2020

Department of Chemistry

Programme offered	B.Sc Chemistry M.Sc Chemistry			
B.Sc Chemistry				
Programme Specific Outcome	PSO 1: Develop scientific outlook scientific attitude and scientific temper PSO 2: Develop skill in experimenting, analyzing and interpreting data PSO 3 Develop research attitude and adopt scientific method of identifying, analyzing and solving research problems in an innovative way PSO 4: Apply physical and mathematical theories and principles in the context of chemical science PSO 5: Use chemistry related soft wares for drawing structure and plotting graphs PSO 6: Use instruments- potentiometer, conductometer, pH meter and colorimeter. PSO 7: Acquire skill in safe handling of chemicals including hazardous materials. PSO 8: Identify the ingredients in household chemicals, use them in a critical way PSO 9: Predict analytical procedures, compare experimental, theoretical and graphical methods of analysis PSO 10: Predict reaction mechanism in organic reactions PSO 11: Understand the terms, concepts, methods, principles and experimental techniques of physical, organic, inorganic and analytical chemistry PSO 12: Develop critical thinking and adopt healthier attitudes towards individual, community and culture through the course of Chemistry PSO 13: Become cautious about environmental aspects and impact of chemicals in soil, water and air and adopt ecofriendly approach in all frontiers of life PSO 14: Become responsible in consumption of natural resources and adopt measures for sustainable development. PSO 15: Visit Chemical factories and industries with scientific curiosity PSO 16: Develop writing skills and presentation skills using audio visual aids PSO 17: Compare and share knowledge in an interdisciplinary manner PSO 18: Inculcate spirit of originality, novelty, and necessity in scientific research PSO 19: Contribute to the academic and industrial requirements of the society PSO 20: Get motivated to higher studies - PG Degree in different branches of Chemistry, BEd Degree in Physical Science, and job opportunities in industrial and non-industrial sectors PSO 21: Adopt safer life skills in a human friendly and eco-friendly way			
Course code	***Course Name***	***Course Outcome***	***Cognitive Level***	***PSO No.***
CH1141	Inorganic Chemistry I	CO 1: Discuss the course of development of structure of atom.	U	PSO1
		CO 2: Apply rules for filling electrons in classifying elements into s, p, d and f blocks	A	PSO10
		CO 3: Define various scales of electronegativities and their applications	U	PSO10
		CO 4: Define Effective nuclear charge and Slater's rules	U, A	PSO10
		CO 5: Discuss about diagonal relationship and anomalous behaviour of hydrogen and other first element in each group.	U	PSO4
		CO 6: Correlate and predict general properties of s and p block elements based on their electronic configuration.	A	PSO4
		CO 7: Realise applications of s and p block elements in sustainable and renewable energy sources.	A	PSO14
		CO 8: Define various concepts of acids and bases.	U	PSO11
		CO 9: Understand reactions in non-aqueous solvents.	U	PSO11
		CO 10: Realise various causes, effects and control measures of environmental pollution.	E	PSO13
		CO11: Review national movements for environmental protection.	U, A	PSO21

CH1221	Chemistry-Its origin,methodology and impacts	CO 1: Appreciate the development of scientific theories through years with specific examples	U	PSO1
		CO 2: Develop curiosity and scientific attitude towards the application of chemistry in daily life	C	PSO1
		CO 3: Outline a procedure for experimentation	A	PSO2
		CO 4: Appraise the current development in Chemistry	E	PSO1
		CO 5: Identify the common ingredients of house hold synthetic products	U	PSO8
		CO 6: Discriminate and classify chemicals used as drugs, explosives,	U	PSO7
		CO 7: Get motivated in visiting chemical Industries	E	PSO15
		CO 8: Adopt safety measures in handling chemicals	A	
		CO 9: Draw titration curves and explain theory of volumetric titrations	A	PSO2/PSO3
		CO 10: Select suitable indicators for acid base titration knowing the theories of acid base titration and indicators	A	PSO11
		CO 11: Develop computational skills	A	PSO5
		CO 12: Discuss separation techniques of filtration and chromatographic techniques	U	PSO3
CH1341	Inorganic Chemistry II	CO 1: Understand various theories of chemical bonding and their limitations.	U	PSO4
		CO 2: Predict stability of atoms and the nature of bonding between atoms.	U, A	PSO4
		CO 3: Discuss various applications of intermolecular interactions	U	PSO4
		CO 4: Understand chemistry of glass, silicates and silicones	U	PSO7 PSO8
		CO 5: Discuss chemistry of Boron compounds, oxyacids and oxides of Phosphorous	U	PSO11
		CO 6: Understand refractory carbides, nitrides, borides and silicides.	U	PSO11
		CO 7: Describe various types of halogen compounds.	U	PSO3
		CO 8: Understand chemistry of noble gas	U	PSO3
		CO 9: Understand inorganic polymers and their applications.	U	PSO8
		CO 10: Distinguish between types of nuclear reactions.	U	PSO11
		CO 11: Describe measurement of radioactivity.	U	PSO2 PSO3
		CO 12: Discuss applications of radioactivity in various fields.	U	PSO3
		CO 13: Understand introductory concepts of nano chemistry	U, A	PSO18
		CO 14: Suggest methods of synthesizing nano materials.	U	PSO18
		CO 15: Appreciate the variety of applications of nanomaterials.	U, A	PSO18
CH1441	Organic Chemistry I	CO 1: Recall the fundamentals of organic chemistry.	R	PSO1
		CO 2: Apply the electron displacement effects to compare acidity, basicity and stability of organic compounds/intermediates.	A	PSO4
		CO 3: Judge the reaction mechanism of substitution and elimination on the basis of the structure of alkyl halides.	U	PSO10
		CO 4: Summarise the chemistry of reaction intermediates.	U	PSO10
		CO 5: Discuss optical, geometrical and conformational isomerism of organic compounds.	U	PSO11
		CO 6: Use CIP rules to predict the configuration of organic compounds	A	PSO10

