



# Satish Pradhan Dnyanasadhana College, Thane

(Arts, Science and Commerce)

Re-Accredited "B+" Grade (CGPA 2.69) by NAAC, ISO 21001:2018 (Certified)

Affiliated to University of Mumbai

## M.Sc. Chemistry

### Program Specific Outcome

PSO1	Understand the fundamental concepts, principles, and processes of Chemistry.
PSO2	Employ critical thinking and scientific knowledge to solve problems in Chemistry
PSO3	Design, carry out, record, and analyze the results of chemical experiments and develop research-oriented skills. Understand safety of chemicals, preparation of solution and find out the green route of chemical reaction for sustainable development.
PSO4	Appreciate the central role of Chemistry in our society, to opt for higher education, disciplinary & multi-disciplinary research and to be a life-long learner.



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Department	Semester	Course Name
M.Sc. (Organic Chemistry)	I	Inorganic Chemistry-I

CO No.	Course Outcomes	Bloom's Level	PO / PSO
CO1	Understanding the concept of hybridization Derivation of wave functions apply this concept to construct MOT diagrams for diatomic species & Polyatomic species.	L2 L3 L6	PO2 PO4 PSO1
CO2	Explain the fundamental ideas of molecular symmetry and group theory apply this to construction of character tables for point groups $C_{2v}$ , $C_{3v}$ and $C_{2h}$ , structure of character tables.	L2 L3 L6	PO2 PO4 PSO2
CO3	Outline the fundamental ideas of material science and solid state chemistry.	L3	PO1 PSO1
CO4	Understanding of the many methods used to characterize coordination molecules. Apply knowledge to analyze spectral, optical and magnetic properties of the transition metal complexes.	L2 L4 L3	PO1 PO3 PSO2



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Department	Semester	Course Name
M.Sc. (Organic Chemistry)	I	Organic Chemistry-I

CO No.	Course Outcomes	Bloom's Level	PO /PSO
CO1	Identify an organic compound's reactivity based on its structure. Describe a fundamental idea for Mechanisms of organic reactions. Learn the various techniques utilized to determine the Organic Reaction Mechanism  Evaluate various aspects of reaction mechanisms and kinetics, including product analysis, kinetic studies, and the use of isotopes such as the kinetic isotope effect.	L1 L2 L3 L5	PO1 PO4 PSO2
CO2	Apply the different symmetry components of organic molecules to understand the fundamental concept of stereochemistry. Identify the nomenclature of various stereo chemical phenomena Using substitution and symmetry criteria, evaluate the identification of chiral and prochiral centers.	L2 L3 L5	PO3 PSO1
CO3	Outline the methods for creating and modifying compounds using aromatic nucleophilic substitution processes.  Outline the steps involved in making Aliphatic nucleophilic substitution reactions. Understand the concept of aromaticity and to know the nature of bonds, electronic effects and other properties of molecules.	L2 L3	PO2 PO4 PSO1
CO4	Outline the actions, selectivity, and uses of various oxidizing and reducing agents. understand the general mechanism of dehydrogenation reaction	L4 L2	PO2 PSO2



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Department	Semester	Course Name
M.Sc. (Organic Chemistry)	I	Analytical Chemistry-I

CO No.	Course Outcomes	Bloom's Level	PO /PSO
CO1	Applying the fundamental understanding of quality inspection, quality management, and quality systems. Outline the fundamentals of the language applied analytical chemistry with respect to errors involved, safety in laboratories and quality in it	L2 L3	PO1 PO3 PSO1
CO2	Implement the fundamental calculations needed for chemical analysis. analyze the principles and applications of oxidation numbers and redox reactions	L3 L4	PO2 PSO3
CO3	Analyze the experimental data using analytical methods. Understand the fundamental ideas behind optical instrumentation techniques including UV-Visible Spectroscopy and FTIR.	L2 L4	PO1 PO2 PSO1
CO4	Outline the various thermal techniques, like TGA, DTA, and DSC. Understand the advantages of automation in the field of chemical analysis.	L2	PO1 PSO1



