

G.E. Society's

RNC ARTS, JDB COMMERCE & NSC SCIENCE COLLEGE, NASHIK-ROAD

Department of Chemistry

Programme Outcomes: B. Sc. Chemistry

Programme Outcomes	<p>PO-1: B.Sc. Chemistry programme is meant to give students a thorough understanding of the fundamentals of chemistry, including all principles and perspectives.</p> <p>PO-2: Various branches of Chemistry such as Organic Chemistry, Inorganic Chemistry, and Physical Chemistry, Analytical Chemistry Industrial and Bio Chemistry expose the various aspects of chemistry where the Students gain a broader understanding of the subject.</p> <p>PO-3: It help them to Demonstrate, solve and an understanding of major concepts in all disciplines of chemistry.</p> <p>PO-4: The three year B.Sc. Chemistry course curricula are separately classified to provide incremental progression.</p> <p>PO-5: The practical activities performed in the laboratories teach students about numerous chemical reagents and reactions.</p> <p>PO-6: They are also taught about the dangers of toxic substances and how to administer first aid.</p> <p>PO-5. It helps to find out the green route for chemical reaction for sustainable development.</p> <p>PO-6. To inculcate the scientific temperament in the students and outside the scientific community.</p> <p>PO-7. Use modern techniques, decent equipment and Chemistry software's</p>
Programme Specific Outcomes	<p>PSO-1: Students will understand the processes of several types of organic and inorganic reactions and will attempt to predict the outcomes of unknown reactions.</p> <p>PSO-2: Students will comprehend the presence of matter in the universe as solids, liquids, and gases made up of molecules, atoms, and subatomic particles.</p>

	<p>PSO-3 Chemistry practical classes, help students to learn to estimate inorganic salt mixtures and organic compounds both qualitatively and quantitatively using conventional methods of analysis.</p> <p>PSO-4: Students will learn how to manufacture chemical compounds by manipulating reagent under optimal reaction conditions.</p> <p>PSO-5: Learn about different aspects of Green Chemistry through theoretical and practical knowledge.</p> <p>PSO-6. Study about nomenclature, stereochemistry, structures, reactivity, and mechanism, numerical problems and formulae</p> <p>PSO-7: Use contemporary chemical tools, models, chem-draw, charts, and equipment to create</p> <p>PSO-8. Recognize safe laboratory methods and procedures.</p> <p>PSO-9. Improve research skills. and awareness of and operate advanced instruments/equipment.</p>
<p>Course Outcomes B. Sc Chemistry</p> <p>Semester III (2020-21)</p>	
Course Outcomes	After completion of these courses students should be able to;
CH-331 Physical Chemistry	<p>CO-1. Expression for rate constant k for third order reaction</p> <p>CO-2. Graphical evaluation of energy of activation</p> <p>CO-3. Ohm's law and electrical units such as coulomb, Ampere, Ohm and Volt.</p> <p>CO-4. Understand the term additive and constitutive properties</p> <p>CO-5. Meaning and Types of equilibrium such as true or static, metastable and Unstable equilibrium</p> <p>CO-6: Solve the numerical problems based on this topic.</p>
CH-332 Inorganic Chemistry	<p>CO-1 The content of syllabus have been framed in such a way that student could be able to understand basic principles of chemistry</p> <p>CO-2 Syllabus inspired & boosted the interest of students towards chemistry as main subject.</p>

<p>CH-333 Organic Chemistry</p>	<p>CO-1 Definition and types of organic acid and base 2. The pka and pkb concepts 3. Effect of temperature on pka/pkb 4. Comparison between strengths of acids/bases 5. What is acid-base catalysis</p> <p>CO-2. To draw different types of disubstituted cyclohexane in Chair form 2. To distinguish between geometrical and optical isomerism 3. Stability, energy calculations with potential energy diagram and optical activity of these conformers</p> <p>CO-3. Definition and type of nucleophiles and leaving groups 2. Different types of nucleophilic substitution reactions</p> <p>CO-4. An S_Ni mechanism in presence and absence of pyridine</p> <p>CO-5. Orientation / rules in addition reactions , The structure of carbonyl group , Reactivity concept</p> <p>CO-6: To predict product/s or supply the reagent/s for such reactions.</p>
<p>CH-334 Analytical Chemistry</p>	<p>CO-1. Principles of common ion effect and solubility product CO-2. Methods of thermo gravimetric analysis</p> <p>CO-3. Principles of Spectrophotometric analysis and properties of electromagnetic radiations</p> <p>CO-4. Construction, working, advantages and disadvantages of DME</p> <p>CO-5. Precautions during filtration, drying and ignition of precipitate</p> <p>CO-6. Mathematical Statement and derivation of Lambert's Law and Beer's Law</p>
<p>CH-335 Industrial Chemistry</p>	<p>CO-1. Student will know the importance of chemical industry</p> <p>CO-2. The student will understand the various unit operations and unit processes in chemical industry and also gain the knowledge of various industrial aspects</p> <p>CO-3. The student will understand the manufacturing process of ammonia, sulphuric acid, nitric acid</p> <p>CO-4. The student will understand the physicochemical principles involved in manufacturing process of ammonia, sulphuric acid, nitric acid and know various uses of these chemicals.</p> <p>CO-5. The student will know the various petrochemical products, the extraction, purification and their uses</p>

