Department of Chemistry

B.Sc. Chemistry

S.No.	Course Code	Course Name	Course Outcomes
		SEMESTER- I	
1.	23UCHC11	Core Course - I: General Chemistry - I	**CO1[K1]:** explain the atomic structure, wave particle duality of matter, resonance, periodic properties, structure and bonding. **CO2[K2]:** Classify the elements in the periodic table, Dual nature of matter, types of bonds, reaction intermediates and types of reagents. **CO3[K3]:** apply the theories of atomic structure and bonding in the molecules. **CO4[K4]:** evaluate the relationship existing between electronic configuration, bonding, geometry of molecules and reactions; structure reactivity and electronic effects. **CO5[K5]:** predict trends in periodic properties, assess the properties of elements and explain hybridization in molecules, orbital, nature of H-bonding and organic reaction mechanisms and construct MO diagrams.

S.No.	Course Code	Course Name	Course Outcomes
2.	23UCHC1P	Core Course - II: Practical: Quantitative Inorganic Estimation and Inorganic Preparations	**CO1[K2]:** explain the basic principles involved in titrimetric analysis and inorganic preparations and laboratory safety. **CO2[K3]:** compare the methodologies of differenttitrimetricanalysis, preparation of inorganic compounds. **CO3[K4]:** plan and perform all the experiments, analyze and record the readings. **CO4[K5]:** determine the concentrations of unknown solutions in different ways and develop the skill to estimate the amount of a substance present ina given solution. **CO5[K6]:** predict the yield of different inorganic preparations and the end point of various titrations.
3.	23UCHS11	Skill Enhancement Course – I: Foundation Course – Basic Concepts of Chemistry	**CO1[K1]:** describe the general lab safety and basic concepts of organic, inorganic and physical chemistry **CO2[K2]:** classify the first aid, various elements in periodic table and bonds. **CO3[K3]:** apply the rules to write IUPAC nomenclature and to write electronic configuration **CO4[K4]:** evaluate the safety rules, bonding and states of matter. **CO5[K5]:** predict the hybridization, equivalent weight and fundamental and derived units

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4.	23UCHS12	Skill Enhancement Course –II:Non Major Elective Course: Food Chemistry	**CO1[K1]:** outline the food adulteration, contamination of wheat, rice, milk, butter, pesticides, food additives, poison, fats and oils **CO2[K2]:**discuss the awareness about food poisons, food additives,contaminations, beverages, saturated and unsaturated fats and oils **CO3[K3]:**explain the exposure on food additives, contamination, natural poisons, determination of oils and soft drinks. **CO4[K4]:**inspect the knowledge on beverages, determination of adulterants, preservatives, chemical poisons and vegetable oils. **CO5[K5]:** discuss about fats and oils, adulterants, food flavors and food poisons
SEMESTER- II			

S.No.	Course Code	Course Name	Course Outcomes
5.	23UCHC21	Core Course - III: General Chemistry - II	**CO1[K1]:** explain the concept of acids, bases and ionic equilibria; periodic properties of s and p block elements, preparation and properties of aliphatic and aromatic hydrocarbons. **CO2[K2]:** classify hydrocarbons, reactions of s and p – block elements, acids and bases, reaction mechanisms of aliphatic and aromatic hydrocarbons. **CO3[K3]:** examine the various compounds of s and p-block elements, strength of acids and poly nuclear aromatic hydro carbons. **CO4[K4]:** comment the theories of acids, bases and indicators, buffer action and important compounds of s-block elements, cycloalkanes, hydrocarbons. **CO5[K5]:** assess the application of hard and soft acids, indicators, buffers, compounds of s and p-block elements and hydrocarbons.
6.	23UCHC2P	Core Course – IV: PracticalQualitative Organic Analysis and Preparation of Organic Compounds	**CO1[K2]:** infer the organic analysis and organic preparation **CO2[K3]:** identify the presence of special elements and functional group in an unknown organic compound performing a systematic analysis, first aid and purification of organic compounds. **CO3[K4]:** classify the different functional groups and preparation pathway **CO4[K5]:** explain and identify the functional group, electrophoresis,basic idea about Bunsen burner. **CO5[K6]:** predict a solid derivative with respect to the identified functional group, recrystallize the compound prepared.

