

MASTER OF
SCIENCE
(CHEMISTRY)

COURSE OUTCOMES
SEMESTER I

16CHE21C1 Inorganic
Chemistry-I

CO1: To explain bonding in main group compounds.

CO2: To predict the shapes and energetics of hybridisation of main group compounds.

CO3: To explain the mechanisms of displacement reactions in octahedral and square planar complexes.

CO4: To understand the structures and properties of isopoly and heteropoly acids and salts.

CO5: To explain crystal structures of selected binary and tertiary compounds.

16CHE21C2 Physical Chemistry-I

CO1: To explain various concepts of quantum mechanics and amp, wave mechanics.

CO2: To explain detailed application and amp, need of first and amp, second law of thermodynamics.

CO3: To discuss in detail Debye huckel theory for solutions.

CO4: To explain Collision theory of reaction rates and activated complex theory.

16CHE21C3 Organic Chemistry-I

CO1: To differentiate between chiral and achiral molecules.

CO2: To know the relationship between enantiomers and their specific rotations.

CO3: To differentiate between simple synthesis and asymmetric synthesis of organic molecules.

CO4: To analyse the structure of carbohydrates, natural and synthetic dyes.

CO5: To deliver the importance of reaction mechanisms.

16CHE21CL1 Inorganic Chemistry Practical-I

CO1: To determine iodide, hydrazine and antimony(III) using potassium iodide.

CO2: To determine antimony (III), aluminium, magnesium, and zinc using potassium bromate.

CO3: To determine calcium, copper and barium using EDTA (forward and back titrations).

CO4: To determine strengths of metal ions in the presence of masking agents.

CO5: To synthesise metal acetylacetonato complexes using green methods.

16CHE21CL2 Physical Chemistry Practical-I

CO1: To describe various conductometric titrations of strong acid/strong base, weak acid/weak base, strong acid/weak base and weak acid/strong base.

CO2: To describe applications of thermo chemistry in determination of heat of neutralisation.

CO3: To know the handling of instruments such as refractometer.

CO4: To know the adsorption and surface tension practically.

16CHE21CL3 Organic Chemistry Practical-I

CO1: To demonstrate the knowledge of separation of organic compounds from binary mixture.

CO2: To recognise different types of procedures for separation, identification and purification of organic compounds.

CO3: To apply basic chemical concepts to write the mechanism of the derivatives.

CO4: To describe different methods for separation of mixtures.

16CHE21F1 Computer for Chemists

CO1: To recognise different parts of the computer and their functioning.

CO2: To describe computer applications in different fields.

CO3: To identify the problems and their solutions by flow charts and decision tables.

CO4: To describe Information Technology and their application.

SEMESTER II

16CHE22C1 Inorganic Chemistry-II

CO1: To explain bonding in transition metal complexes.

CO2: To derive spectroscopic states from spectroscopic terms and interpret Orgel diagrams and Tanabe Sugano diagrams.

- CO3: To explain electronic spectra of complexes.
- CO4: To apply fundamentals of magneto chemistry in structure determination.
- CO5: To explain structure and bonding in selected metal clusters and transition metal-pie complexes.

16CHE22C2 Physical Chemistry-II

- CO1: To understand various concepts of quantum mechanics and their applications.
- CO2: To study detailed application and amp, third law of thermodynamics and systems of one component as well as multi component systems.
- CO3: To study mechanism and further studies in chain reactions.
- CO4: To explain ion transport in solutions.

16CHE22C3 Organic Chemistry-II

- CO1: To identify and differentiate between aromatic and aliphatic nucleophilic substitution reactions.
- CO2: To be able to understand all different kind of mechanisms given by different compounds.
- CO3: To know about the regio and chemoselectivity and different type of elimination and addition reactions.
- CO4: To develop capacity to solve the organic reaction mechanism related problems.
- CO5: To develop a clear understanding about the reactions for addition to the carbon-carbon and carbon-hetero bond.

