

**Sudhagad Education Society's
Sheth J.N. Paliwala Commerce College, Science & Arts College
Pali - Sudhagad - Raigad (M. S.) PIN 410205**

COURSE OUTCOMES OUT COMES OF BACHLEOR OF CHEMISTRY

Semester I

Course Outcome	Chemistry Paper I
1	To Know the ideas of de-Broglie and Heisenberg Uncertainty principle
2	To understand the various types of quantum numbers and principle of extra stability
3	To understand the electronic displacement and concept of organic reaction
4	To Understand the concept Chemical Thermodynamics
5	To understand the long form of the periodic table, interpretation of the periodic table
6	To know about the classification and Nomenclature of Organic Compounds
7	To understand the fundamentals of organic reactions.
Course Outcomes	Chemistry Paper II
1	To understand the basic concept of Chemical kinetics
2	To understand the basic concept of main group elements
3	To understand the basic concept of stereochemistry
4	To understand the concept of surface tension and methods of determination of surface tension
5	To knows about the concept of viscosity and determination of viscosity by viscometer
6	To knows about the basic concept of geometrical and optical isomerism



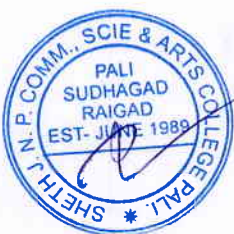
Semester II

Chemistry Paper I	
1	To know about the concept of kinetic theory of gases and gaseous state of matter
2	To know the concept of Chemical equilibrium and thermodynamic parameters and laws of thermodynamics.
3	To understand the Concept of Qualitative Analysis
4	To understand the basic concept of acid base theory
5	To understand organic reactions like Fridel & Craft reaction
6	To understand the basic concept of chemistry of aliphatic hydrocarbons
Chemistry Paper II	
1	To knows about the concept of Ionic equilibrium in chemical reactions.
2	To understand the concept of Molecular spectroscopy
3	To understand the concept of solid state chemistry and laws of Crystallography
4	To know the concept of electromagnetic radiation, Planck's quantum theory
5	To understand the Beer's & Lamberts law
Chemistry Practicals	
1	To perform the experiments on Physical chemistry like the standardization of NaOH, dermine the rate constant of acid hydrolysis of methyl acetate ester.
2	To perform the experiments on commercial analysis of mineral acids , organic acids and salt of weak acid and strong base
3	To perform the experiments on gravimetric analysis
4	To purify the organic compounds by crystallization process
5	To perform the experiments on paper chromatography
6	To separate the mixture of Ortho and Para nitro phenols by thin layer chromatography



Semester III

Course Outcome	Chemistry Paper I
1	To understand the concept of Chemical Thermodynamics & Electrochemistry
2	To understand the nature of bond in various compounds and to interpret the structure
3	To understand the reaction mechanism in various organic compounds.
4	To Understand the concept of reactions and reactivity of halogenated hydrocarbons, alcohols, phenols and epoxides
5	To make the learner capable of solving problems in the various units of this course
Course Outcomes	Chemistry Paper II
1	To understand the basic concept of Chemical kinetics
2	To understand the basic concept of main group elements
3	To understand the basic concept of stereochemistry
4	To understand the concept of surface tension and methods of determination of surface tension
5	To knows about the concept of viscosity and determination of viscosity by viscometer
6	To knows about the basic concept of geometrical and optical isomerism
Course Outcomes	Chemistry Paper III
1	Students are able to understand the basics of analytical chemistry in non-chemistry fields like pharmacy.
2	Students should able to understand method of analysis of substance, procedure for analysis
3	Students should understand errors and sources of errors in chemical analysis.
4	Understand the concept of sampling.
5	Students should be able to identify sources of possible errors in the results obtained.