	<p>CO-6. The student will understand the scope of food industry, food preservation and food additives</p> <p>CO-7 The student will understand the cement and glass manufacturing process, various types of cement and glass</p>
CH-336-C Biochemistry	<p>CO-1. The student will understand Cell types, structure and function of various cell organelles Concepts of biomolecules, Bonds in biomolecules.</p> <p>CO-2. The student will understand the types of carbohydrates and their Structure and biochemical significance</p> <p>CO-3. Know the types of lipids with examples, structure of lipids, properties of lipids</p> <p>CO-4. The structure and types of amino acids. Reactions of amino acids. Properties of amino acids.</p> <p>CO-5. Classes of enzymes, subclasses and examples. Enzyme Specificity, Equations of enzyme kinetics K_m and its significance, Enzyme inhibitions, industrial applications of enzymes.</p> <p>CO-6 Basic concepts of Endocrinology. Types of Endocrine glands and their hormones. Biochemical nature of hormones. Mechanism of action of lipophilic and hydrophilic hormones.</p>
<p>Course Outcomes B. Sc Chemistry</p> <p>Semester IV(2020-21)</p>	
Course Outcomes	After completion of these courses students should be able to;
CH-341 Physical Chemistry	<p>CO-1. Origin of EMF of electrochemical cell. iii. Conventions used to represent electrochemical cell.</p> <p>CO-2. The atom its nucleus and outer sphere. ii. Classification of nuclides with suitable examples such as isotope, isobar, isotone and isomers</p> <p>CO-3. Distinguish between crystalline and amorphous solids / anisotropic and isotropic solid</p> <p>CO-4. Concept of quantization, Atomic spectra iii. Wave particle duality</p> <p>CO-5. Solve the numerical problems based on this topic.</p>
CH-342 Inorganic Chemistry	CO-1 The content of syllabus have been framed in such a way that student could be able to understand basic principles of chemistry

	CO-2 Syllabus inspired & boosted the interest of students towards chemistry as main subject.
CH-343 Organic Chemistry	<p>CO-1 Definition and formation of carbanions 2. Possible mechanism of some known name reactions involving carbanions 3. Synthetic applications some reagents</p> <p>CO-2. Meaning of terms Disconnection, Synthons, Synthetic equivalence, Functional Group Interconversion, Target Molecule.</p> <p>CO-3. What is rearrangement reaction? , Different types of intermediate in rearrangement reactions?</p> <p>CO-4. Types of energy levels with diagram , Brief idea about the advantages of spectroscopic methods</p> <p>CO-5. Various terms used in UV spectroscopy ,What is the effect of conjugation on UV band , To calculation of λ max for dienes and enone systems</p> <p>CO-6: Various terms used in PMR spectroscopy</p> <p>CO-7: Various methods of isolation/extraction of these natural products.</p>
CH-344 Analytical Chemistry	<p>CO-1 i) Principles of solvent extraction. ii) Difference between KD and D iii) Various types of techniques of solvent extraction such as- (a) extraction (b) continuous extraction (c) counter current extraction.</p> <p>CO-2. Principle of chromatographic methods 2. Relation between theoretical plates and column efficiency</p> <p>CO-3. Principle of GSC and GLC analysis</p> <p>CO-4. Separation mechanism involved in adsorption and partition HPLC</p> <p>CO-5. Comparison between electrophoresis and chromatography</p> <p>CO-6: Difference between Nephelometry and Turbidimetry ,Application and numerical problems</p>
CH-345 Industrial Chemistry	<p>CO-1. The student will understand the concept of polymers, various terms in polymer chemistry</p> <p>CO-2. The student will understand the types of polymers, structures, types of polymers, synthesis of polythene, SBR, Nylon 6, Teflon etc.</p> <p>CO-3. The student will understand the importance of sugar industry, manufacture of cane sugar, refining of cane sugar, manufacture of ethyl alcohol from molasses, food grains, fruits, hydrocarbons.</p> <p>CO-4. The student will know the various types of alcoholic beverages- beer, rum, whisky etc</p>

