KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

Re-accredited by NACC with 'A+' Grade (4th Cycle)

College of Excellence (UGC)

GN Mills Post, Coimbatore – 641 029

DEPARTMENT OF CHEMISTRY (UG)

COURSE OUTCOMES (CO) OF B.Sc., CHEMISTRY

CURRICULUM AND SCHEME OF EXAMINATIONS (CBCS)

(2023 – 2024 and onwards)

COURSE OUTCOMES (CO)

Subject code: 23UCH101

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**CORE PAPER – I: INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY – I**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	I	6	90	5

Objectives	
1.	To know the concept of qualitative inorganic analysis.
2.	To acquaint knowledge about electron displacement effects, hybridization and conformations.
3.	To know about the structure of an atom.

Course Outcomes (CO)		
K1 – K5	CO1	Explain the basic analytical knowledge and group separation of elements.
	CO2	To know the types of bonding and geometry in molecules and VSEPR theory
	CO3	Explain the isomerism of alkanes and cycloalkanes.
	CO4	Acquire the knowledge about the structure of atoms.
	CO5	Understand characteristics of gases.

Subject code: 23EVS101

Programme code: 04	
PART IV – ENVIRONMENTAL STUDIES	
Hours / Week	**Total Hours**
2	**30**

Course Objectives

The course will provide students with an understanding and appreciation of the complex interactions of man, health and the environment. It will expose students to the multi-disciplinary nature of environmental health sciences
To inculcate knowledge and create awareness about ecological and environmental concepts, issues and solutions to environmental problems.
To shape students into good "Ecocitizens" thereby catering to global environmental needs.
This course is designed to study about the types of pollutants including gases, chemicals petroleum, noise, light, global warming and radiation as well as pollutant flow and recycling and principles of environmental pollution such as air, water and soil
The course will address environmental stress and pollution, their sources in natural and workplace environments, their modes of transport and transformation, their ecological and public health effects, and existing methods for environmental disease prevention and remediation

Course Outcomes (CO)

Understand how interactions between organisms and their environments drive the dynamics of individuals, populations, communities and ecosystems.
Develop an in depth knowledge on the interdisciplinary relationship of cultural, ethical and social aspects of global environmental issues.
Acquiring values and attitudes towards complex environmental socio-economic challenges and providing participatory role in solving current environmental problems and preventing the future ones.
To gain inherent knowledge on basic concepts of biodiversity in an ecological context and about the current threats of biodiversity.
To appraise the major concepts and terminology in the field of environmental pollutants, its interconnections and direct damage to the wildlife, in addition to human communities and ecosystems.

Subject code: 23UCH202

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**CORE PAPER – II** **INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY -II**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	II	6	90	5

Course Objectives

1	Know about metallurgy, importance of periodic table and atomic properties.
2	To learn about Benzene and Aromaticity.
3	To study the fundamentals of thermodynamics and thermochemistry.

Course Outcomes (CO)

K1 – K5	CO1	Obtain problem solving skills in order to modify industrial processes in Extraction metallurgy.
	CO2	Gain knowledge about periodic properties
	CO3	Study of Aromatic Compounds and mechanism of certain reactions
	CO4	Learn about concepts of thermodynamics.
	CO5	Acquire the knowledge in thermochemistry.

Subject code: 23VED201

Programme Code: 04		**B.Sc.** Chemistry		
Title of the paper		**MORAL AND ETHICS**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	II	2	30	2

Course Objectives

1.	To impart Value Education in every walk of life.
2.	To help the students to reach excellence and reap success.
3.	To impart the right attitude by practicing self-introspection.
4.	To portray the life and messages of Great Leaders.
5.	To insist the need for universal brotherhood, patience and tolerance.
6.	To help the students to keep them fit.
7.	To educate the importance of Yoga and Meditation.