		CO 7: Differentiate photochemical and thermal reactions.	U	PSO11
		CO 8: Discuss theory of colour and constitution and the method of synthesis of dyes	U	PSO8
		CO 9: Explain aromaticity, orientation effect and mechanism of aromatic electrophilic substitution.	U	PSO10
		CO 10: Demonstrate the method of determination of reaction mechanism.	A	PSO10
CH1442	Inorganic Qualitative Analysis	CO 1: Obey Lab safety instructions, develop qualities of punctuality, regularity and scientific attitude, outlook and scientific temper (GOOD LAB PRACTICES)	U	PSO1
		CO 2: Develop skill in safe handling of chemicals, take precaution against accidents and follow safety measures	A	PSO2/ PSO8
		CO 3: Use glass wares, electric oven, burners and weighing balance	A	PSO1
		CO 4: Develop skill in observation, prediction and interpretation of reactions	A	PSO1
		CO 5: Detect solubility, and classify compounds according to their solubility	U	PSO3
		CO 6: Apply the principle of common ion effect and solubility product in the identification and separation of ions	A	PSO1& PSO2
		CO 7: Develop skill in preparing and purifying inorganic complex compounds	A	
		CO 8: Use filtration and chematographic techniques, vacuum pump and centrifugal pumps	U	PSO4
CH1541	Physical Chemistry I	CO 1: Identify, compare and explain the properties and behaviour of ideal and real gases, knowing kinetic theory of gases and different types of molecular velocities and collision properties.	U	PSO11
		CO 2: Perform numerical problems of gases under a set of conditions	A	PSO2
		CO 3: Differentiate between amorphous and crystalline solids, understand anisotropy, symmetry and types of crystals, X- ray diffraction methods of study of crystal structure, identify the imperfections in crystals understand the physical aspects of surface tension and viscosity of liquids and the basics of liquid crystals and their applications	U	PSO11
		CO 4: Representation of lattice planes and calculation of interplanar spacing, draw the crystal structures of NaCl and CsCl	A	PSO9
		CO 5: Recalling the basic concepts of solutions, concentration terms, Raoult's law and colligative properties	U	PSO9
		CO 6: Determination of colligative properties and molecular mass of solute	E	PSO9
		CO 7: Understand the working principle Electro-Chemical cells	U	PSO9
		CO 8: Design and Determine the potentials of electrochemical systems	E	PSO2
		CO 9: Assess the nature of electrolytes in terms of dissociation and ionic conductance of electrolytes in terms of mobility of ions	E	PSO2

		CO 10: Integrate the theory into practical applications of conductometric titrations	A	PSO3
CH1542	Inorganic Chemistry III	CO 1: Discuss the electronic configuration and related properties of transition elements and inner transition elements	U	PSO11
		CO 2: Understand preparation of selected transition metal compounds, lanthanides and actinides	U, A	PSO11
		CO 3: Compare lanthanide and actinide contraction and their consequences.	U	PSO11
		CO 4: Name coordination complexes, organometallics, discuss their properties and bonding	U	PSO11
		CO 5: Understand stability of complexes and factors affecting stability	U	PSO3
		CO 6: Describe isomerism in coordination compounds	U, A	PSO3
		CO 7: Discuss spectrochemical series, CFSE and their consequences	U	PSO3
		CO 8: Correlate geometry, stability and Jahn Teller effect and its causes	A	PSO11
		CO 9: Discuss reaction mechanisms and applications of coordination compounds	U	PSO11
		CO 10: Name and Classify organometallic compounds	U	PSO3
		CO 11: Discuss preparation and properties and bonding of carbonyls	U	PSO3
		CO 12: Identify the role of organometallic compounds in organic synthesis	U	PSO10
		CO 13: Discuss the role of inorganic ions in biological systems and biochemistry of haemoglobin, myoglobin, cytochromes, iron sulphur proteins	U	PSO10
		CO 14: Discuss various bioinorganic processes like photosynthesis, working of sodium potassium pump, etc	U	PSO17
		CO 15: Describe various aspects of metallurgy and instrumental methods of analyses viz., spectrophotometric methods, thermal methods and tools available to measure nanomaterials	U	PSO6
CH1543	Organic Chemistry II	CO 1: Describe the preparation of hydroxy, carbonyl & amino compounds, carboxylic acids and organo Mg, Li & Zn compounds.	R	PSO10
		CO 2: Distinguish primary, secondary & tertiary alcohols and amines.	U	PSO10
		CO 3: Write reaction steps in ascending & descending of alcohol and aliphatic acid series, interconversion of aldose and ketose, chain lengthening and shortening of aldoses.	U	PSO11
		CO 4: Explain the structure of glucose, fructose, sucrose, starch and cellulose.	U	PSO11
		CO 5: Predict the outcome and mechanism of simple organic reactions, using a basic understanding of the reactivity of functional groups	A	PSO10
		CO 6: Illustrate the use of organic reagents in synthesis.	A	PSO3 PSO10
		CO 7: Discuss fundamental principles of supramolecular and green chemistry	U	PSO13
CH1641	Physical Chemistry II	CO 1: Understand basic concepts of thermodynamics spectroscopy and group theory	U	PSO11
		CO 2: Apply laws of thermodynamics in physical and chemical processes and real system	A	PSO1
		CO 3: Classify processes, properties and systems on a thermodynamic basis		

		CO 4: Discuss the second law of thermodynamics and assess thermodynamic applications using second law of thermodynamics.	E, A	PSO3
		CO 5: Discuss basic concepts of statistical thermodynamics	U	PSO11
		CO 6: Solve numerical problems based on thermodynamics and thermochemistry		PSO2
		CO 7: Understand the basics of spectroscopic techniques- Rotational, Vibrational and Raman Spectroscopy	U	PSO2
		CO 8: Compare NMR and ESR spectroscopy and their applications	U	PSO3
		CO 9: Evaluate physical and chemical quantities using non-spectroscopic techniques.	U, E	PSO4
		CO 10: Identify the elements of symmetry and determine the point groups of simple molecules	E	PSO11
		CO 11: Differentiate diamagnetism and paramagnetism, measurement of magnetic susceptibility	U	PSO11
		CO 12: Correlate dipole moment with geometry of molecules	R, U	PSO11
CH1642	Organic Chemistry III	CO 1: Outline the chemistry of simple heterocyclic compounds	U	PSO10
		CO 2: Classify amino acids, proteins, nucleic acids, drugs, terpenes, vitamins, lipids and polymers.	U	PSO10
		CO 3: Discuss the synthesis of amino acids, peptides, drugs and polymers.	U	PSO9
		CO 4: Describe the isolation and structure of terpenes and alkaloids.	R	PSO10
		CO 5: Explain the mechanism and techniques of polymerisation.	U	PSO11
		CO 6: Discuss the principle of UV, IR, NMR and Mass spectroscopy.	U	PSO2
		CO 7: Interpret spectroscopic data to elucidate the structure of simple organic compounds.	A	PSO18
		CO 8: Use the simple organic reactions to elucidate the structure of quinoline, piperine and conine.	A	PSO18
CH1643	Physical Chemistry III	CO 1: Recall the basic physical concepts in quantum mechanics, colloids, adsorption, Chemical Kinetics, catalysis, chemical and ionic equilibria, phase equilibria, binary liquid systems and photochemistry	R	PSO4
		CO 2: Understand the basic concepts involved in quantum mechanics, colloids, adsorption, Chemical Kinetics, catalysis, chemical and ionic equilibria, phase equilibria, binary liquid systems and photochemistry	U	PSO4
		CO 3: Derive and Interpret important theories and equations involved in physical chemistry	A	PSO10
		CO 4: Demonstrate the origin of quantum numbers by correlating the Cartesian and spherical polar coordinates of hydrogen atom.	A	PSO10
		CO 5: Identify and recognize the applications of various principles, equations and physical processes	U	PSO10
		CO 6: Perform calculations involving physical concepts and equations	A	PSO4
		CO 7: Analyze graphical representations (phase diagrams, two and three components, vapour pressure – composition and boiling point –	A	PSO9