16CHE22CL1 Inorganic Chemistry Practical-II

- CO1: To separate and determine binary mixtures of metal ions using volumetric methods.
- CO2: To separate and determine binary mixtures of metal ions using gravimetric
- CO3: To determine strengths of ferrous, oxalate and nitrite ions using Cerimetry.
- CO4: To know the handling of Cerimetry.

16CHE22CL2 Physical Chemistry Practical-II

- CO1: To describe various potentiometric titrations of strong acid/strong base and weak acid/

strong base, etc.

CO2: To describe the concept of pH through working of instruments like pH meter.

CO3: To determine partition coefficient of various systems.

CO4: To determine equilibrium constants of various systems.

16CHE22CL3 Organic Chemistry Practical-II

CO1: To handle organic chemicals in a safe and competent manner.

CO2: To perform the standard techniques used in practical organic chemistry.

CO3: To carry out multistep synthesis of organic compounds following a prescribed procedure.

CO4: To develop skills to determine the mechanism of the performed practicals.

CO5: To characterise and purify the synthesised compounds.

16CHE22D1 General Spectroscopy

CO1: To study the spectra of compounds and propose structures for compounds.

CO2: To determine functional groups and write structures.

CO4: To develop capacity to solve the organic reaction mechanism related problems.

CO5: To develop a clear understanding about the reactions for addition to the carbon-carbon and carbon-hetero bond.

16CHE22O1 Environmental Chemistry-I

CO1: To demonstrate knowledge of chemical and biochemical principles of fundamental environmental processes in air, water and soil.

CO2: To recognise different types of toxic substances and responses and analyse toxicological information.

CO3: To apply basic chemical concepts to analyse chemical processes involved in different environmental problems (air, water and soil).

CO4: To describe causes and effects of noise pollution and discuss some mitigation strategies.

SEMESTER III

17CHE23GA1 Inorganic Special-I (Instrumental Techniques)

CO1: To identify and characterise the molecule on the basis of spectroscopic study.

CO2: To apply vibrational spectroscopy to identify modes of bonding of ambidentate ligands and active sites of metalloproteins.

CO3: To apply ESR in transition metals with unpaired electrons.

CO4: To find application of mass, mossbauer, nmr and nqr spectroscopy in various fields.

17CHE23GA2 Inorganic Special-II (Nuclear and Radiochemistry)

CO1: To explain origin of nuclear energy and decay of unstable nuclei.

CO2: To explain structure of the nucleus based on experimental evidence.

CO3: To discuss the impact of radiation on matter.

CO4: To describe the various methods of detecting nuclear radiation.

CO5: To explain types and mechanism of nuclear reactions.

17CHE23GA13 Inorganic Special-III (Bioinorganic Chemistry Environmental chemistry)

CO1: To identify the essential and trace elements found in nature and describe their function.

CO2: To explain how metal ions contribute to functioning of vital biological systems.

CO3: To explain the structure and function of vial metalloproteins and metalloenzymes.

CO4: To explain the composition of the atmosphere.

CO5: To explain the impact of foreign particles (chemicals, noise, etc.) released in the atmosphere.

17CHE23GAL1 Inorganic Special Practical-I

CO1: To synthesise different coordination complexes.

CO2: To observe the various colours associated with particular complexes.

CO3: To compare the properties of the complexes by preparing similar complexes by changing the metal.

CO4: To analyze the samples and estimate their yield.

17CHE23GAL2 Inorganic Special Practical-II

CO1: To determine concentrations of selected cations and anions spectrophotometrically.

CO2: To determine pK value of an indicator spectrophotometrically.

CO3: To determine the stoichiometry and stability constants of complexes by Job's method/Slope ratio method.

CO4: To know handling of spectrophotometer.

17CHE23GAL3 Inorganic Special Practical-III

- CO1: To determine selected metal ions and mixtures polarographically.
CO2: To conduct amperometric titrations.
CO3: To estimate metal ions by atomic absorption spectrometry and flame photometry.
CO4: To interpret graphs of DTA/TGA for a given sample.