Course Outcomes (CO)

K1 – K5	CO1	Will be able to recognize Moral values, Ethics, contribution of leaders, Yoga and its practice
	CO2	Will be able to differentiate and relate the day to day applications of Yoga and Ethics in real life situations
	CO3	Can emulate the principled life of great warriors and take it forward as a message to self and the society
	CO4	Will be able to Analyse the Practical outcome of practicing Moral values in real life situation
	CO5	Could Evaluate and Rank the outcome of the pragmatic approach to further develop the skills

Subject code: 23UCH2CL

Programme Code: 04		**B.Sc.** Chemistry		
Title of the paper		**CORE PRACTICAL – I INORGANIC QUALITATIVE ANALYSIS AND PREPARATIONS**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	II	3	90	2

Course Objectives

1.	To demonstrate the basic laboratory technique of semi micro qualitative analysis.
2.	To understand about the interfering anions, its elimination and group separation.
3.	To prepare inorganic complexes.

Course Outcomes (CO)

K1 – K5	CO1	Build the knowledge in principles of semi micro qualitative analysis.
	CO2	Know about the interfering and non-interfering anions.
	CO3	Experience to remove interfering anion and group separation of various cations.
	CO4	Group separation of various cations
	CO5	Learn the preparation of inorganic complexes.

Subject code: 23UCH303

Programme Code: 04		**B.Sc.** Chemistry		
Title of the paper		**CORE PAPER – III** **INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY - III**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	III	4	60	4

Course Objectives

1.	To know the basic concepts in quantitative analysis.
2.	To observe the chemistry of dicarboxylic acids and reactions involving carbonyl compounds.
3.	To enumerate second law of thermodynamics, state functions S, A, G and chemical equilibrium.

Course Outcomes (CO)

K1 – K5	CO1	Gain knowledge in preparation, standardization of solution and principles of volumetric analysis.
	CO2	Study the preparation, properties and reactions of di carboxylic acids, unsaturated acids and hydroxy acids.
	CO3	To Study on the preparation and properties of aldehydes and ketones.
	CO4	Analyze and apply laws of thermodynamics.
	CO5	To understand the importance of absolute zero

Subject code: 23UGC3S1

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**Skill Based Subject 1 – Cyber Security**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	III	2	30	3

Course Objectives

1.	The course introduces the basic concepts of Cyber Security
2.	To develop an ability to understand about various modes of Cyber Crimes and Preventive measures
3.	To understand about the Cyber Legal laws and Punishments

Course Outcomes (CO)

K1 – K5	CO1	To Understand the Concepts of Cybercrime and Cyber Frauds
	CO2	To Know about Cyber Terrorism and its preventive measures
	CO3	To Analyze about the Internet, Mobile Phone and E-commerce security issues
	CO4	To Understand about E-mail and Social Media Issues
	CO5	To Describe about various legal responses to Cybercrime

Subject code: 23UCH404

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**CORE PAPER – IV** **INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY - IV**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	IV	4	60	4

Course Objectives

1.	To learn group IA elements.
2.	To know about various types of alcohols, phenols and their reactions
3.	To know about phase rule and phase equilibria

Course Outcomes (CO)

K1 – K5	CO1	Gain the knowledge about the properties of alkali metals.
	CO2	Understand the basic aspects of phenols, amines and its derivatives.
	CO3	Analyze and apply phase rule to various systems.
	CO4	Understand colligative properties and their determinations.
	CO5	Understanding Intellectual Properties and the importance of it and awareness of patents

Subject code: 23UCH4S2

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**SKILL BASED SUBJECT-II WATER POLLUTION AND MANAGEMENT**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	**IV**	2	30	3

Course Objectives

1.	To know about the sources and characteristics of water.
2.	To learn about the analysis of the pollutants in water.
3.	To learn the methods of purification and management of water.

Course Outcomes (CO)

K1 – K5	CO1	To understand the importance of water.
	CO2	To study the types of water pollution.
	CO3	To analyze and measure the toxic chemical substances.
	CO4	To gain knowledge in purification techniques of water.
	CO5	To know the irrigation systems used in agriculture.

Subject code: 23UCH4CM

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**CORE PRACTICAL – II INORGANIC VOLUMETRIC AND ORGANIC QUALITATIVE ANALYSIS**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	**IV**	3	90	3

Course Objectives

1.	To demonstrate the concept of quantitative volumetric analysis.
2.	To understand the various types of titrimetric analysis.
3.	To identify the functional groups of unknown organic compounds.