	<p>CO-5. The student will understand the importance of soap and detergent industry, types of soaps, detergents and cosmetics.</p> <p>CO-6. The student will understand the various cosmetic products and additives used in soap, detergent and cosmetics</p> <p>CO-7. The student will understand the various types of pharmaceutical preparations, synthetic methods of synthesis of paracetamol, aspirin, sulphanilamide</p> <p>CO-8. The student will understand the various methods of pollution prevention and waste management, treatment of industrial waste</p>
CH-346-C Biochemistry	<p>CO-1. The student will understand the significance of metabolism and energetics. Role of ATP, metabolic pathways, various enzymes and coenzymes, energetic and features of the pathway.</p> <p>CO-2. The concepts of biological oxidation. Types of electron carriers and their location in mitochondria.</p> <p>CO-3. The structures of purines, pyrimidine, nucleosides and nucleotides, structural features of nucleic acid types and their role.</p> <p>CO-4. Central dogma of molecular biology. Experimental procedures that prove DNA as genetic material and its interpretations.</p> <p>CO-5. Features of semi conservative DNA replication, stepwise events involved in replication of DNA.</p> <p>CO-6 Stepwise events of transcription and translation of RNA</p> <p>CO-7 Applications of genetic engineering in various fields like agriculture, industries and medicine.</p>
<p>Course Outcomes B. Sc Practical Chemistry</p> <p>Semester III and IV(2020-21)</p>	
Physical Chemistry Practicals: CH- 347	<p>CO-1. To study the effect of concentration of the reactants on the rate of hydrolysis of an ester</p> <p>CO-2. To determine the molecular weight of a high polymer by using solutions of different concentrations..</p> <p>CO-3. To study the effect of addition of salt on critical solution temperature of phenol water System</p> <p>CO-4. To determine the transport number of cation by moving boundary method.</p> <p>CO-5. To determine the specific refractivity's of the given liquids</p> <p>CO-6 Determination of λ_{max} and concentration of unknown solution</p>

	CO-7 To determine the cell constant of the given cell
In Organic Chemistry Practical (CH-348)	CO-1 Encouraged students to know & verify principles experimentally & perform lab activities to improve the practical skills. CO-2 Syllabus also encouraged interdisciplinary approach of inorganic chemistry with bio-inorganic chemistry, medicinal chemistry, environmental chemistry, biology....etc.
Organic Chemistry Practical (CH-349)	Students are expected to find the- CO-1 Type, Separation of mixture, Preliminary tests, Physical constants, Elements and Functional groups of the given organic compound. CO-2 Purification of the sample by suitable method CO-3 Separation and qualitative analysis of the binary Mixtures should be carried out on micro scale using micro scale kits.

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Department of Chemistry

Programme Outcomes: M. Sc. Organic Chemistry

Programme Outcomes	<p>PO-1. A graduate with a Master's degree in Chemistry has in-depth and detailed functional knowledge of the fundamental theoretical concepts and experimental methods of chemistry.</p> <p>PO-2. The graduate has specific skills in planning and conducting advanced chemical experiments and applying structural-chemical characterization techniques.</p> <p>PO-3. Skilled in examining specific phenomena theoretically and/or experimentally, the graduate is able to contribute to the generation of new scientific insights or to the innovation of new applications of chemical research.</p> <p>PO-4. Work in the pure, interdisciplinary and multidisciplinary areas of chemical sciences and its applications.</p> <p>PO-5. Apply the knowledge to develop the sustainable and eco-friendly technology in Industrial Chemistry</p> <p>PO-6. Communicate scientific information in a clear and concise manner both orally and in Writing.</p>
Programme Specific Outcomes	<p>PSO-1 Gains knowledge about fundamental aspects of the elements of chemistry.</p> <p>PSO-2. Understands the background of organic reaction mechanisms, stereochemistry, complex chemical structures, organometallic chemistry, name reactions and separation techniques.</p> <p>PSO-3. Learns about the potential uses of organic chemistry, industrial chemistry, medicinal chemistry and green chemistry.</p> <p>PSO-4. Carry out experiments in the area of organic qualitative & quantitative analysis, small scale preparation of compounds, isolation of natural products, separation, derivatization, etc</p> <p>PSO-5. To educate and prepare post graduate students from rural and urban area who will get employment on large scale in academic institutes, R & D and Quality control laboratories of Indian</p>