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7.	23UCHS21	Skill Enhancement Course – III: Cosmetics and Personal Care Products	**CO1[K1]:**list out the composition of various cosmetic products **CO2[K2]:** understand chemical aspects and applications of hair care and dental care and skin care products **CO3[K3]:** identify chemical aspects and applications of perfumes and skin care products. **CO4[K4]:** examine the various methods of beauty treatments and their advantages and disadvantage **CO5[K5**]: assess the various cosmetics used in personal grooming
8.	23UCHS22	Skill Enhancement Course – IV: Non Major Elective Course: Diary Chemistry	**CO1[K1]:** outline the general composition, processing, preservation, fermented and types of milk products **CO2[K2]:** explain composition, processing, types of pasteurization, common adulterants, rancidity, prevention, fermented and milk products **CO3[K3]:** discuss about the cream and butter, composition, estimation of fat in milk products, cream milk, preservation, special, fermented milk **CO4[K4]:** analyze about processing, preservation, constitution of milk products, homogenized milk, vitaminized milk, toned milk, fermented milk. **CO5[K5]:** develop an idea about the processing of various milk products and its properties and fermented products.
SEMESTER- III			

S.No.	Course Code	Course Name	Course Outcomes
9.	23UCHC31	Core Course – V: General Chemistry III	**CO1[K1]:** explain the kinetic properties of gases, solid & liquid states, nuclear radioactivity, and reaction in organic compounds, halogen derivatives and phenol **CO2[K2]:** describe the properties of states, the crystal structure, packing, terms in nuclear chemistry, halogen derivatives and phenol **CO3[K3]:** discuss the radioactivity, nuclear energy, nuclear waste management, alcohols, basis of halo, phenol derivatives **CO4[K4]:** examine about gaseous, liquid and solid states, radioactivity, isotopes, alcohols, halides, reaction of organic compounds **CO5[K5]:** deduct the derivations & equations of gases, solid & liquid states, organic compounds- halides, alcohols, phenols and crystal **structure**
10.	23UCHC3P	Core Course – VI: Practical: Qualitative Inorganic Analysis	**CO1[K2]:** generalize the cations into groups based on common ion effect and solubility product principles **CO2[K3]:** identify the elimination of interfering anions by using suitable reagents **CO3[K4]:** analysis anion and cation by following systematic procedure of semi- micro qualitative analysis **CO4[K5]:** assign cations into different groups and carry out group analysis to confirm the cation **CO5[K6]:** predict anions and cations present in the mixture using selective reagents.

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11.	23UCHS3P	Skill Enhancement Course – V:(Entrepreneurial Skill) – Entrepreneurial Skills in Chemistry	**CO1[K1]:** identify adulterated food items by doing simple chemical tests. **CO2[K2]:** educate others about adulteration and motivate them to become entrepreneurs. **CO3[K3]:**plan a method to preparecleaningproducts andbecome entrepreneurs **CO4[K4]:**analyze the adulterated food items. **CO5[K5]:** evaluate the hardness, chlorine content and pH of water samples
12.	23UCHS31	Skill Enhancement Course – VI: Pesticide Chemistry	**CO1[K1]:** illustrate about the pesticides, insecticides and biopesticides. **CO2[K2]:** explain the preparation, properties and structures of pesticides, insecticides and biopesticides. **CO3[K3]:** outline the pesticide residues, classification of insecticides and biopesticides. **CO4[K4]:** examine the extraction, analytical methods of pesticides, pesticide residues and application of biopesticides. **CO5[K5]:** create awareness to the public on toxicity of pesticides, effects of pesticide residues and bio - pesticides.
SEMESTER- IV			

