic properties of gases

## **SJCHE2L04 : INORGANIC CHEMISTRY PRACTICALS- I AND II**

SJCHE2L04.1

To understand the basic concepts of intergroup separation

SJCHE2L04.2

To familiarize the students with reactions of rare elements

SJCHE2L04.3

To gain expertise in preparation of standard solutions

SJCHE2L04.4

To acquire skills in quantitative colorimetric analysis

SJCHE2L04.5

To apply the acquired skills to analyse quality of potable water and food samples

## **SJCHE2L05 : ORGANIC CHEMISTRY PRACTICALS- I AND II**

SJCHE2L05.1

To practice various purification techniques

SJCHE2L05.2

To prepare organic compounds by multistage methods

SJCHE2L05.3

To enable functional group analysis

SJCHE2L05.4

To analyse organic binary mixture

SJCHE2L05.5

To determine the physical constants of organic compounds

SJCHE2L05.6

To apply organic qualitative analysis by microscale techniques

## **SJCHE2L06 : PHYSICAL CHEMISTRY PRACTICALS- I AND II**

SJCHE2L06.1

To determine the molar heat of solution of a substrate

SJCHE2L06.2

To determine phase diagram of a simple eutectic system

SJCHE2L06.3

To determine phase diagram of a binary solid system forming a compound

SJCHE2L06.4

To determine molar refractions of pure liquids

SJCHE2L06.5 To apply the principles of viscosity to determine molecular weight of a polymer

## SJCHE3C09 : MOLECULAR SPECTROSCOPY

SJCHE3C09.1 To understand the basics of microwave spectroscopy  
SJCHE3C09.2 To understand the basics of infrared, Raman, and electronic spectroscopy  
SJCHE3C09.3 To analyse the structure of organic compounds using infrared and electronic spectroscopy  
SJCHE3C09.4 To understand the basics of NMR and ESR spectroscopy  
SJCHE3C09.5 To analyse the structure of organic compounds using NMR spectroscopy  
SJCHE3C09.6 To apply the mass spectrometry for the structure elucidation of organic compounds

## SJCHE3C10 : ORGANOMETALLIC & BIOINORGANIC CHEMISTRY

SJCHE3C10.1 To understand the role of metal ions in biological systems  
SJCHE3C10.2 To understand the significance of enzymes in biological systems  
SJCHE3C10.3 To understand the applications of organometallic compounds  
SJCHE3C10.4 To analyse bonding pattern and stability of organometallic compounds  
SJCHE3C10.5 To understand the reactivity and reactions given by organometallic compounds  
SJCHE3C10.6 To understand the stability of organometallic compounds using 18-electron rule

## SJCHE3C11 : REAGENTS AND TRANSFORMATIONS IN ORGANIC CHEMISTRY

SJCHE3C11.1 To understand the oxidation reactions in organic chemistry  
SJCHE3C11.2 To understand various types of polymerization  
SJCHE3C11.3 To apply the principles of reduction and various coupling reactions in organic synthesis  
SJCHE3C11.4 To analyse natural and artificial supramolecular systems  
SJCHE3C11.5 To analyse the strategy of peptide synthesis  
SJCHE3C11.6 To understand the use of important synthetic reagents for organic reactions

## SJCHE3E01 : SYNTHETIC ORGANIC CHEMISTRY

SJCHE3E01.1 To understand the chemistry of carbonyl condensation reactions  
SJCHE3E01.2 To understand the chemistry of fused and higher ring heterocyclics  
SJCHE3E01.3 To understand the basic principle of multistep synthesis.  
SJCHE3E01.4 To apply metal catalyzed coupling reaction in organic synthesis.  
SJCHE3E01.5 To apply organometallic and organo-nonmetallic reagents in organic synthesis.  
SJCHE3E01.6 To apply reagents for oxidation reduction reactions

## SJCHE4C12 : INSTRUMENTAL METHODS OF ANALYSIS

SJCHE4C12.1 To study the errors in Chemical analysis  
SJCHE4C12.2 To study the principle and working of various optical instruments  
SJCHE4C12.3 To understand the working and application of various analytical instruments  
SJCHE4C12.4 To understand the principle of conventional analytical procedures

SJCHE4C12.5	To study the thermal and radiochemical methods
SJCHE4C12.6	To understand the basic principle of Chromatography

## SJCHE4E05 : INDUSTRIAL CATALYSIS

SJCHE4E05.1	To study the principles of catalysis
SJCHE4E05.2	To understand the synthesis of different catalyst
SJCHE4E05.3	To study deactivation of catalysts
SJCHE4E05.4	To understand the basic concepts in phase transfer catalysis
SJCHE4E05.5	To study the industrial catalysis
SJCHE4E05.6	To study the biocatalysis

## SJCHE4E08 : ORGANOMETALLIC CHEMISTRY

SJCHE4E08.1	To understand the stability of metal carbonyls
SJCHE4E08.2	To understand the structure and synthesis of organometallic pi-complexes
SJCHE4E08.3	To understand the applications of organometallic compounds
SJCHE4E08.4	To analyse bonding pattern and stability of organometallic compounds
SJCHE4E08.5	To understand the reactivity and reactions given by organometallic compounds
SJCHE4E08.6	To understand the stability of organometallic compounds using 18-electron rule

## SJCHE4L10 : INORGANIC CHEMISTRY PRACTICALS- III AND IV

SJCHE4L10.1	To develop skill in the separation techniques of inorganic mixtures
SJCHE4L10.2	To apply the principles of gravimetric analysis to inorganic compounds
SJCHE4L10.3	To apply the principles of colourimetry to inorganic compounds
SJCHE4L10.4	To apply the principles of different types of volumetric analysis

## SJCHE4L11 : ORGANIC CHEMISTRY PRACTICALS- III AND IV

SJCHE4L11.1	To introduce various food colours
SJCHE4L11.2	To determine the purity of organic compounds by chromatographic methods
SJCHE4L11.3	To understand common methods of extraction of natural products
SJCHE4L11.4	To analyse organic compounds by quantitative methods
SJCHE4L11.5	To apply the principles of colourimetry to organic compounds

## SJCHE4L12 : PHYSICAL CHEMISTRY PRACTICALS- III AND IV

SJCHE4L12.1	To determine specific reaction rate
SJCHE4L12.2	To determine phase diagram of a ternary liquid system
SJCHE4L12.3	To determine surface area of adsorbent
SJCHE4L12.4	To determine molecular mass of a solute using depression in freezing point of a liquid solvent
SJCHE4L12.5	To apply HF/6-31G level of theory to determine various physical constants

## SJCHE4P01 : RESEARCH PROJECT

SJCHE4P01.1	To understand the relevance of the topic and statement of the problem
SJCHE4P01.2	To understand the relevance of the topic and statement of the problem
SJCHE4P01.3	To interpret the results obtained
SJCHE4P01.4	To present the work and to develop communication skills

## SJCHE4V01 : VIVA VOCE

SJCHE4V01.1	To assess the grasp of knowledge gained by the student
SJCHE4V01.2	To test the communication skill in translation of knowledge
SJCHE4V01.3	To motivate the student for higher studies in the field through interaction