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Department	Semester	Course Name
M.Sc. (Organic Chemistry)	I	Chemistry Practical-I (Organic Chemistry and Analytical Chemistry)

CO No.	Course Outcomes	Bloom's Level	PO /PSO
CO1	Perform one-step preparation in laboratory with basic understanding of stoichiometry	L1 L6	PO3 PSO3 PSO4
CO2	Calculate percentage yield, find the physical constant, analyze and apply the purification techniques.	L1 L4	PO2 PO3 PSO3 PSO4
CO3	Learn and apply the non-aqueous titration idea when analyzing samples.	L1 L4	PO4 PSO3 PSO4
CO4	Operate and become familiar with the SOPs for instruments such as spectrophotometers, conductivity meters, colorimeters, and potentiometers.	L4	PO2 PO4 PSO3 PSO4



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Department	Semester	Course Name
M.Sc. (Organic Chemistry)	I	Physical Chemistry-I (Elective)

CO No.	Course Outcomes	Bloom's Level	PO /PSO
CO1	Understand principles of chemical thermodynamics and apply it to the real gasses, solutions, surfaces, and their respective energies.	L1 L2	PO2 PSO1
CO2	Derive the Schrodinger equation and learn its applications in the field of quantum chemistry.	L1 L4	PO1 PSO2



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Department	Semester	Course Name
M.Sc. (Organic Chemistry)	I	Physical and Inorganic Chemistry Practical-I (Elective Practical I)

CO No.	Course Outcomes	Bloom's Level	PO /PSO
CO1	Understand knowledge of SOPs and use of instruments like pH metry, spectrophotometers, conductivity meters, and potentiometers and apply it for analysis of samples	L1 L2 L3	PO1 POS1
CO2	To learn preparation of solutions and gain knowledge of chemical kinetics and advanced thermodynamics concepts related to chemical reactions.	L2 L6	PO3 PSO3
CO3	Using chemical analysis to efficiently apply fundamental ideas for metal ion estimation and separation from constituent ores and alloys	L1 L4	PO2 PO4 PSO1
CO4	Understand and apply the use of instrumental methods to quantitative analysis.	L1 L3	PO2 PSO3



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Department	Semester	Course Name
M.Sc. (Organic Chemistry)	I	Physical Chemistry-II(Elective)

CO No.	Course Outcomes	Bloom's Level	PO /PSO
CO1	Analyze different chemical kinetics theories and the impact of temperature on reaction rates.	L1 L4	PO2 PSO1
CO2	Apply the idea of bio electrochemistry to assess the resting membrane potential.	L1 L3	PO2 PSO1



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Department	Semester	Course Name
M.Sc. (Organic Chemistry)	I	Physical and Inorganic Chemistry Practical-I (Elective Practical II)

CO No.	Course Outcomes	Bloom's Level	PO /PSO
CO1	Understand knowledge of SOPs and use of instruments like pH metry, spectrophotometers, conductivity meters, and potentiometers and apply it for analysis of samples	L1 L2 L3	PO2 PSO1
CO2	To learn about chemical kinetics and advanced thermodynamics concepts related to chemical reactions. Interpret data by using graphs. Prepare & Standardize solutions	L2 L6	PO2 PO4 PSO3
CO3	Using chemical analysis to efficiently apply fundamental ideas for metal ion estimation and separation from constituent ores and alloys	L1 L4	PO2 PSO1
CO4	Understand and apply the use of instrumental methods to quantitative analysis.	L1 L3	PO1 PSO1



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Department	Semester	Course Name
M.Sc. (Organic Chemistry)	I	Research Methodology

CO No.	Course Outcomes	Bloom's Level	PO /PSO
CO1	Understand knowledge about finding data from digital and journal sources and apply it for searching research papers and review article	L2 L3	PO1 PSO1
CO2	The investigative approach includes measuring and documenting data using SI units, scientific methodologies, and experiment design. Analysis and Presentation of Data Interpret the results using mathematical and statistical tools	L1 L2 L4	PO2 PO4 PSO3
CO3	Writing and presenting scientific articles, as well as understanding methods for data analysis. Explain the process of conducting research, identifying research problems, and writing proposals.	L1 L2 L5	PO3 PSO2
CO4	Understand safe working procedures for handling chemicals, disposal of waste chemicals, reuse of laboratory chemicals, and transportation of hazardous chemicals.	L1 L3	PO1 PSO2