		composition, temperature-composition) present in physical chemistry.		
		CO 8: Understand terminology	U	PSO11
		CO 9: Understand the effects of external influence on various chemical processes	U	PSO1
		CO 10: Understand different laws and principles of physical chemistry	U	PSO3
CH1544	Inorganic volumetric analysis	CO 1: Develop skill in selecting, primary and secondary standards	U	PSO1
		CO 2: Develop skill in weight calculation of primary standards weighing by electronic balance, making of solutions of definite strength (standard solutions)	A	PSO2 PSO8
		CO 3: Use sophisticated glass wares, calibrate apparatus and develop skill in keen observation, prediction and interpretation of results	A	PSO1
		CO 4: Perform volumetric titrations under acidimetry-alkalimetry, permanganometry, dichrometry, iodimetry- iodometry,cerimetry, argentometry and complexometry	A	
		CO 5: Compare the advantages and disadvantages of different volumetric techniques	U	
		CO 6: Practice Punctuality and regularity in doing experiments and submitting Lab records	A	
CH1545	Physical chemistry experiments)	CO 1: Develop Scientific outlook and approach in applying principles of physical chemistry in chemical systems/reactions	U	PSO1
		CO 2: Use computational methods for plotting graph	A	PSO2/PSO8
		CO 3: Describe systematic procedures for physical experiments	U	PSO1
		CO 4: Acquire Instrumentation skill in using conductometer, potentiometer, refractometer, stalagmometer and Ostwald's viscometer.	U	PSO3
		CO 5: Compare theory with experimental findings	A	PSO1& PSO2
		CO 6: Practice Punctuality and regularity in doing experiments and submitting Lab records	A	
CH1551.3	Environmental Chemistry (Open Course)	CO 1: Discuss the structure and composition of the atmosphere	U	PSO14
		CO 2: Identify, Realise and enlist the causes of pollution to water, soil and air	U	PSO14
		CO 3: Become aware of environmental issues and its effect to man and other living beings	U	PSO12
		CO 4: Review major environmental disasters and suggest controlling and preventive measures	U	PSO12
		C0 5: Discuss the laws of environmental protection	U	PSO21
CH1644	Organic chemistry experiments	CO 1: Develop curiosity in systematically analyzing organic compounds	A	PSO1
		CO 2: Differentiate and identify organic compounds by their characteristic reactions towards standard reagents	U	PSO10
		CO 3: Confirm their findings by preparing solid derivatives, and thus understand reliability of experimental results	A	PSO2
		CO 4: Determine physical constants of organic compounds	A	PSO3
		CO 5: Separate organic compounds by TLC/paper/column chromatographic techniques	A	PSO3
		CO 6: Prepare soaps	A	PSO18

		CO 7: Apply the principles and techniques in organic chemistry, thereby developing skill in designing an experiment to synthesize and purify organic compounds	A	PSO18
		CO 8: Practice systematic scientific procedure and prepare adequate report of them	A	PSO16
		CO 9: Understand the chemistry behind organic reactions	A	PSO10
CH1645	Gravimetry	CO 1: Understand precipitation techniques in quantitative context	U	PSO1
		CO 2: Appreciate the application of silica crucible and sintered crucible in gravimetry	A	PSO2 PSO8
		CO 3: Practice technique of making, diluting solutions on quantitative basis	A	PSO1
		CO 4: Realise the factors affecting precipitation/ crystallisation	A	PSO1
		CO 5: Take precautionary measures in filtration, drying and incineration of precipitates	U	PSO3
		CO 6: Understand the principle of colorimetry to estimate Fe3+ and ammonia	A	PSO1& PSO2
		CO 7: Practice Punctuality and regularity in doing experiments and submitting Lab records	A	PSO18
CH1651.1	Supramolecular,Nano Particles and Green Chemistry (Elective Course)	CO 1: Become aware of pollution cauded by industries	U	PSO13
		CO2: Recognise the necessity of green approaches to protect nature	U	PSO14
		CO 3: Discuss about sustainable development and logical use of natural resourses	A	PSO14
		CO 4: Motivated to more ecofriendly life style	A	PSO4
		CO 5: Realises the importance of microscsale approaches and nano material research	U	PSO13&21
CH1646	Project and Factory visit	CO 1: Develop an aptitude for research in chemistry	U, A	PSO1
		CO 2: Practice research methodology and literature search	A	
		CO 3: Critically choose appropriate research topic and presentation	A	PSO2 PSO8

M. Sc. Chemistry

Programme Specific Outcomes:

PSO 1: Develop a better understanding of the current chemical principles, methods and theories with the ability to critically analyse at an advanced level.

PSO 2: Acquire solid knowledge of classical and modern experimental techniques and interpretation of results; thereby acquire the ability to plan and carry out independent projects.

PSO 3: Develop the qualities of time management and organization, planning and executing experiments.

PSO 4: Have a good level of awareness of the problems associated with health, safety and environment.

PSO 5: Understand how chemistry relates to the real world and be able to communicate their understanding of chemical principles to a lay audience and as well apply the knowledge when situation warrants.

PSO 6: Learn to search scientific literature and databases, extract and retrieve the required information and apply it in an appropriate manner.

PSO 7: Demonstrate proficiency in undertaking individual and/or team-based laboratory investigations using appropriate apparatus and safe laboratory practices.

PSO 8: Develop analytical solutions to a diversity of chemical problems identified from application contexts; critically analyse and interpret qualitative & quantitative chemical information's.

PSO 9: Set the scene to make use of the wide range of career options open to chemistry graduates.