17CHE23O1 Environmental Chemistry-II

- CO1: To demonstrate knowledge of water quality parameters and standards.
CO2: To recognise different types of toxic substances for soil pollution and industrial pollution.
CO3: To describe causes and effects of environmental pollution by energy industry and discuss some mitigation strategies.
CO4: To explain the importance and principles of green chemistry.

SEMESTER IV

17CHE24GA1 Inorganic Special-IV (Organotransition metal Chemistry)

- CO1: To define and identify an organometallic compound.
CO2: To write their structures, synthesis and reaction mechanism.
CO3: To apply their properties for different applications like polymerisation, catalytic hydrogenation, etc.
CO4: To comment on their kinetics and stability.

17CHE24GA2 Inorganic Special-V (Electroanalytical Chemistry)

- CO1: To compare the advantages and/or disadvantages of dropping mercury electrode.
CO2: To describe how a coulometric titration is performed and discuss the advantages of a coulometric titration over a conventional redox titration.
CO3: To describe the process of performing an amperometric titration.
CO4: To discuss the theory of stripping voltametry and ion selective electrode.

17CHE24GA3 Inorganic Special-VI (Medicinal aspects of Inorganic Chemistry)

CO1: To identify the metal deficiency diseases and treat them with proper therapy.

CO2: To become familiar with carcinogens, tumor growth and role of various metals in anti-cancer activity.

CO3: To discuss role of ligands and their beneficial effects as chelating agents in anti cancer drugs.

CO4: To apply knowledge of nuclear medicine as they study about radioiodine-131, technitium-99m, gallium and indium.

17CHE24GDAL1 Inorganic Special Practical-IV

CO1: To interpret the structure and bonding of inorganic compounds from IR spectra.

CO2: To interpret the structure and bonding of coordination compounds from IR spectra.

CO3: To differentiate between the isomers from IR spectra.

CO4: To interpret spectra of isomer.

17CHE24GDAL2 Inorganic Special Practical-V

CO1: To perform titrations of strong acid-strong base, weak acid-strong base and strong acid-weak base conductometrically.

CO2: To perform titrations of precipitation and displacement reactions conductometrically.

CO3: To describe various potentiometric titrations.

CO4: To perform titrations of organic acids by pH metery.

17CHE24GDAL3 Inorganic Special Practical-VI

CO1: To identify the capacity of a cation exchange resin.

CO2: To determine the capacity of an anion exchange resin.

CO3: To identify the ions by Ion exchangers.

CO4: To know about the column chromatography.

PROGRAMME OUTCOMES

PO1: To appreciate the achievements in chemistry and know the role of chemistry in nature and society.

- PO2: To develop scientific outlook not only with respect to chemistry subject but also in all aspects related to science and technology.
- PO3: To demonstrate and apply the fundamental knowledge of the basic principles in various fields of chemistry.
- PO4: Create awareness and sense of responsibilities towards the environment and apply knowledge to solve the issues related to environmental pollution.
- PO5: It would help students to collaborate effectively in the field of chemistry.
- PO6: Have developed their critical reasoning, judgement and communication skills.
- PO7: 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.
- PO8: To inculcate logical thinking to address a problem and become result oriented with a positive attitude.

PROGRAMME SPECIFIC OUTCOMES

- PSO1: To understand the nature of bonding and hybridisation of compounds.
- PSO2: To analyze the reaction mechanism and structure of transition metal complexes.
- PSO3: To analyze the bonding and stereochemistry of organic molecules.
- PSO4: To understand the various instrumental techniques for structural study of compounds.
- PSO5: To perform thermodynamic and surface studies of the liquid mixtures.
- PSO6: To understand nuclear, radio analytical techniques and corrosion technology.
- PSO7: To analyze the bioorganic, bioinorganic chemistry and heterocyclic chemistry and their applications.