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Department	Semester	Course Name
M.Sc. (Organic Chemistry)	II	Inorganic Chemistry-II

CO No.	Course Outcomes	Bloom's Level	PO /PSO
CO1	outline the fundamentals of stereochemistry and substitution in inorganic reaction and construct mechanisms. redox reactions.	L3 L6	PO1 PO2 PSO1
CO2	Explain the fundamental ideas behind the organometallic chemistry of transition metals. Preparation of metal derivatives. Determine properties of metal compound	L2 L5 L6	PO2 PSO2
CO3	Explain environmental chemistry in terms of radioactive releases and the toxicity of heavy metals.	L4	PO1 PSO1
CO4	Outline the functions of the metal ions Fe, Cu, N, and Pt in biologically active substances such as enzymes, cytochromes, and Hb and Mb. Explain medicinal applications of cis-platin and related compounds	L2 L4	PO2 PSO1 PSO3



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Department	Semester	Course Name
M.Sc. (Organic Chemistry)	II	Organic Chemistry-II

CO No.	Course Outcomes	Bloom's Level	PO /PSO
CO1	Analyze the sort of mechanism and intermediates found in the given organic reaction and provide evidence of the mechanism.	L3	PO1 PO2 PSO1
CO2	Understand the HOMO-LUMO concept and its significance in organic chemistry. Learn basic concepts and principal of organic spectroscopic methods such as UV-Visible and IR apply it for interpret structure	L2 L3 L4	PO1 PO2 PSO3
CO3	Identify and explain the mechanism of rearrangement reaction with stereochemistry and its applications.		PO1 PSO1
CO4	Understand basic concepts of organic spectroscopic methods such as, Mass, $^1\text{H NMR}$ and $^{13}\text{C NMR}$ and apply it for interpretation structure	L1 L2	PO1 PO2 PSO3



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Department	Semester	Course Name
M.Sc. (Organic Chemistry)	II	Analytical Chemistry-II

CO No.	Course Outcomes	Bloom's Level	PO /PSO
CO1	Classify Chromatographic method and describe method with examples. To comprehend principles of Gas Chromatography and High Performance Liquid Chromatography technique and apply knowledge for qualitative and quantitative analysis	L2 L3 L4	PO2 PSO1 PSO2
CO2	Compare X-ray spectroscopy method of absorption, fluorescence and diffraction To understand the use of X-ray spectroscopy and apply knowledge for qualitative and quantitative analysis. To study theories of mass spectrometry and its application.	L5 L2 L3	PO3 PSO1 PSO2
CO3	Outline important analytical techniques include SEM, STM, TEM and atomic spectroscopy techniques. Interpret the schematic diagram of SEM, STM, TEM and AAS, label its critical components. assess the applications and limitations of AAS.	L3 L5	PO1 PO4 PSO1 PSO3
CO4	Understand the application of Ion selective electrodes, Coulometry and Electrogravimetry Execute the essential calculations required for chemical analysis.	L2 L3	PO1 PO2 PSO1



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M.Sc. (Organic Chemistry)	II	Chemistry Practical-I (Organic Chemistry and Analytical Chemistry)

CO No.	Course Outcomes	Bloom's Level	PO /PSO
CO1	To understand and perform separation of binary mixtures of organic compounds based on their chemical properties	L2 L6	PO1 PO5 PSO1 PSO2 PSO3
CO2	Determine chemical type, element, functional group, physical constant of two separated compound synthesize derivatives from one of the separated compounds Understand and Apply recrystallization technique for purification compound.	L2 L3 L5 L6	PO1 PO2 PO4 PSO1 PSO3
CO3	Know each instrument's SOPs and standardize the instruments before its use. Understand SOPs of all instrument and standardize instrument Perform instrumental methods like spectrophotometers, conductivity meters, and flame photometer of analysis of given samples. Prepare and standardize solutions	L2 L3 L4 L5	PO1 PO2 PO4 PSO1 PSO2 PSO3
CO4	Determine the percentage amount of lead and tin from a solder alloy by complexometric titration Determine the amount of Cu(II) present in the given solution.	L5	PO2 PO4 PSO2 PSO3