Course code	Course Name	Course Outcome	Cognitive Level	PSO No.
CH 211	Inorganic Chemistry I	CO 1: Employ crystal field theory in analysing the splitting of d orbitals in octahedral, tetragonal, square planar, tetrahedral, trigonal bipyramidal and square pyramidal fields, calculate Crystal Field Stabilization Energy and Interpret Octahedral Site Stabilization Energy.	Ap, An, U	1
		CO 2: Apply Jahn-Teller theorem and demonstrate evidence for JT effect, static and dynamic JT effect.	Ap	1
		CO 3: Illustrate MOT for octahedral and tetrahedral complexes with and without pi bonds and construct MO diagrams.	An, C	1
		CO 4: Critically evaluate data from a variety of analytical chemistry techniques and apply knowledge of the statistical analysis of data.	Ap, E	1, 2
		CO 5: Interpret complexometric titrations, redox titrations, gravimetric titrimetry and titrations in non-aqueous solvents.	E, U	1, 2
		CO 6: Apply TG, DTA and DSC in the study of metal complexes.	Ap, An	1, 2
		CO 7: Explain the functioning of the frontier materials in inorganic chemistry like Solid Electrolytes, Solid oxide fuel cells, Rechargeable battery materials, Molecular materials and fullerides.	U	1, 4, 6
		CO 8: Explain the preparation, properties and structure of isopoly acids of Mo, W and V and heteropoly acids of Mo and W.	U	1
		CO 9: Explain preparation and properties of xenon fluorides, and noble gas compounds, aluminosilicates, zeolites and silicones and identify the importance of shape selectivity.	U	1
		CO 10: Identify the chemical processes occurring naturally in earth's atmospheric, aquatic and soil environments and evaluates the impacts of human perturbations to these processes.	An, E	4
CH 212	Organic Chemistry I	CO 1: Write down the IUPAC name of polycyclic, spirocyclic and heterocyclic compounds and draw the structures from the IUPAC name of these compounds.	U	1
		CO 2: Determine R and S, P and M, E and Z configuration of compounds with chiral centres, biphenyls, allenes, spiranes and draw the configurations in dash and wedge formula, or zig –zag configurations.	E	1
		CO 3: Detect prochirality in a compound and explain relevance of prochirality	U, An	1
		CO 4: Explain chiral centre, chiral axis and chiral plane with examples, stability of conformations, stereoselective and stereospecific reactions.	An, E	1
		CO 5: Calculate Cotton effect of a compound from its structure and configuration.	E	1
		CO 6: Explain different methods for generation of free radical and different types of free radical reactions- Predict the products in a free radical reaction.	U, An	1
		CO 7: Describe different types mechanism of substitution, elimination, hydrolysis and addition reactions.	Ap	1

		CO 8: Differentiate the rate, mechanism and stereochemistry influenced by solvent, substrate structure, intermediate stability.	An	1
		CO 9: Predict the products or reactants or reagents in selected types of reactions.	U	1
		CO 10: Design the mechanism of selected reactions.	C	1
CH 213	Physical Chemistry I	CO 1: Outline the development of quantum mechanics and its tools and apply them in determining the wave functions and energies of moving particles.	U, Ap, An	1
		CO 2: Recognize the nature of adsorption and propose theories and choose theoretical and instrumental methods of measurements of surface property.	U, Ap, An	1
		CO 3: Understand theory and mechanism of catalytic action.	U	1
		CO 4: Correlate thermodynamic properties and apply them in systems.	U, Ap, An	1
		CO 5: Understand theories, mechanism and, kinetics of reactions and solve numerical problems.	U, Ap, An	1
		CO 6: Identify point groups and construct character table and predict hybridisation and spectral properties of molecules.	U, Ap, C	1
CH 221	Inorganic Chemistry II	CO 1: Obtain the term symbols of dn system and determine the splitting of terms in weak and strong octahedral and tetrahedral fields.	E	1
		CO 2: Explain the correlation diagrams for d^n and d^{10-n} ions in octahedral and tetrahedral fields and interprets electronic spectra of complexes.	U, E	1
		CO 3: Applies magnetic measurements in the determination of structure of transition metal complexes.	Ap	1
		CO 4: Relates crystalline structure to X-ray diffraction data and the reciprocal lattice and explains the diffraction methods	U	1
		CO 5: Explains crystal defects.	U	1
		CO 6: Elaborates the structure of selected compounds of AX, AX2, AmX2, ABX3 and spinels.	C	1
		CO 7: Explains the electronic structure of solids using free electron theory and band theory.	E	1
		CO 8: Understands the differences in semiconductor and dielectric materials and their electrical and optical properties	U, E	1
		CO 9: Explain the structure and reactions of S–N, P–N, B–N, S–P compounds and boron hydrides.	U, E	1
		CO 10: Analyse the topological approach to boron hydride structure and estimates styx numbers and apply Wade's rules in borane and carboranes.	Ap, An, E	1
		CO 11: Identify the electronic configurations and term symbols of lanthanides and actinides.	Ap	1
		CO 12: Sketches the shapes of f orbital and shows their splitting in cubic ligand field.	U	1
		CO 13: Elaborates the importance of the beach sands of Kerala and their important components.	C	1
CH 222	Organic Chemistry II	CO 1: Discuss the fundamentals, operating principles and instrumentation of separation techniques.	R	1
		CO 2: Differentiate the principle and applications of phase transfer catalysis with examples.	An	1
		CO 3: Describe the various methods of determining reaction mechanisms and basic thermodynamic principles of organic reactions.	U	1

		CO 4: Explain the Hammet parameters of reaction and design an experiment to confirm the mechanism of a reaction.	R, C	1
		CO 5: Identify different types of rearrangement reactions, determine the product of the reaction applying migratory aptitude, and reproduce the evidences for the mechanism of the reaction.	R, E	1
		CO 6: Understand that the outcomes of pericyclic reactions may be understood in terms of frontier orbital interactions, correlation diagram, Mobius and Huckel approach.	R	1
		CO 7: Recall and define the various types of pericyclic reaction; define such terms as 'conrotatory', 'suprafacial'.	R	1
		CO 8: Predict and rationalise the outcomes of pericyclic reactions including stereospecificity, regioselectivity, and stereoselectivity.	U	1
		CO 9: State the synthetic importance of the above cycloaddition and rearrangement reactions, and give disconnections of target compounds corresponding to these reactions.	R	1
		CO 10: Describe the fate of excited molecule based on Jabolonoski diagram, predict the course of an organic photochemical reaction and identify the product with the type of functional group.	R, An	1
		CO 11: Propose synthetic routes to a variety of molecules, starting from simple precursors with correct stereochemistry and reagents of selected reactions.	Ap	1
CH 223	Physical Chemistry II	CO 1: Apply quantum mechanical principles in solving both realand imaginary spherical harmonics systems-multi electron systems and analyse spectral lines.	U, Ap, An	1
		CO 2: Describe and explain the physical and chemical principles that underlie molecular structure determination techniques like microwave, vibrational, Raman and electronic spectroscopy.	R, U	1
		CO 3: Predict likely spectral characteristics of given molecular species, and be able to rationalise those characteristics on the basis of structural and electronic arguments.	Ap, An	1
		CO 4: Acquire knowledge of basics of statistical mechanics and compare statistical methods.	U, Ap	1
		CO 5: Understand and apply of theories of heat capacity.	U, Ap	1
		CO 6: Understand theories of electrolytes and electrochemical reactions.	R, U, Ap, An	1
		CO 7: Ascertain the application of electrochemistry in industrial fields.	An	1
		CO 8: Understand the theories and applications behind various types of analytical techniques in electrochemistry.	U	1
		CO 9: Acquire skill in solving numerical problems.	Ap	1
CH 214	Inorganic Practicals I	CO 1: Interpret data from an experiment, including the construction of appropriate graphs and the evaluation of errors.	U, E	3, 7, 8
		CO 2: Estimate volumetrically the concentration of Zn, Mg and Ni using EDTA and the volumetric estimation of Fe.	Ap, An	7, 8
			Ap, An	7, 8