Semester IV

Course Outcomes	Chemistry Paper I
1	Students will be able to understand basic knowledge of Electrochemistry.
2	Students will be able to understand the concept of vapour pressure and equations associated with it.
3	Students will be able to identify & classify all periodic properties of transition metals
4	Students will be able to understand Application of coordination compounds.
	Students will be able to identify, formulate And Solve carboxylic acid reactions.
Course Outcomes	Chemistry Paper II
1	To understand the laws of Crystallography
2	To know about the importance of catalyst in chemistry
3	To understand about the environmental aspects of oxy acids of N & P
4	To know the importance of nitrogen containing & heterocyclic compounds.
	Chemistry Paper III
1	Understand Basics of Chemical analysis, Separating components of given sample
2	To understand basic concepts like pH different experimental techniques and different ways to analyse the samples.
3	Understand Statistical Treatment of analytical data --II.
4	To know the various Instrumental Methods and select a method of separation of an analyte from the matrix.
5	To study the effect of various parameters on solvent extraction of a solute



Semester V

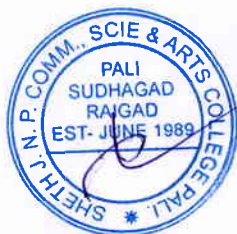
Course Outcomes	Physical Chemistry USCH 501
1	Students will be able to understand the concept of Molecular spectroscopy
2	Students will be able to understand the concept of Chemical Thermodynamics
3	Students will be able to understand the concept of Chemical Kinetics
4	Students will be able understand the importance of Nuclear chemistry
5	Students will be able understand the concept of Adsorption ,Adsorption isotherm and colloidal state of matter.
Course Outcomes	Inorganic Chemistry USCH 502
1	Students will be know about the concept of Molecular symmetry and Chemical bonding
2	Students will be know about the structure of solid and calculation of APF in various arrangement of solids.
3	Students will be understand the importance of Inner transition elements, their separation and applications.
4	Students will be able know about the concept of non aqueous solvents and chemistry of group 17 elements.
Organic Chemistry USCH503	
1	Students are able to understand synthesis and mechanisms of organic reactions
2	Students able to understand photochemical phenomenon occur in organic compounds.
3	Students are able to understand IUPAC nomenclature of organic compounds
4	Students are able to understand the use of UV-visible and mass spectrometry in structure determination.
5	Students able to understand chemistry of natural products
Analytical Chemistry US CH 504	
1	The students learn about understand the concept of errors, measures of central tendency and dispersion. Sampling techniques. Sampling of gases, solids and liquids.
2	To learn the calculations for construction of acid-base titration curve as pH with volume of titrant added. Understand the theory of precipitation titration, especially argentometric titration, their types ad indicators used for the titrations. Know about the instrumentation of photometers and spectrophotometers, qualitative and quantitative analysis
3	Learn the calculations of extraction efficiency, ways to enhance the separation efficiency and different types of solvent extraction. Introduction and classification of chromatographic techniques Principle, techniques and applications of paper and thin layer chromatography.



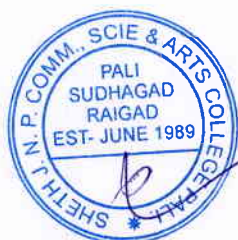
4	Students learn about: Atomic spectroscopy including basic principle of Flame emission spectroscopy and atomic absorption spectroscopy, instrumentation, qualitative and quantitative analysis and applications. Molecular Fluorescence and Phosphorescence Spectroscopy :Theory, Instrumentation and applications Turbidimetry and Nephelometry: Basic principle instrumentation and application.
Course outcomes	Applied Component (Drugs and Dyes) USDD01
1	They will come to know the Health and Environmental Hazards of Synthetic Dyes and their Remediation Processes.
2	Effluent Treatment Strategies, Non-textile uses of dyes, Dyes used in food and cosmetics,
3	Students will study different types and applications of Paper and leather dyes, Miscellaneous dyes, pigments