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M.Sc. (Organic Chemistry)	II	Physical Chemistry-I (Elective:I)

CO No.	Course Outcomes	Bloom's Level	PO /PSO
CO1	Understand the principles of quantum chemistry and employ it to solve problems related to 1D box, 2D box, 3D box. To learn applications of HMO and Determine the $\pi$ -electron energy and wave function for ethylene 1,3-butadiene, cyclobutadiene and benzene molecule Interpret radial and angular plots, and understand the concept of maximum probability	L2 L3 L5	PO1 PO4 PSO1 PSO2 PSO3
CO2	Interpret the nature of electronic spectra and primary processes in terms of electronic structure and molecular properties. Apply selection rules to determine which electronic transitions are allowed or forbidden based on conservation principles. Evaluate quenching mechanisms produced by excimer and exciplex emission	L3, L4 L5	PO2 PO4 PSO3



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M.Sc. (Organic Chemistry)	II	Physical and Inorganic Chemistry Practical I (Elective)

CO No.	Course Outcomes	Bloom's Level	PO /PSO
CO1	Apply potentiometry's principles to determine a silver-ammonia complex's formula. Analyze conductivity data obtained at various concentrations of sodium lauryl sulfate to determine the Critical Micelle Concentration (CMC) Execute experiments using spectrophotometry to determine the Michaelis-Menten constant (Km) value of the enzyme Beta Amylase.	L3 L4 L6	PO2 PO4 PSO2
CO2	Apply the principles of dilatometry for determination of rate constant of the decomposition reaction of diacetone alcohol evaluate phase diagrams of ternary systems involving water, chloroform/toluene, and acetic acid. Use the angular part of the wave functions of hydrogen atoms to generate polar plots of atomic orbitals.	L3 L5 L6	PO3 PO4 PSO2
CO3	Evaluate the synthesis of copper complex, cobalt complex and Nickel complex Estimate of copper, cobalt and Nickel present in their complex	L4 L5	PO3 PO4 PSO2
CO4	Determine the electrolytic nature of inorganic materials using conductance measurements. Evaluate experimental data obtained from the slope-intercept method to determine the equilibrium constant for the formation of the complex $\text{Fe}^{3+}/\text{SCN}^-$	L3 L4	PO2 PO4 PSO3



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M.Sc. (Organic Chemistry)	II	Physical Chemistry-II (Elective:II)

CO No.	Course Outcomes	Bloom's Level	PO /PSO
CO1	Analyze standard free energy changes in biochemical reactions applying the principles of bioenergetics Understand chemical thermodynamics concept and apply it to derive equations.	L3 L2 L6	PO1 PO2 PSO3
CO2	Understand the principles of enzyme kinetics and apply it to analyze reaction mechanisms using Michaelis-Menten, Lineweaver-Burk, and Eadie-Hofstee analyses. Evaluate the impact of metal ions and pH on the activity of enzymes	L2 L3 L5	PO3 PSO3



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Department	Semester	Course Name
M.Sc. (Organic Chemistry)	II	Physical and Inorganic Chemistry Practical I (Elective) CHEM50712