		CO 3: Estimate volumetrically the hardness of water and concentration of Ca in water samples using EDTA. CO 4: Estimate colorimetrically the concentration of Chromium – (using Diphenyl carbazide), Iron (using thioglycolic acid), Iron (using thiocyanate), Manganese (using potassium periodate), Nickel (using dimethyl glyoxime). CO 5: Carry out the preparation of the metal complexes Potassium trioxalato chromate(III), Tetraammonium copper (II) sulphate, Hexammine cobalt (III) chloride. CO 6: Record the UV spectra, IR spectra, magnetic susceptibility, TG, DTA and XRD of the complexes prepared.	Ap, An Ap Ap, An	7, 8 7, 8 2, 7, 8
CH 215	Organic Practicals I	CO 1: Interpret data from an experiment, including the construction of appropriate graphs and the evaluation of errors. CO 2: Determine the correct method for separation of a binary mixture and make the separated compounds in pure form. CO 3: Develop thin layer chromatogram of compound and determine its purity. CO 4: Separate two compounds by column chromatography. CO 5: Utilize the synthetic procedures and reagents to convert a compound into another. Differentiate the products by spectroscopic methods. CO 6: Use green chemical principles in the synthesis. CO 7: Solve GC MS and LC MS of a compound to ascertain purity and identity, apply the basic principles	U, E An, E C An An Ap Ap, E	3, 7, 8 2, 7, 8 2, 7, 8 2, 7, 8 2, 7, 8 2, 4 2, 7
CH 216	Physical Practicals I	CO 1: Interpret data from an experiment, including the construction of appropriate graphs and the evaluation of errors. CO 2: Construct the Freundlich and Langmuir isotherms for adsorption of acetic/oxalic acid on active charcoal/alumina and determine the concentration of acetic/ oxalic acid. CO 3: Determine the rate constant, Arrhenius parameters, rate constant and concentration using kinetics CO 4: Construct the phase diagram and determine the composition of an unknown mixture CO 5: Construct the ternary phase diagram of acetic acid chloroform-water system and out the procedure in an unfamiliar situation to find out the composition of given homogeneous mixture. CO 6: Construct the tie-line in the ternary phase diagram of acetic acid chloroform-water system. CO 7: Determine distribution coefficient using distribution law. CO 8: Determine the equilibrium constant employing the distribution law. CO 9: Determine the coordination number of Cu2+ in copper-ammonia complex. CO 10: Determine Kf of solid solvent, molar mass of non-volatile solute, mass of solvent and composition of given solution	U, E C, Ap, An Ap Ap, An C, Ap, An C, Ap, An Ap Ap Ap Ap, An Ap, An	3, 7, 8 7, 8 7, 8 7, 8 7, 8 7, 8 7, 8 7, 8 7, 8 7, 8 7, 8

		CO 11: Determine KT of salt hydrate, molar mass of solute, mass of salt hydrate and composition of given solution.	Ap	7, 8
		CO 12: Determine surface tension and parachor of liquids.	Ap, An	7, 8
		CO 13: Ascertain the relationship between surface tension with concentration of a liquid and use this to find out the composition of given homogeneous mixture	Ap, An	7, 8
		CO 14: Determine the concentration of given strong acid/alkali.	Ap, An	7, 8
		CO 15: Determine the heat of ionisation of acetic acid.	Ap, An	7, 8
		CO 16: Determine the heat of displacement of Cu^{2+} by Zn.		
CH 231	Inorganic Chemistry III	CO 1: Demonstrate knowledge of advanced content in the areas of inorganic chemistry such as in organometallic compounds, bioinorganic compounds, spectroscopic methods in inorganic Chemistry and nuclear chemistry.	U	1
		CO 2: Examine the bonding in simple and polynuclear carbonyls with and without bridging and complexes with linear π donor ligands.	U, An	1
		CO 3: Explain the structure and bonding of ferrocene and dibenzene chromium with the help of MO theory.	U, An, C	1
		CO 4: Understand fundamental reaction types and mechanisms in organometallics and to employ them to understand selected catalytic processes in industry.	U, An, C	1
		CO 5: Contrasts the thermodynamic and kinetic stability of complexes, analyses the factors affecting stability of complexes and explains the methods of determining stability constants.	An, E	1
		CO 6: Classifies ligand substitution reactions and explains its kinetics and various mechanisms.	U, E	1
		CO 7: Analyze the chemical and physical properties of metal ions responsible for their biochemical action as well as the techniques frequently used in bioinorganic chemistry such as oxygen transport, e-transfer, communication, catalysis, transport, storage etc.	U, An	1
		CO 8: Explain the principles of spectroscopic methods employed in inorganic chemistry and their applications in the study of metal complexes.	An, E	1
		CO 9: Demonstrate a knowledge of fundamental aspects of the structure of the nucleus, radioactive decay, nuclear reactions, counting techniques.	R, U	1
		CO 10: Evaluate the role of nuclear chemistry to find the most suitable measures, administrative methods and industrial solutions to ensure sustainable use of the world's nuclear resources.	U, E, C	1, 4
CH 232	Organic Chemistry III	CO 1: Describe and explain the physical and chemical principles that underlie molecular structure determination techniques such as UV-visible, IR, mass and NMR spectroscopy.	U, An	1
		CO 2: Apply knowledge of molecular structure determination using UV-visible, IR, mass and NMR spectroscopic techniques to identify and/or	Ap, An	1, 8