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13.	23UCHC41	Core Course – VII: General Chemistry -IV	**CO1[K1]:** recognize the terms, applications in thermodynamics, transition elements, and organic compounds like ethers, thio ethers, epoxides and acids **CO2[K2]:** explain the laws, importance of thermodynamics, trends of transition series, ethers, thio ethers, epoxides and acids **CO3[K3]:** organize the conditions involved in thermodynamics, transition element, and organic compounds **CO4[K4]:** discriminate the features of thermodynamics, d - block elements, ethers, thio ethers, epoxide and acids **CO5[K5]:** assess reactivity of thermodynamics, transition element, and organic compounds
14.	23UCHC4P	Core Course – VIII: Practical: Physical Chemistry – I	**CO1[K2]:** describe the principles and methodology for practical work **CO2[K3]:**apply the principles of electrochemistry, kinetics, thermochemistry, adsorption and colligative properties for carrying out the practical work **CO3[K4]:** analyze the skills involved in kinetics, electrochemistry, molecular weight determination and adsorption **CO4[K5]:** select the procedure, data and methodology for the project work **CO5[K6]:** predict rate constant, cell constant and conductance, colorimetry, molecular weight determination and adsorption

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15.	23UCHS41	Skill Enhancement Course – VI:Instrumental Methods of Chemical Analysis	**CO1[K1]:** relate error analysis in the calibration and use of analytical instruments, explain theory, instrumentation and application of flame photometry and Atomic Absorption spectrometry **CO2[K2]:** explain preparation of solutions, stoichiometric calculations **CO3[K3]:** apply error analysis in the calibration and use of analytical instruments, explain theory, instrumentation and application of flame photometry and Atomic Absorption spectrometry **CO4[K4]:** examine the use of chromatographic techniques in the separation and identification of mixtures **CO5[K5]** : discuss instrumentation, theory and applications of thermal and electrochemical techniques
16.	23UCHS42	Skill Enhancement Course – VII:Forensic Science	**CO1[K1]:** describe about the poisons, crime detection, forgery, tracks and traces and medical aspects. **CO2[K2]:** discuss about the classification of poisons, accidental explosion, forged signatures and detection of foot prints. **CO3[K3]:** find out the forgery documents, crime and contamination in heavy metal, steroid consumption and misuse of scheduled drugs. **CO4[K4]:** analyze the postmortem appearances, composition of bullets, forgery documents and combustible materials. **CO5[K5]:** create awareness on AIDS, handling fire explodes and explain DNA finger print, diagnosis of poisons and forgery in currency notes.

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		SEMESTER- V	
17.	23UCHC51	Core Course – IX: Organic Chemistry - I	**CO1[K1]:** describe the reactions of chemistry of nitrogen compounds, heterocyclic compounds. **CO2[K2]:** explain the stereochemistry of aliphatic and six membered heterocyclic compound reactions. **CO3[K3]:** apply oxidizing and reducing agents in the organic synthesis and do conformational analysis in simple compounds such as ethane, butane. **CO4[K4]:** examine the primary, secondary and tertiary structure of amines. **CO5[K5]:** measure the basicity and acidity of amines, natural and artificial dyes and optical activity of allenes and biphenyl.
18.	23UCHC52	Core Course – X: Inorganic Chemistry - I	**CO1[K1]:**explainisomerism,Werner'sTheoryandstabilityofchelatecomplexes,metalcarbonyls,f-blockelementsandinorganicpolymers. **CO2[K2]:**discuss crystal field theory, EDTA, magnetic and spectral properties ofcomplexes,EANruleandpreparation, propertiesof silicones. **CO3[K3]:**point out the preparation and properties of metal carbonyls, metalchelates,spectrochemicalseries,solventextractionmethodandsulphurbasedpolymers. **CO4[K4]:**analyze the comparative account of the characteristics of lanthanoidsandactinoids,nomenclatureofco-ordinationcompound,thermodynamicstability, carbonylsandsilicones. **CO5[K5]:**assess the properties and uses of inorganic polymers, coordinationcompounds,ferrocene andchemistryofuranium