CO No.	Course Outcomes	Bloom's Level	PO /PSO
CO1	Apply potentiometry's principles to determine a silver-ammonia complex's formula. Analyze conductivity data obtained at various concentrations of sodium lauryl sulfate to determine the Critical Micelle Concentration (CMC) Execute experiments using spectrophotometry to determine the Michaelis-Menten constant ( $K_m$ ) value of the enzyme Beta Amylase.	L3 L4 L6	PO2 PO4 PSO2 PSO3
CO2	Apply the principles of dilatometry for determination of rate constant of the decomposition reaction of diacetone alcohol evaluate phase diagrams of ternary systems involving water, chloroform/toluene, and acetic acid. Use the angular part of the wave functions of hydrogen atoms to generate polar plots of atomic orbitals.	L3 L5 L6	PO3 PO4 PSO2 PSO3
CO3	Evaluate the synthesis of copper complex, cobalt complex and Nickel complex Estimate of copper, cobalt and Nickel present in their complex	L4 L5	PO2 PO3 PO4 PSO2 PSO3
CO4	Determine the electrolytic nature of inorganic materials using conductance measurements. Evaluate experimental data obtained from the slope-intercept method to determine the equilibrium constant for the formation of the complex $Fe^{3+}/SCN^-$	L3 L4	PO2 PO4 PSO2 PSO3



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Department	Semester	Course Name
CHEMISTRY (M.Sc – Part - II)	III	Theoretical Organic Chemistry – I

CO No.	Course Outcomes	Bloom's Level	PO PSO
CO1	Recall and explain the fundamental principles of organic reactive intermediates, analyze the mechanisms of neighboring group participation, synthesize knowledge of pericyclic reactions to evaluate reaction outcomes, comprehensive understanding and application of advanced concepts in organic chemistry.	L1 L2 L4 L5	PO1 PO2 PSO1
CO2	Interpret the details of pericyclic reactions, evaluate the effects of substituents on reaction outcomes and create innovative approaches to synthesize complex molecules using pericyclic reactions, synthesize knowledge of sigmatropic rearrangements and electrocyclic reactions to design novel synthetic pathways.	L2 L5 L6	PO2 PO3 PSO2
CO3	Classify point groups and describe symmetry elements with examples, analyze the conformational behavior of medium rings and their reactions, compare the stereochemistry of complex fused and bridged ring systems, and apply their understanding to evaluate the effects of conformation on the reactivity of cyclohexane derivatives.	L1 L2 L4 L5	PO1 PO2 PSO2
CO4	Interpret photochemistry principles, apply energy dissipation concepts, evaluate carbonyl and olefin photo-reactions, analyze arena photo cycloadditions, and assess singlet oxygen's role in photo-oxygenation, achieving an understanding of photochemical processes.	L2 L3 L5	PO3 PO4 PSO2



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Department	Semester	Course Name
CHEMISTRY (M.Sc – Part - II)	III	Synthetic Organic Chemistry – I

CO No.	Course Outcomes	Bloom's Level	PO/PSO
CO1	Understand the mechanisms and applications of key name reactions, apply their knowledge to analyze domino and multicomponent reactions, create new synthetic pathways by integrating concepts from click reactions.	L2 L3 L6	PO1 PO2 PSO1
CO2	Understand and explain the generation, stability, and reactivity of free radicals, evaluate characteristic radical reactions including substitutions and additions, synthesize new understanding by creating innovative approaches to radical synthesis, such as intermolecular C-C bond formation and assessing the outcomes of advanced reactions.	L2 L3 L5 L6	PO1 PO2 PSO3
CO3	Comprehend the formation and utility of enamines in organic synthesis, analyze the reactivity of enamines versus enolates and synthesize asymmetric reactions using chiral enamines, evaluate the preparation and applications of phosphorus ylides and create novel synthetic methods.	L2 L4 L5 L6	PO2 PO3 PSO1
CO4	Understand the utilization of metals and non-metals in organic synthesis, apply knowledge to explore mercury and organoboron reactions, evaluate organosilicones for bond formation, and synthesize advanced organic transformations using different organic reagents.	L2 L3 L5	PO1 PO4 PSO2



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Department	Semester	Course Name
CHEMISTRY (M.Sc – Part - II)	III	Natural Products and Spectroscopy – I