Course Outcomes (CO)

K1 – K5	CO1	Gain the knowledge in principles of volumetric analysis.
	CO2	Estimating the amount of substances present in solutions.
	CO3	Learn to approach a problem systematically
	CO4	Interpret the results logically.
	CO5	Detect various functional groups present in an organic compound.

Subject code: 23UCH505

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**CORE PAPER – V SPECTROSCOPY AND CHROMATOGRAPHIC TECHNIQUES**		
Batch	**Semester**	Hours / Week	Total Hours	Credits
2023 - 2024	V	3	45	3

Course Objectives

1.	To know about the region of electromagnetic spectrum, fundamentals of ultra – violet visible spectroscopy and Infrared spectroscopy.
2.	To study Nuclear Magnetic Resonance (NMR) spectroscopy and Mass
3.	Spectrometry and to interpret and solve problems using various spectra.

Course Outcomes (CO)

K1 – K5	CO1	Understand the basic principles of UV-Visible spectroscopy and to utilize their basic aspects to identify various organic compounds.
	CO2	Gain the knowledge in principles, and functions of IR spectroscopy.
	CO3	Study the basic principles of NMR spectroscopy and apply to identify the organic compounds.
	CO4	Know about basic principles of mass spectroscopy technique and the application of various spectral techniques to elucidate the structure of organic molecules.
	CO5	Exploring the various chromatography techniques and their applications in separation of organic mixtures.

Subject code: 23UCH506

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**CORE PAPER – VI INORGANIC CHEMISTRY**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	V	3	45	3

Course Objectives

1.	To understand the key features of coordination compounds, including: the variety of structures, ligands, various theories of coordination complexes, stability of complexes.
2.	To identify what radioisotopes and acquaint knowledge about nuclear reactions.
3.	To describe about Inorganic acids, bases, Inorganic Solvents and Inorganic Polymers.

Course Outcomes (CO)

K1 – K5	CO1	Understand the theories of co-ordination compounds.
	CO2	Knowledge about basics nuclear Chemistry
	CO3	Analyze the importance of radioactive isotopes and nuclear reactions.
	CO4	Describe about the different concepts of Inorganic acids, bases, Inorganic Solvents and Inorganic Polymers.
	CO5	Understanding the importance of Inorganic Solvents and Inorganic Polymers.

Subject code: 23UCH507

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**CORE PAPER – VII** **ORGANIC REACTION MECHANISM**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	**V**	4	60	3

Course Objectives

1.	To study asymmetry and optical activity of organic molecules and basics in carbohydrate.
2.	To understand the mechanisms of important organic rearrangements reactions and Preparations and reactions of Amines and Diazo compounds.
3.	To study preparation and properties of heterocyclic compounds.

Course Outcomes (CO)

K1 – K5	CO1	Understanding the fundamental aspects of stereochemistry.
	CO2	Learn about preparation, properties and structural elucidation of carbohydrates.
	CO3	Study on the various naming reactions and their detailed mechanistic pathway.
	CO4	Acquire the knowledge about the preparations and reactions of Amines and Diazo compounds.
	CO5	To inculcate knowledge about five and six membered heterocyclic compounds

Subject code: 23UCH508

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**CORE PAPER - VIII PHYSICAL CHEMISTRY - I**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	V	4	60	4

Course Objectives

1.	To understand the fundamentals of electrochemistry.
2.	To know the types and importance of electrodes and electro chemical cells.
3.	To study about corrosion, batteries and Electroanalysis.

Course Outcomes (CO)

K1 – K5	CO1	Understanding the concept of conductance and its applications.
	CO2	Acquire basic knowledge about electrode potential, electrochemical cell and potentiometric titrations.
	CO3	Understanding the fundamental principles of corrosion, protective coatings
	CO4	electroplating and its significance.
	CO5	Know about basic principles and instrumentation of Electrochemical Power Systems, Polarography and its applications.

Subject code: 23UCH609

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**CORE PAPER – IX SOLID STATE AND COORDINATION CHEMISTRY**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	VI	5	75	4

Course Objectives

1.	To know about fundamentals of crystallography and solid state Chemistry
2.	To study about reactions of complexes.
3.	To in sight knowledge about Bio – Inorganic Chemistry

Course Outcomes (CO)

K1 – K5	CO1	Knowing the difference between amorphous and crystalline solids and their arrangement in crystal lattice.
	CO2	Learn about defects in crystals, various theories of metallic bonding and alloys.
	CO3	Decide the various crystal structures using X-ray diffraction techniques and Study about liquid crystals.
	CO4	Study about various ligand substitution reactions.
	CO5	To acquire knowledge about bioinorganic chemistry.