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19.	23UCHC53	Core Course – XI: Practical: Physical Chemistry - I	**CO1 [K1]:** outline the concepts of energy functions, kinetics adsorption catalysis and photochemistry **CO2 [K2]:** express the various thermodynamic terms, surface chemistry, adsorption theory, catalysis, macromolecules and photochemistry **CO3 [K3]:** determine the Gibbs Helmholtz free energy, Ellingham diagram, adsorption isotherm and theories, sol preparation, properties, and concepts of photochemistry **CO4 [K4]:** examine the various theories of molar quantities, activation energy, catalysis, adsorption, molecular weight, photochemical changes **CO5 [K5]:** predict the effects of temperature on reaction rate, significance, adsorption isotherm, macromolecules emulsion, photochemistry and chemistry of vision.
20.	23UCHJ51	Core Course – XII: Project	**CO1[K2]**:expresstheirviewswithaptillustrationsandcriticalsupport **CO2[K3]:**organizetheviewsandformatthemintoaresearchpaperofabouttwentypages **CO3[K4]:** analyze the plot, themes and characters of the chosen literary piece **CO4[K5]:** evaluate the stylistic features employed in the chosen text **CO5[K6]:**compiletheDocumentationasperthelatestResearchMethodology

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21.	23UCHO51	Elective Course Generic/ Discipline Specific - V: Biochemistry	**CO1[K1]:** describe the fundamental macromolecules like lipids and amino acids enzymes **CO2[K2]:** classify various biological functions, mechanism and applications of macromolecules **CO3[K3]:** present the structure of proteins, nucleic acids and mechanism of enzyme action **CO4[K4]:** compare the structure, arrangement of atoms in each biomolecule **CO5[K5]:** interpret the structure, function of the molecule in bio system.
22.	23UCHO52	Elective Course Generic/ Discipline Specific - V: Environmental Chemistry	**CO1[K1]:** recognize the composition of air, water and sources of pollution **CO2[K2]:** illustrate effects and sources accountable in the environmental pollution and their control **CO3[K3]:** present factors causing pollution and possible solution **CO4[K4]:** analyze contamination of air and water, water quality parameters and climate change **CO5[K5]:** evaluate the chemical reactions leading to the environmental issues.

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23.	23UCHO53	Elective Course Generic/ Discipline Specific - V: Photochemistry	**CO1 [K1]:** define the terms like electronic state, photosynthesis and excited state energy levels **CO2 [K2]:** interpret the basic concepts in in electronic excitation, singlet and triplet states **CO3 [K3]:** present the mechanism of photo physical and photo chemical process **CO4 [K4]:** discriminate radiative and non-radiative transitions and types of photochemical reactions **CO5 [K5]:** resolve the mechanism involved in photo-physical pathways and photochemical reactions.
24.	23UCHO54	Elective Course Generic/ Discipline Specific - VI: Industrial Chemistry	**CO1[K1]:** outline the preparation of fuels, cosmetics, sugar, abrasives and lubricants. **CO2[K2]:** describe about cosmetic products, fuels, lubricants, food preservation, industries of paper, leather, cement and characteristics of abrasives. **CO3[K3]:** explain manufacture of sugar, food spoilages, fuels, leather, pulp, soap, detergents and food additives. **CO4[K4]:** examine the properties of abrasives, fules, cosmetics, lubricants, food additives and manufacture of leather and paper. **CO5[K5]:** discuss the applications of cosmetics, soap and detergents, preservatives, abrasives and intellectual property rights.