		characterise chemical compounds from experimental data.	U, Ap	1, 8
		CO 3: Calculate λmax of a compound, apply IR frequency table to determine the functional groups present in the molecule, interpret mass spectrum of compound from fragmentation.	U, Ap, An	1, 8
		CO 4: Predict likely spectral characteristics of given molecular species; solve the structures of unknown molecules using appropriate spectroscopic techniques.		
		CO 5: Devise a 2 D NMR of a compound based on learned principles and solve the structure of a compound based on NMR data.	C, Ap	1, 8
		CO 6: Discuss organic transformations with organometallic compounds and predict the products of the reactions.	U	1
		CO 7: Propose the retro synthetic pathways to a variety of Molecules	U, Ap, C	1
		CO 8: Propose mechanisms for chemical reactions, given starting materials, reagents, conditions, and/or products.	U, Ap, C	1
		CO 9: Compare the reactions and mechanism and determine the products of a selected set of reactions; identify protecting group strategies.	Ap, E	1
		CO 10: Devise combinatorial method to create a library of compounds.	C	1, 6
		CO 11: Give examples of stereoselective, regioselective and chemoselective reductions and oxidations.	U	1
CH 233	Physical Chemistry III	CO 1: Understand the theories of chemical bonding and their application with help of approximate methods predict the nature of orbitals and molecular spectra.	U, Ap, An	1
		CO 2: Compare MO and VBT.	An	1
		CO 3: Understand the properties of gases and liquids and the nature of the intermolecular forces in them.	U, Ap, An	1
		CO 4: Describe the principle behind the determination of surface tension and coefficient of viscosity.	U	1
		CO 5: Describe and explain the physical and chemical principles that underlie molecular structure determination techniques like NMR, ESR, Mossbauer, NQR and PES spectroscopy.	U, Ap, An	1
		CO 6: Judge the degrees of freedom of systems and understand theories of irreversible thermodynamic systems.	U, Ap,	1
		CO 7: Understand the quantum mechanical and non-quantum mechanical methods in computational chemistry, potential energy surface and basic functions.	An, E	1
		CO 8: Write the Z matrix of simple molecules.	U, An	1
		CO 9: Acquire skill in solving numerical problems.	U, Ap, Ap	1
CH 241	Chemistry of Advanced Materials	CO 1: Understand dimensions, synthesis, physicochemical properties of nanomaterials and its applications.	U, Ap, An	1
		CO 2: understand and apply characterization tools for analysing nano structures.	U, Ap, An	1
		CO 3: Outline and recognize the types of polymerizations, kinetics and mechanisms.	U, Ap, An	1
		CO 4: Understand the stereochemical aspects and methods for the determination of molecular weights of polymers.	U, Ap, An	1
			U, Ap, An	1, 5

		CO 5: Discuss the synthesis and applications of selected classes of speciality polymers. CO 6: Distinguish the types and important applications of smart materials.	U, Ap, An	1, 5
CH 242 (a)	Inorganic Chemistry IV	CO 1: Explain the schemes for σ and π bonding with examples. CO 2: Explain MO and Ligand field theory with the support of group theory and construct the MO diagram of octahedral complexes. CO 3: Apply character tables to find out the Infrared and Raman active modes for C2v, C3v and D4h. CO 4: Assimilate the concepts of molecular recognition, self-assembly, dynamic combinatorial chemistry and supramolecular chirality, and be aware of the most important work in the field. CO 5: Understand the nature of bonding in metal atom clusters and distinguish Low nuclearity and High nuclearity carbonyl clusters. CO 6: Perform the electron counting schemes in cluster compounds. CO 7: Differentiate the different types of cluster molecules and understand their utility in catalysis. CO 8: Understand and explain the role of metal ions in biological systems and give examples for the use of metals in medicine. CO 9: Differentiate the defects arising due to deficiency and excess presence of metal ions in the body. CO 10: Explain the acid base concept in non-aqueous media and identify the reactions taking place in selected non aqueous solvents.	U U, C Ap, An U U, An Ap, An An U, An An An	1 1 1 1 1 1 1 1 1 1
CH 242(b)	Organic Chemistry IV	CO 1: Define secondary metabolites from plants and animals. CO 2: Explain the biosynthesis of terpenes and sterols, illustrate the structural elucidation and synthesis of natural products. CO 3: List the forces involved in molecular recognition and recognize molecular receptors. CO 4: Quote molecular recognition events in biological systems. CO 5: Discuss the methods of creating combinatorial libraries and its processing to locate lead molecule. CO 6: Explain the various stages in drug development process, and outline the synthesis of paracetamol, phenobarbital, diazepam, sulphamethoxazole, benzylpenicillin, and chloramphenicol. CO 7: Construct a solid phase synthesis of tripeptide from any three aminoacids, explain protection, deprotection and automated synthesis of peptides and nucleotides. CO 8: Describe twelve principles green chemistry. CO 9: Illustrate reactions in which green chemistry principles are applied and calculate atom economy.	R U, An U U U R, U, C U, C R Ap, An	1 1 1 1 1 1 1 1, 4 1, 4
CH 242(c)	Physical Chemistry IV	CO 1: Apply the group theory in the identification of IR and Raman active normal modes in molecules coming under various point groups such as C2v, C3v, C4v, D3h, Td and Oh. CO 2: Apply group theory in solving spectroscopic problems.	Ap Ap	1 1