CO No.	Course Outcomes	Bloom's Level	PO/PSO
CO1	Identify and describe carbohydrate structures, analyze natural pigments, synthesize insect pheromone syntheses, and evaluate alkaloid applications, integrating knowledge across organic chemistry's natural products spectrum.	L1 L2 L4 L5	PO1 PO2 PSO 1
CO2	Comprehend advanced synthesis techniques, synthesize innovative pathways for natural products, and evaluate their biological and industrial applications, assess impacts, devise strategies and judge the significance of lipids and growth regulators in health and agriculture.	L2 L5 L6	PO1 PO2 PSO2
CO3	Understand and apply advanced NMR techniques, analyze spectral data, synthesize solutions for spectral problems, and evaluate spectroscopic methods, apply knowledge to analyze complex spectra, synthesize strategies for accurate structure elucidation, and evaluate the reliability of spectroscopic analyses in research.	L2 L3 L4 L5 L6	PO1 PO2 PSO3
CO4	Understand DEPT experiments, apply 2D NMR, analyze NOE/NOESY for molecular insights, and evaluate the efficacy of these techniques in structural analysis, understand UV, IR, and Mass spectroscopy basics, apply them to spectral problems, analyze data for structure determination, synthesize multi-technique strategies, and evaluate their spectral problem-solving accuracy.	L2 L3 L4 L5 L6	PO1 PO2 PSO3



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Department	Semester	Course Name
CHEMISTRY (M.Sc – Part - II)	III	Medicinal, Biogenesis and green chemistry

CO No.	Course Outcomes	Bloom's Level	PO/PSO
CO1	Remember essential medicinal chemistry terms and apply concepts that influence bioactivity, analyze pharmacokinetics and the role of physicochemical properties in drug interaction, apply lead discovery methods, and analyze lead modification strategies to enhance drug effectiveness.	L1 L3 L4	PO1 PO2 PSO1
CO2	Understand QSAR studies, apply modern drug design techniques, synthesize new drug candidates, and evaluate their therapeutic potential, understand the significance of prodrugs, apply synthesis methods for key pharmaceuticals, create innovative solutions in drug development.	L2 L3 L5 L6	PO1 PO4 PSO3
CO3	Remember the basics of metabolite biosynthesis, understand key biosynthetic pathways, analyze the details of these processes, and synthesize this knowledge to predict the formation of natural products.	L1 L2 L4 L5	PO1 PO3 PSO2
CO4	Know the core principles of green chemistry and apply them to design sustainable syntheses using green reagents, synthesize environmentally friendly chemical processes and evaluate the benefits and challenges of nano catalysts, comparing green methods to traditional ones.	L1 L2 L3 L5 L6	PO1 PO2 PSO1



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Department	Semester	Course Name
CHEMISTRY (M.Sc – Part - II)	III	Theoretical organic chemistry-I & Synthetic Organic Chemistry-I Practical

CO No.	Course Outcomes	Bloom's Level	PO/PSO
CO1	Remember and Understand the fundamental principles and procedures for separating ternary mixtures of organic compounds based on their physical and chemical properties, including solubility and phase differences.	L1 L2	PO4 PSO3
CO2	Understand the rationale behind using microscale techniques for the identification of organic compounds, apply micro-scale techniques to effectively separate and identify components within a ternary mixture.	L2 L3	PO1 PSO3
CO3	Analyze the separated components to determine their purity and suitability for subsequent derivative preparation, synthesize new derivatives from one of the separated compounds.	L4 L6	PO2 PSO3
CO4	Evaluate the efficiency and apply green chemistry principles throughout the separation, identification, and considering the environmental and economic impacts of their laboratory practices.	L3 L5	PO6 PSO3



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Department	Semester	Course Name
CHEMISTRY (M.Sc – Part - II)	III	Natural products and Spectroscopy & Medicinal , Biogenesis and green chemistry Practical