Subject code: 23UCH610

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**CORE PAPER – X CHEMISTRY OF NATURAL PRODUCTS**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	**VI**	5	75	4

Course Objectives

1.	To study about Terpenoids and Alkaloids.
2.	To understand about Vitamins and Hormones.
3.	To study the preparations and reactions of amines, Diazocompounds and Chemotheraphy.

Course Outcomes (CO)

K1 – K5	CO1	Study on the classification, structural elucidation and synthesis of few important terpenoids.
	CO2	Learn about structural determination and synthesis of alkaloids.
	CO3	Acquire basic knowledge about vitamins and hormones.
	CO4	To study about Amino acids, peptides and Proteins.
	CO5	To gain knowledge about chemotherapy.

Subject code: 23UCH611

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**CORE PAPER – XI PHYSICAL CHEMISTRY - II**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	**VI**	4	60	4

Course Objectives

1.	To understand the basics and theoretical aspects of Chemical kinetics.
2.	To learn about kinetics of thermal and photochemical reactions.
3.	To gain knowledge about importance of catalysis, colloids and Liquid state.

Course Outcomes (CO)

K1 – K5	CO1	Understand the basic principles, various experimental techniques and Theories of chemical kinetics.
	CO2	To understand the importance of various theories explaining chemical kinetic.
	CO3	Gain the knowledge about principles of photochemical and photosensitized Process.
	CO4	Study the basic principles and types of catalysis and colloids.
	CO5	Explore the fundamentals of Liquid State.

Subject code: 23UCH6S3

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**SKILL BASED SUBJECT – III FOOD CHEMISTRY**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	VI	2	30	3

Course Objectives

1.	To have an idea about food adulteration and food preservation techniques.
2.	To understand the chemistry of vinegar, fruit juices, vegetable acids and beverages.
3.	To analyse and characterize chemical aspects of milk.

Course Outcomes (CO)

K1 – K5	CO1	Know about the nutrition values in food, food adulteration, standards of food, contamination and food poisoning.
	CO2	Understand about the minerals in food
	CO3	Know about food additives
	CO4	Understand the detailed information about commercially important beverages
	CO5	Know about dairy products

Subject code: 23UCH6CN

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**CORE PRACTICAL – III INORGANIC QUANTITATIVE ANALYSIS**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	VI	3	90	3

Course Objectives

1.	To understand the concept of gravimetric analysis.
2.	To get acquainted with the experimental procedure of gravimetric analysis.
3.	To determine the quantity of analyte in solution.

Course Outcomes (CO)

K1 – K5	CO1	Understand the basic principles of Gravimetric analysis.
	CO2	Understand about the various precipitating agents.
	CO3	Determination of analyte masses through the gravimetric analysis.
	CO4	Improve the accuracy of analysis.
	CO5	To gain knowledge about Metal analysis in cosmetic products using AAS

Subject code: 23UCH6CO

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**CORE PRACTICAL – IV PHYSICAL EXPERIMENTS**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	**VI**	3	90	3

Course Objectives

1.	Transformation of theoretical knowledge gain to practical aspects.
2.	To have experience in handling electrical and non-electrical equipments.
3.	To determine the strength of various solutions through spectrometric and electrochemical techniques.

Course Outcomes (CO)

K1 – K5	CO1	The results of physical chemistry experiments are incorporated in both theoretical and practical aspects.
	CO2	Gain familiarity with a variety of physico-chemical measurement techniques.
	CO3	Interpret data from an experiment, including the construction of appropriate graphs and the evaluation of errors.
	CO4	To know about Determination of Cell Constant, Specific conductivity and Equivalent conductivity of strong electrolyte.
	CO5	To determine strength of acids and bases by Conductometric Titration.