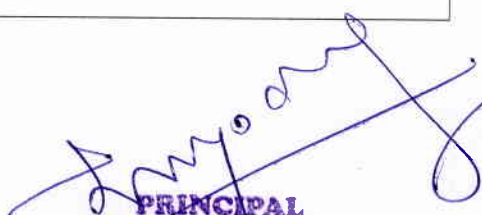
Semester VI

Course Outcomes	Physical Chemistry USCH 601
1	They will understand the concept of electrochemistry and electrochemical cells.
2	Understand types of polymers and different applications of polymers in different area.
3	Students will be able to know about the basic concept of Quantum mechanics and renewable energy sources.
4	Students will be able to the concept of NMR and ESR spectroscopy and its application in structural elucidation of organic compounds.
Course Outcomes	Inorganic Chemistry USCH 602
1	Students will be able to understand the concept of bonding and theories of bonding in coordination compounds.
2	To understand the concept of stability, electronic spectra, reactivity and molecular orbital theory of complexes.
3	Students will be able to understand the classification, synthesis, reactivity, structure and bonding of organometallic compounds.
4	Students will be able to know about the concept of metallurgy, chemistry of group 18 elements and bioinorganic chemistry.



Course Outcomes	Organic Chemistry USCH 603
1	Students will understand structure of the organic compound from spectral data
2	They will be able to understand various organic reactions from reagents and catalysts
3	Structures and uses Polymers and Nucleic acids
Course Outcomes	Analytical Chemistry USCH 604
1	The students learn about DC polarography including basic principle and the concepts involves in it. Instrumentation, qualitative and quantitative analysis and applications. Amperometric titrations: Basic principle, instrumentation, various titration curves with example, advantages and applications.
2	Students get basic understanding of Gas chromatography, High performance liquid chromatography and Ion exchange chromatography including of each the basic principle, special features regarding theoretical part, instrumentation and applications.
3	Students add to their knowledge about treatment of data as regards distribution of random errors presented as Gaussian distribution curve, Confidence limit and confidence interval, criterion of rejection of results, testing of significance, graphical representation of results. Complexometric titrations: Specially EDTA titrations including theory of titration curves, metallochromatic indicators, methods to increase selectivity and applications. Redox titrations : Using example of Fe(II) titrations, calculation of potentiometric titration curve for one electron and multi-electron system, redox indicators
4	Students are introduced to the concept of TQM, ISO series and Good laboratory practices. Mass spectrometry: concept and introduction of components. Radio-analytical techniques : Classification, introduction to NAA and its application
Course Outcomes	Applied component : Drugs & Dyes USCHDD06
1	They will come to know the Health and Environmental Hazards of Synthetic Dyes and their Remediation Processes.
2	Effluent Treatment Strategies, Non-textile uses of dyes, Dyes used in food and cosmetics
3	Students will study different types and applications of Paper and leather dyes, Miscellaneous dyes, pigments.




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Pali - Sudhagad - Raigad (M. S.)

Faculty of Science

Department of Chemistry

Programme outcomes

PO-1	Students should acquire scientific attitude, problem solving skill and environmental awareness
PO-2	To develop an ability in the creation of Project plan
PO-3	To understand the basic concepts of Chemistry
PO-4	Students should become expertise in their specific subjects and curriculum
PO-5	Students should be able to develop and design the synthesis of organic and Inorganic compounds
PO-6	Students should be able to understand the concept of thermodynamics, chemical kinetics, Bioinorganic chemistry and electro analytical techniques
PO-7	To understand the various experimental methods of chemical analysis by performing practicals in the laboratory.
PO-8	To find the employment in the respective industry and government sector.




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Programme Specific Outcomes (PSO)

Department of Chemistry

PSO-1 To analyse the result of Chemical experiments and use instruments like pH meter, Conductometer, Potentiometer and visible spectrophotometer in chemical analysis.

PSO-2 To learn the techniques of methods of separation like Ion exchange chromatography, steam distillation and gravimetric analysis

PSO-3 To understand the applications of micro scale techniques in Qualitative analysis.

PSO-4 To understand the synthesis of organic and Inorganic compounds.