CO No.	Course Outcomes	Bloom's Level	PO/PSO
CO1	Remember the concepts of organic synthesis, including reaction parameters, stoichiometry, and safety aspects such as Material Safety Data Sheets (MSDS), understand the mechanisms involved in organic reactions and interpret the expected spectral data for both starting materials and final products.	L1 L2 L3	PO4 PSO3
CO2	Design a plan for the synthesis of organic compounds, considering reaction parameters and expected outcomes, execute purification techniques like steam distillation, vacuum distillation and column chromatography and measure the yield of their synthesis.	L3 L6	PO4 PSO3
CO3	Analyze the purity of the compounds using Thin Layer Chromatography (TLC), determine physical constants, and calculate the percentage yield of the reactions to assess the efficiency of the synthesis process	L3 L4 L5	PO2 PSO3
CO4	Assess and understand the effectiveness of their synthesis and purification methods, reflecting on the environmental and practical implications of their work.	L2 L5	PO6 PSO4



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Department	Semester	Course Name
CHEMISTRY (M.Sc – Part - II)	IV	Theoretical Organic Chemistry – II

CO No.	Course Outcomes	Bloom's Level	PO/PSO
CO1	Understand the principles of LFER and the Hammett equation, apply these concepts to organic reactions, and analyze substituent effects and solvent influences to gain insights into reaction mechanisms.	L2 L3 L4	PO1 PO2 PSO1
CO2	Understand molecular associations, apply knowledge to create molecular receptors, analyze supramolecular structures for synthesis, and evaluate their applications in catalysis and material science.	L2 L3 L4 L6	PO1 PO2 PSO2
CO3	Memorize racemisation mechanisms and resolution methods, understand enantiomer determination techniques, analyze configurational assignments through correlative methods, and synthesize knowledge of molecular dissymmetry to apply chiroptical properties.	L1 L2 L4 L5	PO1 PO2 PSO3
CO4	comprehend the chiral pool and asymmetric induction, apply these concepts to synthesize L-DOPA, analyze mechanisms of asymmetric reactions, synthesize strategies using chiral auxiliaries, and evaluate the efficiency of their synthesis.	L2 L3 L4 L5 L6	PO2 PO3 PSO1



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Department	Semester	Course Name
CHEMISTRY (M.Sc – Part - II)	IV	Synthetic Organic Chemistry – II

CO No.	Course Outcomes	Bloom's Level	PO/PSO
CO1	Learn the strategic use of protecting groups, grasp the concept of umpolung for acyl anion equivalents, implement retrosynthetic analysis in synthesis planning, craft innovative synthetic routes through disconnection, and assess the selectivity and sequence of synthetic events.	L1 L2 L3 L5 L6	PO1 PO4 PSO1
CO2	Apply knowledge to refine syntheses and form alcohols. They analyze symmetry and regioselectivity to deepen reaction insights. Assessing starting material viability and evaluating synthesis practicality, create innovative methods for complex molecular construction.	L3 L4 L5 L6	PO2 PSO3
CO3	Understand electro-organic chemistry fundamentals, apply cathodic reduction and anodic oxidation techniques, analyze organic synthesis methods using crown ethers and organocatalysts, and evaluate Pd-catalyzed reactions.	L2 L3 L4 L5	PO1 PO2 PSO2
CO4	Understand the core principles of transition and rare earth metals in synthesis, apply techniques like C-H activation and cross-coupling reactions, and evaluate the use of catalysts like Grubb's and metal carbonyls to innovate in organic synthesis.	L2 L3 L5	PO1 PO2 PSO2



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(Arts, Science and Commerce)

Re-Accredited "B+" Grade (CGPA 2.69) by NAAC, ISO 21001:2018 (Certified)

Affiliated to University of Mumbai

Department	Semester	Course Name
CHEMISTRY (M.Sc – Part - II)	IV	Natural Products and Heterocyclic chemistry