Subject code: 23UCH6CP

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**CORE PRACTICAL – V APPLICATION ORIENTED PRACTICAL**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	VI	4	120	4

Course Objectives

1.	To demonstrate the basic laboratory techniques and application oriented physical constants.
2.	To prepare organic dyes, organic compounds and home care products.
3.	To estimate the hardness of water, DO, available chlorine in bleaching powder and saponification value of an oil.

Course Outcomes (CO)

K1 – K5	CO1	Gain the knowledge of physical constants and preparation of dyes.
	CO2	Know about the preparation of organic compounds.
	CO3	Learn about the preparation method of home care products.
	CO4	Learn about estimation of hardness of water, dissolved oxygen, Saponification of oil and isolation of citric acid.
	CO5	Learn about estimation of hardness of water, dissolved oxygen

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**MAJOR ELECTIVE - I POLYMER TECHNOLOGY**		
Batch		**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024		4	60	5
Course Objectives				
1.	To know about basics of polymers, polymerization and plastic materials			
2.	To learn about polymer processing and synthesis of some commercially important polymers and to know about various polymer processes techniques.			
3.	To know different type of plastics, advancements, disposal, applications			
Course Outcomes (CO)				
K1 – K5	CO1	Know about the types of polymers, chemical and physical properties, its industrial applications and uses.		
	CO2	Understand the various polymerization techniques, processing and different types of individual polymer products.		
	CO3	Know about different Polymerization Processing Techniques		
	CO4	Acquiring knowledge of commercially important polymer products and its applications.		
	CO5	Know about the recent advances in polymer products and their applications.		

Programme Code: 04			B.Sc. Chemistry		
Title of the paper			**MAJOR ELECTIVE - II** **NANO AND GREEN CHEMISTRY**		
Batch			**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024			4	60	3
Course Objectives					
1.	To gain knowledge about in - depth look at the basics of Nano Chemistry and to know the methods to prepare Nano materials.				
2.	To get the knowledge about Green Chemistry and its limitations.				
3.	To have a holistic idea about Green solvents in laboratory as well as in Industry and also to study the Reactions and applications of Green Chemistry.				
Course Outcomes (CO)					
K1 – K5	CO1	To understand the basics of Nano Chemistry.			
	CO2	To know the methods to prepare Nano materials.			
	CO3	To have an idea about Nano chemistry in medicine.			
	CO4	To gain knowledge about Green reactions in laboratory.			
	CO5	To gain knowledge about Green solvents.			

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**MAJOR ELECTIVE - III PHARMACEUTICAL CHEMISTRY**		
Batch		**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024		4	60	5
Course Objectives				
1.	To know about the common diseases and cure-terms of pharmacology and drug action.			
2.	To get introduced to chemotherapy – antibiotics.			
3.	To know the drugs meant for diabetes.			
Course Outcomes (CO)				
K1 – K5	CO1	Gain the knowledge about the common diseases and cure-terms of pharmacology.		
	CO2	Understanding Mechanism of actions of drugs		
	CO3	Understand about drug classification.		
	CO4	Learn about Common body ailments.		
	CO5	Basic ideas about various health promoting drugs.		

Programme Code: 04			B.Sc. Chemistry		
Title of the paper			**MAJOR ELECTIVE - IV** **AGRICULTURAL CHEMISTRY**		
Batch			**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024			4	60	5
Course Objectives					
1.	To know about origin, physical and chemical aspects of soil				
2.	To know about the basic idea of plant nutrients				
3.	To acquire the knowledge pesticides, fungicides and Herbicides				
Course Outcomes (CO)					
K1 – K5	CO1	To gain the knowledge about the origin soil.			
	CO2	To understand about physical and chemical properties of soil.			
	CO3	To understand about chemical aspects of soil			
	CO4	To learn about plant nutrients.			
	CO5	To learn Basic ideas about pesticides, fungicides and herbicides.			