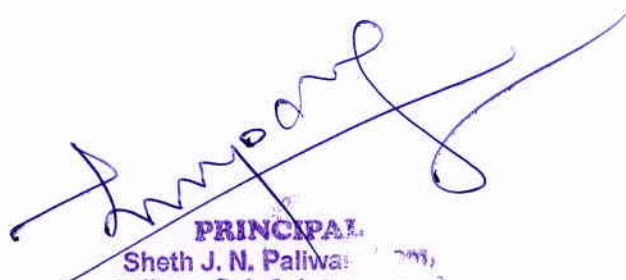
PSO-5 To understand the concept of stereochemistry, spectroscopy and reaction mechanism

PSO-6 Student will learn the usage of analytical instruments, select, and apply appropriate techniques and resources for the analysis.

PSO-7 Learners will acquire the recent techniques in chemistry.

PSO-8 Students becomes careful about handling of hazardous chemicals and able to perform work with industrial work with responsibility and safety.




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COURSE OUTCOMES OUT COMES OF MASTER OF COMMERCE

MSc PART- I

Sem I

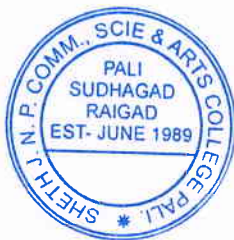
Course Outcome	Physical Chemistry
CO 1	The students learn about understand the concept of Thermodynamics, Quantum Chemistry, Chemical Dynamics, and Electrochemistry.
CO 2	The students will be skilled in handling the different types of instruments practically. e.g. to find out pka values, activity coefficient, solubility product etc.
	Inorganic Chemistry
CO 1	The students learn about Chemical Bonding, Molecular Symmetry and Group Theory, Solid state Chemistry and Nanomaterials and Materials Chemistry and Nanomaterials
CO 2	The students learn to analyze the ores and alloys samples and handle different type of instruments.
CO 3	Preparation of Complexes to make the students to understand the various requirements for coordination complex preparation and analysis.
	Organic Chemistry
CO 1	The students learn about Thermodynamic and kinetic requirements and mechanism of a reaction, acid base reaction, Nucleophilic substitution reactions and Aromaticity, Stereochemistry, and oxidation and reduction
CO 2	The students learn to setup one step reactions and short preparation of organic compounds and check purity byTLC.
CO 3	Planning of synthesis, effect of reaction parameters including stoichiometry, and safety aspects including MSDS should be learnt.
	Analytical Chemistry
CO 1	The students learn about language and quality of analytical chemistry, lab safety, preparation of solutions numerically, optical and thermal methods etc. Analytical perspective, Common analytical problems, terms involved in analytical chemistry (analysis, determination, measurement, techniques, methods, procedures and protocol)
CO 2	Students learn to prepare resin column, NaCL in saline by Volhard"s method .