CO No.	Course Outcomes	Bloom's Level	PO/PSO
CO1	Understand the fundamental structure and classification of steroids, apply this knowledge to synthesize 16-DPA from cholesterol and plant sapogenin, evaluate the processes involved in converting 16-DPA to key hormones and create synthetic pathways for compounds like cinerolone and muscone,	L2 L3 L5 L6	PO1 PO2 PSO2
CO2	Remember the classifications and biological roles of various vitamins and antibiotics, understand the chemical processes involved in synthesizing vitamins, analyze the structure and spectral data of antibiotics like penicillin-G and chloramphenicol, evaluate the synthetic routes for these compounds.	L1 L2 L4 L5	PO2 PO3 PSO2
CO3	Remember the fundamentals of heterocyclic chemistry, understand the intricacies of monocyclic structures, apply synthesis techniques for compounds like pyrazole and oxazole, and evaluate their reactions to master the predictive aspects of organic reactivity.	L1 L2 L3 L5	PO1 PSO4
CO4	Understand nomenclature for complex heterocycles, apply nucleophilic ring-opening techniques, analyze the synthesis and reactivity of diverse heterocyclic structures, and evaluate their practical applications in advanced organic synthesis	L2 L3 L4 L5	PO1 PSO3



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Department	Semester	Course Name
CHEMISTRY (M.Sc – Part - II)	IV	Research Methodology

CO No.	Course Outcomes	Bloom's Level	PO/PSO
CO1	Recall the distinctions between primary, secondary, and tertiary sources and understand the structure and utility of various journal indices, apply their knowledge to navigate digital resources effectively, including e-journals and databases like SciFinder and Scopus, evaluate the credibility and impact of scientific publications.	L1 L2 L3 L5	PO1 PO4 PSO4
CO2	Remember the importance of precise measurements and the application of SI units, understand the scientific method and experiment design, apply descriptive statistics, chemometrics, and ANOVA to real-world data, analyze data through correlation, and regression.	L1 L2 L3 L4	PO1 PO2 PSO3
CO3	Identify the key elements of scientific reporting, understand the ethics of writing and publication, and apply this knowledge to effectively communicate scientific work through reports, reviews, presentations, and papers.	L1 L2 L3	PO2 PSO4
CO4	Memorize safety protocols and ethical practices for handling chemicals, understand the importance of proper storage, use, and disposal of hazardous substances, and apply these principles to maintain a safe and compliant laboratory environment.	L1 L2 L3	PO1 PO6 PSO3



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Department	Semester	Course Name
CHEMISTRY (M.Sc – Part - II)	IV	Theoretical organic chemistry-II & Synthetic organic chemistry-II Practical

CO No.	Course Outcomes	Bloom's Level	PO/PSO
CO1	Remember and understand the comprehensive planning of synthesis, including the impact of reaction parameters and the importance of safety measures such as Material Safety Data Sheets (MSDS).	L1 L2	PO6 PO1 PSO4
CO2	Apply practical skills to purify the synthesized product through recrystallization, and analyze the purity	L3 L4	PO2 PSO3
CO3	Evaluate the spectral data (IR and NMR) to confirm the structure and synthesize the expected product with a clear understanding of the mechanism.	L5 L6	PO2 PSO3
CO4	Create a comprehensive report detailing the experimental results and calculate the percentage yield to demonstrate mastery of the synthesis process.	L6 L6	PO4 PSO3



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Department	Semester	Course Name
CHEMISTRY (M.Sc – Part - II)	IV	Natural Products and Heterocyclic chemistry and Research Methodology Practical

CO No.	Course Outcomes	Bloom's Level	PO/PSO
CO1	Apply their understanding of spectral techniques to analyze UV, IR, PMR, CMR, and Mass spectra, then synthesize a detailed structural report, showcasing their ability to integrate knowledge and practical skills in a real-world setting.	L3 L4 L6	PO2 PSO3
CO2	Evaluate spectral data against reference materials, create accurate structural elucidations, demonstrating their capacity to remember key concepts and understand complex spectral interpretations.	L1 L2 L5 L6	PO2 PSO3
CO3	Recall the basics and Apply advanced techniques to synthesize novel chemical entities and analyze their structural characteristics using characterization tools such as NMR and Mass Spectrometry.	L1 L3 L4 L6	PO2 PSO3
CO4	Evaluate the effectiveness of their research methods, create a comprehensive thesis to explain their findings, demonstrating their ability to critically assess their work and communicate their results effectively in both written and oral formats	L2 L5 L6	PO4 PSO3