		CO 3: Solve the problems in Exactly solvable systems like Simple Harmonic Oscillator, rigid rotor and the Hydrogen atom.	Ap, An	1
		CO 4: Explain the approximation methods used in quantum mechanics	U	1
		CO 5: Illustrate trial wave functions for calculation of H atom and particle in a 1D box as examples.	U, Ap	1
		CO 6: Set up secular determinants	C	1
		CO 7: Explain the variation in the state of a system with time	U, An	1
		CO 8: Apply computational methods as potential tools for practicing chemistry	An	1
		CO 9: Construction of Z-matrices of simple molecules H2, H2O, H2O2, H2CO, CH3CHO, CH4, C2H6 and with dummy atom, CO2, NH3, C6H6.	C	1
		CO 10: Explain the commonly using force fields (MM3, MMFF, AMBER and CHARMM) and Softwares.	Ap	1
		CO 11: Compare Molecular Mechanics, Ab initio method, Semiempirical method and DFT method of computations.	E	1
CH 234	Inorganic Practicals II	CO 1: Interpret data from an experiment, including the construction of appropriate graphs and the evaluation of errors.	U, An	3, 7, 8
		CO 2: Estimate a simple mixture of ions (involving quantitative separation) by volumetric and gravimetric methods.	An	7, 8
		CO 3: Perform COD, BOD, DO, TDS analysis.	Ap, An	4, 7, 8
		CO 4: Predict likely spectral characteristics of given metal complexes solve the structures of unknown metal complexes using appropriate spectroscopic techniques and magnetic measurements.	Ap, An	6, 8
		CO 5: Analyse the XRD of simple substances.	An	8
		CO 6: Interpret TG and DTA curves.	An	8
CH 235	Organic Practicals II	CO 1: Interpret data from an experiment, including the construction of appropriate graphs and the evaluation of errors.	U, An	3, 7, 8
		CO 2: Predict likely spectral characteristics of given molecular species; solve the structures of unknown molecules using appropriate spectroscopic techniques	Ap, An	6, 7, 8
		CO 3: Develop paper chromatogram of a compound and determine its purity	C	7, 8
		CO 4: Estimate quantitatively the Aniline, Phenol, glucose, Ascorbic acid and Aspirin in a sample	Ap	7, 8
		CO 5: Estimate calorimetrically paracetamol, protein and ascorbic acid	Ap	7, 8
		CO 6: Use green chemical principles in the synthesis	Ap	4, 7, 8
CH 236	Physical Practicals II	CO 1: Interpret data from an experiment, including the construction of appropriate graphs and the evaluation of errors.	U, E	3, 7, 8
		CO 1: Determine the strength of strong/ weak acids by conductometric titrations.	Ap	7, 8
		CO 2: Verify Onsager equation and Kohlrausch's law conductometrically.	An, E	7, 8
		CO 4: Determine the activity and activity coefficient of electrolyte.	Ap, An	7, 8
		CO 5: Determine the concentration of a solution potentiometrically or pH metrically.	Ap, An	7, 8
		CO 6: Employ spectrophotometry in determining unknown concentration.	Ap, An	7, 8

		CO 7: Determine the viscosity of liquid mixtures and use this in determining the concentration of a component in a mixture.	Ap, An	7, 8
		CO 8: Determine the concentration of a liquid mixture using a refractometer.	Ap, An	7, 8
		CO 9: Determine the unknown concentration of a given glucose solution.	Ap, An	7, 8
CH 243(a)	Dissertation	CO 1: Demonstrate an advanced theoretical and technical knowledge of chemistry as a creative endeavour; analyse, interpret and critically evaluate scientific information.	Ap, An	1
		CO 2: Present information, articulate arguments and conclusions, in a variety of modes, to audiences in their field of research.	E, C	5, 8
		CO 3: As part of a team or individually, design, conduct, analyse and interpret results of an experiment, and effectively communicate these in written reports and other formats.	Ap, An	3, 7
		CO 4: Develop an understanding of the requirements to undertake independent research in a chemistry field.	U	6, 9
		CO 5: Demonstrate an understanding of the relationship between scientific research and the progress of new knowledge in a global scenario.	An	5, 6, 9
CH 243(b)	Visit to R & D Centre	CO 1: Understand the relevance of independent supervised research in a chemistry field and the need of well-developed judgement, adaptability and accountability as a practitioner or learner	U, An	2, 9
	Comprehensive viva-voce			

Complementary courses

Course code	*Course Name*	*Course Outcome*	*Cognitive Level*
CH1131 .1	Theoretical and Analytical Chemistry (Complementary Chemistry-physics)	CO 1: Discuss the rules for filling electrons in atomic orbitals	U
		CO 2: Correlate stability of atom with electronic configuration	U
		CO 3: Discuss theories of chemical bonding and their limitations	U
		CO 4: Predict geometry of molecules from the type of hybridisation	U, A
		CO 5: Recognise fundamentals of thermodynamics and the predict spontaneity of reactions	U, A
		CO 6: Derive thermodynamic properties of systems in equilibrium	A
		CO 7: Critically select suitable indicators for acid base and redox titrations	E, A
		CO 8: Appreciate the application of common ion effect and solubility product in precipitation and intergroup separation of cations	A
		CO 9: Discuss the basic principles of paper chromatography and thin layer chromatography	U
		CO 10: Solve numerical problems on bond order, molarity, normality and Lattice energy	A
CH1131 .3	Analytical and Environmental chemistry (Complementary Chemistry-physics)	CO 1: Discuss Bohr atom model and represent electronic configuration of elements	U
		CO 2: Predict structure of simple molecules based on the concept of hybridisation	A
		CO 3: Identify hydrogen bonding in relation to physical and chemical properties	U
		CO 4: List the various chemical bonds	R
		CO 5: Apply the VSEPR theory to explain the geometry of molecules	A
		CO 6: Discuss the theory of volumetric analysis	U
		CO 7: Become aware of threat of chemical pollutants air, water and soil	A

CH1131.4	Theoretical Chemistry (Complimentary Chemistry)	CO 1: Differentiate particle nature and wave nature of matter	U
		CO 2: Associate wave concept with microscopic matter	A
		CO 3: Understand the relevance of periodic classification of elements	U
		CO 4: Describe the various types of chemical bonds	R
		CO 5: Apply the VSEPR theory to explain the geometry of molecules	E, A
		CO 6: Comprehend different segments of titrations	U
		CO 7: Apply the principles of colorimetry to estimate ions and elements	A
		CO 8: Recognize the factors affecting environment and solutions for it	E
CH1231.1	Physical Chemistry I (Complimentary Chemistry)	CO 1: Define enthalpies of formation, combustion, neutralization, solution and hydration reactions	R, U
		CO 2: Apply Hess's law for thermo chemical calculations	A
		CO 3: Predict the effect of temperature pressure and concentration on a system in equilibrium based on Le Chatelier principle	U
		CO 4: Classify acidic and basic compounds in accordance with different concepts.	U
		CO 5: Suggest method for determination of pH	A
		CO 6: Discuss petrochemicals and their applications	
		CO 7: Realise the depletion of petroleum products and the need for alternate sources of energy.	U
		CO 8: Recognise the necessity of sustainable development	U
		CO 9: Appreciate the role of solar energy in photosynthesis and discuss methods of solar energy harvesting	U
		CO 10: Become responsible in the consumption of natural resources and avoid factors affecting the harmony of nature from the equilibrium concept.	A
		CO 11: Discuss and the Illustrate general methods and techniques in metallurgy	U, A
		CO 12: Predict methods of concentration, extraction metals from their ores	A
		CO 13: Discuss the applications of Van Arkel method and zone refining in metallurgy	U
CH1231.3	Inorganic and bioinorganic chemistry (Complimentary Chemistry)	CO 1: Understand the biological and environmental aspects of organic compounds	U
		CO 2: Comprehend the meaning of stability of nucleus	R
		CO 3: Summarise the applications of radioactivity	U
		CO 4: Predict the properties of transition metal complexes	A
		CO 5: Apply complexation reactions in qualitative and quantitative analysis	U
		CO 6: Appreciate biological processes like photosynthesis, respiration etc	E
		CO 7: Realise the use of trace elements in biochemical processes	A
CH1231.4	Inorganic Chemistry (Complimentary Chemistry)	CO 1: Understand the biological and environmental aspects of organic compounds	U
		CO 2: Comprehend the meaning of stability of nucleus	R
		CO 3: Summarise the applications of radioactivity	U
		CO 4: Predict the properties of transition metal complexes	A
		CO 5: Understand the applications of metal complexes	U
		CO 6: Learn to appreciate biological processes like photosynthesis, respiration etc	E
		CO 7: Discuss the biochemistry of trace elements	U, E
CH1331.1	Physical Chemistry II (Complimentary Chemistry)	CO 1: Discuss on electrochemical cells and emf measurements	U
		CO 2: Apply the principles of physical Chemistry in Catalysis and photochemistry	A
		CO 3: Draw unit cells and structure of crystals	U
		CO 4: Understand the effect of temperature on molecular velocities of gases	R
		CO 5: Calculate cell emf and electrode potentials	A