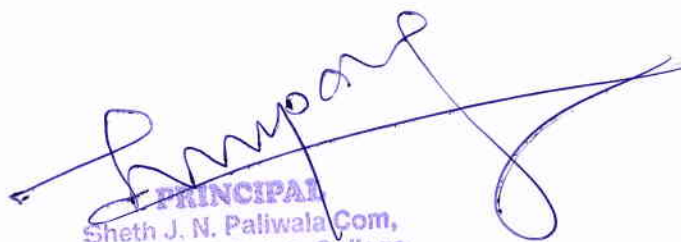


MSc PART- I

Sem II

Course Outcome	Physical Chemistry
CO 1	The students learn about Chemical Thermodynamics (Real gases), Quantum Chemistry, Chemical Kinetics and Molecular Reaction Dynamics, Solid State Chemistry and Phase Equilibria etc.
CO 2	The students learn practically about phase diagram, polar plot of atomic orbitals and handling different types of instruments.
	Inorganic Chemistry
CO 1	The students learn about Inorganic Reaction Mechanism, Organometallic Chemistry of Transition metals, Environmental Chemistry and Bioinorganic Chemistry.
CO 2	The students learn to prepare the different type of complex and handling of the instruments
	Organic Chemistry
CO 1	The students learn about different types of reaction mechanism and rearrangements, Introduction to Molecular Orbital Theory for Organic Chemistry, NMR spectroscopy and Mass spectrometry, NMR spectroscopy and Mass spectrometry etc
CO 2	. The students learn practically Separation of Binary mixture using micro-scale technique and identification
	Analytical Chemistry
CO 1	The students learn about different types of Chromatography, spectroscopy, Surface Analytical Techniques, Electroanalytical Methods.
CO 2	The students will be skilled in handling the different types of instruments practically. e.g. purity of washing soda pH metry, conductometer, potentiometer etc.



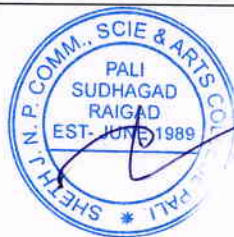

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COURSE OUTCOMES

MSc PART- II

Sem III

Course Outcome	Theoretical organic chemistry-I
CO 1	The students learn about different types of reaction like Organic photochemistry, Basic principles, Jablonski diagram, isomerization, remote functionalization, extrusion reaction, pericyclic reaction, electrocyclic reactions, cycloadditions, sigmatropic rearrangements, carbene addition, cheletropic reactions
CO 2	The students learn about different types of reaction of Organic photochemistry, Basic principles, Jablonski diagram, isomerization, remote functionalization, extrusion reaction, pericyclic reaction, electrocyclic reactions, cycloadditions, sigmatropic rearrangements, carbene addition, cheletropic reactions and Introduction to photochemistry and utilization of photon as a source of energy in organic transformations.
CO 3	Separation of a ternary mixture of organic compounds and identification including derivative preparations using micro-scale.
Synthetic Organic Chemistry-I	
CO 1	The students learn about Radical reaction, detection of radical pathways, common organic named reactions, advanced reagents and their applications in chemo, regio and stereo-selective transformations
CO 2	The students learn about different types of reaction of olefination and its modification, Seyferth–Gilbert homologation, Steven’s rearrangement.
CO 3	The students learn about Separation of a ternary mixture of organic compounds and identification including derivative preparations using micro-scale.
Natural products and Spectroscopy	
CO 1	The students learn about Natural products like carbohydrates, natural pigment, insect pheromone, multistep synthesis of natural pigment, advanced spectroscopic techniques
CO 2	Single step organic preparation(1.0 g scale) involving purification by Steam distillation / Vacuum distillation or Column chromatography.
CO 3	The students learn about (i) the planning of synthesis, effect of reaction parameters including stoichiometry, and safety aspects including
Medicinal , Biogenesis and green chemistry	
CO 1	The students learn about drug discovery, design and development .greenChemistry.
CO 2	Single step organic preparation(1.0 g scale) involving purification by Steam distillation / Vacuum distillation or Column chromatography. Students are expected to know (i) the planning of synthesis, effect of reaction parameters including stoichiometry, and safety aspects including
CO 3	The students learn about (i) the planning of synthesis, effect of reaction parameters including stoichiometry, and safety aspects including