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25.	23UCHO55	Elective Course Generic/ Discipline Specific - VI: Geo Chemistry	**CO1[K1]:** describe the origin of elements and organic compounds through carbon cycle **CO2[K2]:** illustrate the origin of life from organic matter by various processes **CO3[K3]:** apply the basic concepts of geochemistry to understand the evolution of life and other organic matter **CO4[K4]:** analyze geochemical processes to understand the origin of material for life **CO5[K5]:** deduce different types of carbon cycles to enrich the knowledge in the formation of coal, petroleum, life and other organic matter.
26.	23UCHO56	Elective Course Generic/ Discipline Specific - VI: Analytical Chemistry	**CO1[K1]:** identify the analytical techniques on spectroscopy method, thermal analysis and separation techniques **CO2[K2]:** relate the spectroscopic analytical techniques to the all relevant compounds (or) substances **CO3[K3]:** formulate the structure of the compounds by these studied analytic techniques **CO4[K4]:** analyze the functional groups present in the different compounds or substances **CO5[K5]:** assess the properties of the compounds or substances, nature of the solubility by analytical techniques

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27.	23UCHJ52	Internship/ Industrial Training	**CO1[K1]:** Identify different career paths within the industry and gain insights into potential future roles. **CO2[K3]:** apply theoretical concepts and academic knowledge to real-world situations and challenges encountered during the internship. **CO3[K4]:** analyse problems, generate innovative solutions, and make informed decisions. **CO4[K5]:** evaluate how to manage time effectively and prioritize tasks to meet deadlines and deliver quality work. **CO5[K6]:** create a portfolio of the work, projects, and achievements during the internship.
SEMESTER- VI			
28.	23UCHC61	Core Course – XIII: Organic Chemistry - II	**CO1[K1]:** detail the structure of carbohydrate, alkaloids and the principle of green chemistry **CO2[K2]:** explain the structure and configuration of carbohydrates, types of rearrangements, special reagents in organic synthesis and applications of green chemistry. **CO3[K3]:** determine the structural elucidation of alkaloids and terpenoids and applications of reagents in organic synthesis and green chemistry. **CO4[K4]:** classify carbohydrates, alkaloids and terpenes and other important types of rearrangement compounds. **CO5[K5]:** justify the various reagents used in various rearrangement reactions and green synthesis

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29.	23UCHC62	Core Course – XIV: Inorganic Chemistry - II	**CO1[K1]:** explain the importance of tracer elements on biological system, metal ion report, metallo enzymes, silicates and Alloys. **CO2[K2]:** explain the Toxicity of metal ions, nitrogen fixation, Bohr effect, Na, K, Ca pump, properties of silicates and plasticizers. **CO3[K3]:** identify trace elements, myoglobin, explain the function of VitaminB12, Zn-Cu enzyme, ferredoxin, cluster enzymes, structure of Silicates and nano composite hydrogels. **CO4[K4]:** classify and structure of silicates, oils, iron-sulphur proteins, myoglobin and trace elements **CO5[K5]:** explain the manufacture of refractories, explosives, paints and pigments, properties of silicates, metallo enzymes, Transferrin and metal toxicity.
30.	23UCHC63	Core Course – XV: Physical Chemistry - II	**CO1[K1]:** outline phase diagram, chemical equilibrium, conductance, galvanic cells and applications **CO2[K2]:** indicate the concepts in phase diagram, chemical equilibrium and electrochemistry **CO3[K3]:** describe separation of binary liquid mixtures, electrical conductance, galvanic cells and applications **CO4[K4]:** analyze the phase rule, chemical equilibrium, Nernst distribution law, conductance, galvanic cells and applications **CO5[K5]:** interpret two component systems, transport number, theory of conductance, electrochemical series, titrations, calculate cell EMF.