	<p>chemical/pharmaceutical industries as well as multinational and forensic Laboratories</p> <p>PSO-6. In-depth knowledge helps students to succeed in competitive exams.</p> <p>PSO-7. Understand principles of different kinds of spectroscopic techniques & their applications.</p>
<p>Course Outcomes M. Sc Chemistry</p> <p>Semester III (2020-21)</p>	
Course Outcomes	After completion of these courses students should be able to;
CHO-350 Organic Reaction Mechanism and Biogenesis	<p>CO-1. In depth knowledge about organic chemical reactions with a focus on principles for effective synthetic strategies.</p> <p>CO-2. Understand the concept and definitions of Nucleophilic and electrophilic reactions and fundamentals of free radical reactions.</p> <p>CO-3. Have the core idea about advanced organic chemistry principles and reaction mechanisms</p> <p>CO-4. Students will appreciate the central role of chemistry in our society and use this as a basis for ethical behavior in issues facing chemists including an understanding of safe handling of chemicals.</p> <p>CO-5. Develop interest in writing and finding mechanisms of new reactions.</p> <p>CO-6. Understand mechanisms in biological reactions that will help students to understand nature better.</p>
CHO-351 Structure Determination of Organic Compounds by Spectroscopic Methods	<p>CO-1. Students can interpret spectroscopic data for structure determination.</p> <p>CO-2. Analysis of stereochemistry of different organic compounds by using spectroscopic techniques such as NOE.</p> <p>CO-3. Understand principle of spectroscopy and analyze molecules by spectroscopic techniques.</p> <p>CO-4. Students can solve structural problems based on UV-Visible, IR, ^1HNMR, ^{13}CNMR and mass spectral data</p>

	CO-5. Determines the chemical environment using ¹ H and ¹³ C NMR spectra
CHO-352 Stereochemistry and Asymmetric Synthesis of Organic Compounds	CO-1. Helpful to study the spatial arrangement of the atoms in the molecule. CO-2. Students able to assign relative and absolute configuration of the different chiral compounds. CO-3. Conformational analysis of cycloalkanes, reactivity, chirality, interconversion & resolution CO-4. Introduction to asymmetric synthesis & basics of asymmetric organocatalysis. CO-5. To know Transition metal catalyzed homogenous asymmetric hydrogenation, hydroxylation & epoxidation
CHO-353(A) Protection - De- protection, Chiron approach and Carbohydrate	CO-1. Students can construct organic compounds (e.g. (S)-Propanediol, (R) & (S)-Epichlorohydrin, L(+)-Alanine, (-)-Multistriatin, etc.) by using Chiron approach. CO-2. Understanding concepts of selectivity, protection and deprotection, etc., helps students to become good organic chemists. CO-3. Awareness about basics & synthesis of carbohydrates. CO-4. It helps the students to emphasise the trends in synthesis of organic molecules.
Course Outcomes M. Sc Chemistry	
Semester IV(2020-21)	
Course Outcomes	After completion of these courses students should be able to;
CHO-450 Chemistry of Natural Products	CO-1. Have the core idea about advanced organic chemistry principles and theories to develop research oriented skills in applied organic chemistry. CO-2. Understand different Secondary metabolites and their importance. CO-3. Become familiar with many reagents used in organic synthesis. CO-4. Understand nature better by studying mechanisms in biological reactions.

	<p>CO-5. Understand various laboratory methods to determine structure of unknown organic sample.</p> <p>CO-6. Develop interest in Biogenesis of naturally occurring essential compounds.</p>
<p>CHO-451 Organometallic Reagents in Organic Synthesis</p>	<p>CO-1. It develops ability to apply organometallic reagents for synthesis of organic compounds</p> <p>CO-2. To gain knowledge about palladium catalyzed coupling reactions including mechanism and synthetic application</p> <p>CO-3. Use of transition metal based catalysts for different organic reactions.</p> <p>CO-4. Use of reagents for different reaction transformations and their applications in industry.</p> <p>CO-5. Understanding the reactivity and reaction mechanism of various organometallic compounds</p> <p>CO-6. It is also helps to developed research approach in students</p>
<p>CHO-452(A) Concepts and Applications of Medicinal Chemistry</p>	<p>CO-1. Medicinal Chemistry is introduced in postgraduate course which have basic grounding in chemistry.</p> <p>CO-2. This topic convey to student in interesting style, an understanding drug design and molecular mechanism by which drug act in the body.</p> <p>CO-3. This topic focuses to develop and build research mind of students for synthesis of an effective drug.</p> <p>CO-4. It also helps to those students who might be considering a future career in the pharmaceutical industry.</p>