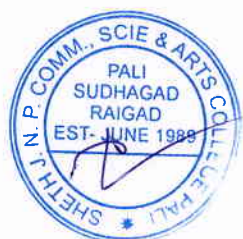


COURSE OUTCOMES

MSc PART- II

Sem IV

Course Outcome	Theoretical organic chemistry-II
CO 1	The students learn about physical organic chemistry, supramolecular chemistry, asymmetric synthesis.
CO 2	The students learn about the planning of synthesis, effect of reaction parameters including stoichiometry, and safety aspects including MSDS (ii) the possible mechanism, expected spectral data (IR and NMR) of the starting material and final product.
	Synthetic Organic Chemistry-II
CO 1	The students learn about designing organic synthesis, electro organic chemistry, transition metal in organic chemistry.
CO 2	The students learn to purify the product by recrystallization, measure its mass or volume, check the purity by TLC, determine physical constant and calculate percentage yield.
	Natural products and heterocyclic chemistry
CO 1	The students learn about Steroids, Vitamins, Antibiotics Heterocyclic compounds.
CO 2	The students learn about Combined spectral identification: Interpretation of spectral evaluation.
CO 3	The students learn about data of organic compounds (UV, IR, PMR, CMR and Mass spectra).
	RESEARCH METHODOLOGY
CO 1	The students learn about Primary, Secondary and Tertiary sources, Journals, Information Technology and Library Resources DATA ANALYSIS, Writing Scientific Papers, CHEMICAL SAFETY & ETHICAL HANDLING OF CHEMICALS
CO 2	The students learn about Interpretation of Project evaluation.



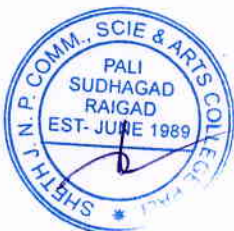
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DEPARTMENT OF CHEMISTRY – (PG)
PROGRAMME-MASTER OF CHEMISTRY

PROGRAMME OUTCOMES OF MASTER OF CHEMISTRY

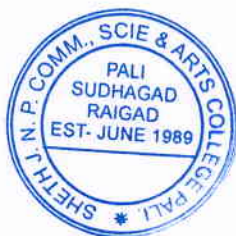
PO-1	Gains complete knowledge about all opportunities fundamental aspects of all the branches of chemistry
PO-2	Learn about the possible uses of analytical industrial chemistry, medicinal chemistry and green chemistry.
PO-3	Understands the background of organic reaction mechanisms. Chemical structures, quantum chemistry, molecular spectroscopy, structure elucidation of organic molecules, chemical analysis.
PO-4	Work efficiently and safely in a laboratory atmosphere
PO-5	Use of advanced spectroscopic tools in chemical science
PO-6	Advanced functional materials, its characterization and applications
PO-7	Designing of targeted molecules and its synthesis followed by characterization.
PO-8	Catalysis and its direct industrial application .
PO-9	Basic understanding in the major area(s) of research and acquire basic tools needed to carry out minor research projects.
PO-10	The ability to implement chemistry in thinking and analytical reasoning in designing problems in research
PO-11	Knowledge of for safe handling of chemicals in research and applied chemical laboratory integral activity an of social, economic and environmental problems.
PO-12	Knowledge in bioorganic and bioinorganic chemistry
PO-13	Designing of targeted molecules and its synthesis followed by characterization.
PO-14	Knowledge of the concepts through theoretical understanding of the principles of chemistry. Topics like stereochemistry, quantum, symmetry from analytical, organic, inorganic and physical chemistry.

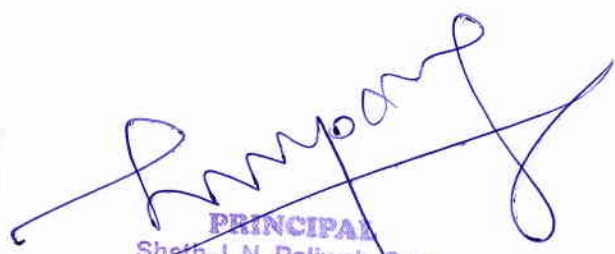



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PROGRAM SPECIFIC OUTCOME

- After completion programme the candidate will be Global level research oppurtunities to Ph.D programme, targeted pursue approach of CSIR NET examination.
- Enaromous job oppurtunities at all level of chemical pharmaceutical food products life oriented material industries.
- Specific placements in R & D and synthetic division of polymer industries & Allied Division.
- Discipline specific competitive exams conducted by service commission.
- Aptitude and skills necessary to pursue research as a career
- Opportunities to get jobs in central and state government organizations like IISC, IIT, NCL, ONGC, ISRO FSL etc.
- Skills necessary to be employed in the various sectors like chemical, pharmaceutical, food and materials industries.




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