		CO 6: Construct electrochemical cells	A
		CO 7: Classify between Photochemical reactions	U
		CO 8: Relate electrolyte concentration with emf	E
CH1331 .3	Physical Chemistry (Complimentary Chemistry)	CO 1: Classify reactions on the basis of order and molecularity	A
		CO 2: Understand the effect of temperature on reaction rates	U
		CO 3: Understand the theories of catalysis	U
		CO 4: Categorize compounds into acids and bases	U
		CO 5: Discuss the principle and application of UV and NMR spectroscopy.	U, A
		CO 6: Understand the properties of colloids and their application	U
CH1331 .4	Organic Chemistry	CO 1: Classify carbohydrates, aminoacids, proteins, nucleic acids, lipids, polymers and drugs.	U
		CO 2: Summarize optical, geometrical and conformational isomerism Draw the structure of simple carbohydrates	U
		CO 3: Discuss the structure of proteins	U
		CO 4: Explain the synthesis of amino acids, peptide, drugs	U
		CO 5: Predict absolute configuration of stereo centers	A
CH1431 .1	Spectroscopy and Material Chemistry (Complimentary Chemistry)	CO 1: Discuss the principle and applications of rotational, vibrational, electronic and NMR spectroscopy.	U
		CO 2: Illustrate isomerism, geometry and bonding in co-ordination complexes	A
		CO 3: Appreciate the use of co-ordination compounds in qualitative and quantitative analysis	U
		CO 4: Solve numerical problems relating to nuclear chemistry	R
		CO 5: Appreciate the use of biodegradable polymers	A
		CO 6: Apply the importance energy and environment conservation	U
		CO 7: Get insight to the emerging area of nano and advanced materials	A
CH1431 .3	Organic Chemistry (Complimentary Chemistry)	CO 1: Discuss the principle and applications of chromatography and electrophoresis	U
		CO 2: Classify amino acids, proteins, carbohydrates and vitamins. Identify and distinguish the structure of amino acids, peptides, proteins and nucleic acids.	U
		CO 3: Summarise the concept of optical isomerism.	U, A
		CO 4: Categorise crude drugs and explain the method of evaluating crude drugs.	U
		CO 5: Draw the structure of aminoacids, carbohydrates, simple optical isomers	R
		CO 6: Explain the preparation and reactions of amino acids and carbohydrates	U
		CO 7: Discuss the extraction process and general properties of natural products -oils, fats, terpenes and alkaloids.	U
CH1431 .4	Physical Chemistry (Complimentary Chemistry)	CO 1: Classify reactions on the basis of order and molecularity	U
		CO 2: Discuss different concepts of acids and bases	R, U
		CO 3: Understand different techniques used for the study of colloids	U
		CO 4: Calculate rate and order of reactions	E, A
		CO 5: Review the principles underlying the working of sophisticated instruments	U
CH1432 .1	Lab for Physics Majors (Complimentary Chemistry)	CO 1: Obey Lab safety instructions, develop qualities of punctuality, regularity and scientific attitude, outlook and scientific temper (GOOD LAB PRACTICES)	E, U
		CO 2: Develop skill in safe handling of chemicals, take precaution against accidents and follow safety measures	A
		CO 3: Develop skill in observation, prediction and interpretation of reactions	U, A
		CO 4: Apply the principle of common ion effect and solubility product in the identification and separation of ions	A
		CO 5: Develop skill in weight calculation for preparing standard solutions	A

		CO 6: Perform volumetric titrations under acidimetry-alkalimetry, permanganometry, dichrometry, iodimetry- iodometry,cerimetry, argentometry and complexometry	A
		CO7: Determine physical constants	A
CH1432 .3	Lab for Botany Majors (Complimentary Chemistry)	CO 1: Obey Lab safety instructions, develop qualities of punctuality, regularity and scientific attitude, outlook and scientific temper (GOOD LAB PRACTICES)	R, U, A
		CO 2: Develop skill in safe handling of chemicals, take precaution against accidents and follow safety measures	U, A
		CO 3: Develop skill in observation, prediction and interpretation of reactions	U, A
		CO 4: Prepare organic compounds, Purify and recrystallise	U, A
		CO 5: Develop skill in weight calculation for preparing standard solutions	E, A
		CO 6: Perform volumetric titrations under acidimetry-alkalimetry, permanganometry, dichrometry, iodimetry- iodometry, cerimetry, argentometry and complexometry	A
		CO 7: Conduct chromatographic separation of mixtures	A
CH1432 .4	Lab for Zoology Majors (Complimentary Chemistry)	CO 1: Obey Lab safety instructions, develop qualities of punctuality, regularity and scientific attitude, outlook and scientific temper (GOOD LAB PRACTICES)	R, U, A
		CO 2: Develop skill in safe handling of chemicals, take precaution against accidents and follow safety measures	U, A
		CO 3: Develop skill in observation, prediction and interpretation of reactions	U, A
		CO 4: Prepare organic compounds, Purify and recrystallise	U, A
		CO 5: Develop skill in weight calculation for preparing standard solutions	E, A
		CO 6: Perform volumetric titrations under acidimetry-alkalimetry, permanganometry, dichrometry, iodimetry- iodometry, cerimetry, argentometry and complexometry	A
		CO 7: Conduct chromatographic separation of mixtures	A