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31.	23UCHC6P	Core Course – XVI: Practical: Physical Chemistry – II	**CO1[K2]:** describe the principles and methodology for the practical work **CO2[K3]:** apply the principles of phase rule, distribution lawand electrochemistry for carrying out the practical work **CO3[K4]:** analyze systematically and record the readings in all the experiments **CO4[K5]:** evaluate and process the experimentally measured values and compare with graphical data **CO5[K6]:** create laboratory skills for safe handling of the equipmentsand chemicals
32.	23UCHO61	Elective Course Generic/ Discipline Specific - VII: Fundamentals of Spectroscopy	**CO1[K1]:** outline the concept of electrical and magnetic properties of materials, UV, IR, Raman, NMR, PMR, Mass and microwave spectroscopy. **CO2[K2]:** illustrate the principles of spectroscopy for the structural elucidation of the molecule. **CO3[K3]:** describe the instrumentation of Infrared, UV, IR, Raman, NMR, PMR, Mass and microwave and Raman spectroscopy. **CO4[K4]:** discuss the applications of Infrared, UV, IR, Raman, NMR, PMR, Mass and microwave and Raman spectroscopy. **CO5[K5]:** interpret to elucidate structure of simple molecules using different Spectroscopy techniques.

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33.	23UCHO62	Elective Course Generic/ Discipline Specific - VII: Medicinal Chemistry	**CO1[K1]**: identify the different types of drugs, hormones and vitamins **CO2[K2]:** substitute the biological action of drugs in the human body and physiological action of hormones in the human body **CO3[K3]:** report mechanism of drug action, structure and uses of medicines and diagnostic tests **CO4[K4]:** analyse types of drug action, uses of drugs and diagnosis of disease by chemical tests **CO5[K5]:** assess the route of administration, physiological action and biological action of drugs.
34.	23UCHO63	Elective Course Generic/ Discipline Specific - VII: Green Chemistry	**CO1[K1]:** outline the basic principle and methodology involved in the green chemistry **CO2[K2]:** explain the ultrasound & microwave assisted and PTC reactions **CO3[K3]:** present the concepts of green & sonochemistry, microwave technology and ionic liquids **CO4[K4]:** analyse role of green solvents, catalysts and renewable energy involved in the green synthesis **CO5[K5]:** predict the synthetic pathway of various organic reactions using greener solvents, catalyst, ionic liquids, biomass and methods

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35.	23UCHS61	Skill Enhancement Course - IX: Professional Competency Skill: Chemistry for Competitive Examinations	**CO1[K1]:** describe the basic concepts in organic, inorganic and physical chemistry **CO2[K2]:** express the various principles used in organic, inorganic and physical chemistry **CO3[K3]:** apply those concepts in the problem solving in organic, inorganic and physical chemistry **CO4[K4]:** analyze the various competitive exam question papers **CO5[K5]:** evaluate the methodology behind problem solving and critical thinking

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S.No	Course Code	Course Name	Course Outcomes
SEMESTER- V			
1.	**21UTAC54**	Core Course - XII: Practical: Office Automation	**CO1 [K2]:**அடிப்படை வடிவமைப்பு விருப்பங்கள், அட்டவணைகள், வரைபடங்கள், அஞ்சல் ஒன்றிணைப்பு வரைபடங்கள் ஆகியவற்றை செய்வர் **CO2 [K3]:**மைக்ரோசா.்ப்ட் அலுவலகத்தைப் பயன்படுத்தி தோட்டாக்கள் மற்றும் எண், கணித சூத்திரங்கள் மற்றும் மற்றும் பல்வேறு வடிவமைப்புகளைப் பயன்படுத்துவர் **CO3 [K3]:**கணித சூத்திரங்கள், எழுத்துரு, பத்தி, பக்க வடிவமைப்பு விருப்பங்களுக்கான **CO4 [K4]:**பல்வேறு வகையான எடிட்டிங் கருவிகள், பட்டியல்கள் மற்றும் விளக்கப்படங்களை ஒப்பிடுவர் **CO5 [K6]:** ஒரு ஆவணம், விளக்கக்காட்சி ஸ்லைடை வடிவமைத்து பணித்தாள்களில் கணக்கீடு செய்வர்