Programme Code: 04			B.Sc. Chemistry		
Title of the paper			**MAJOR ELECTIVE -V DAIRY CHEMISTRY**		
Batch			**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024			4	60	5
Course Objectives					
1.	To know the chemistry of milk and milk products				
2.	To know the basics of milk proteins, milk lipids, milk carbohydrates, and milk vitamins.				
3.	To acquire knowledge of dairy products, analyze the constituents of milk products.				
Course Outcomes (CO)					
K1 – K5	CO1	Learning the chemistry of milk and milk products			
	CO2	Knowing the basics of milk proteins, milk lipids, milk carbohydrates, and milk vitamins.			
	CO3	Understanding the production and composition of milk products.			
	CO4	By applying the acquired knowledge of dairy products, analyze the Constituents of milk products.			
	CO5	To know commercial values of milk.			

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**MAJOR ELECTIVE - VI LEATHER CHEMISTRY**		
Batch		**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024		4	60	5
Course Objectives				
1.	To obtain the knowledge on the structure and composition of the hides, skin and leather.			
2.	To know the basic principles involved in the pre-training methods of leather manufacture.			
3.	To understand about vegetable tanning, chrome tanning and leather machinery.			
Course Outcomes (CO)				
K1 – K5	CO1	Learning the basic principles involved in the theory of curing hides and skins		
	CO2	Understanding the basics of soaking and bating process		
	CO3	Widening a skill on the bating and liming		
	CO4	Gaining the broad idea on the Chrome tanning and vegetable tanning process.		
	CO5	To know about leather machinery.		

Subject Code: 23UCH5X1

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**EXTRA DEPARTMENTAL COURSE (EDC) - CHEMISTRY IN DAY TODAY LIFE**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	V	2	30	3

Course Objectives

1.	To gain knowledge about water treatment in industrial plant and its usage.
2.	To get the knowledge about industrial fermentation process, oil, wax and soap preparation.
3.	To have a holistic idea about food adulteration, food hygiene and paints manufacture.

Course Outcomes (CO)

K1 – K5	CO1	Basic understanding of water technology and acquire knowledge in the treatment of water for multi-purpose.
	CO2	To study about Vitamins in Food
	CO3	To understand the chemistry involved in the manufacturing process of oil, fats, wax and soap.
	CO4	To design a demonstration, that provides an opportunity to identify adulteration in food standards.
	CO5	Broadening the knowledge about paints and pigments.

Subject code: 23UHR3N1

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**PART IV -NON MAJOR ELECTIVE –I HUMAN RIGHTS**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	III	2	30	2

Course Objectives

1.	To prepare for responsible citizenship with awareness of the relationship between Human Rights, democracy and development.
2.	To impart education on national and international regime on Human Rights.
3.	To sensitive students to human suffering and promotion of human life with dignity.
4.	To develop skills on human rights advocacy.
5.	To appreciate the relationship between rights and duties.
6.	To foster respect for tolerance and compassion for all living creature.

Course Outcomes (CO)

K1 – K5	CO1	To understand the hidden truth of Human Rights by studying various theories.
	CO2	To acquire overall knowledge regarding Human Rights given by United Nation Commission. (UNO)
	CO3	To gain knowledge about various organs responsible for Human Rights such as National Human Rights Commission and state Human Right commission (UNHCR).
	CO4	To get habits of how to treat aged person, others and positive social responsibilities.
	CO5	To treat and confirm, child, refugees and minorities with positive social justice.

Subject code: 23UWR4N2

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**Part IV -NON- MAJOR ELECTIVE – II WOMEN'S RIGHTS**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	IV	2	30	2

Course Objectives

1.	To know about the laws enacted to protect Women against violence.
2.	To impart awareness about the hurdles faced by Women.
3.	To develop a knowledge about the status of all forms of Women to access to justice.
4.	To create awareness about Women's rights.
5.	To know about laws and norms pertaining to protection of Women.
6.	To understand the articles this enables the Women's rights.
7.	To understand the Special Women Welfare laws.
8.	To realize how the violence against Women puts an undue burden on healthcare services.

Course Outcomes (CO)

K1 – K5	CO1	Understand the importance of Women's Studies and incorporate Women's Studies with other fields.
	CO2	Analyze the realities of Women Empowerment, Portrayal of Women in Media, Development and Communication.
	CO3	Interpret the laws pertaining to violence against Women and legal consequences.
	CO4	Study the important elements in the Indian Constitution, Indian Laws for Protection of Women.
	CO5	To be Aware of Government Developmental schemes for women and to create Awareness on modernization and impact of technology on Women.

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**NON- MAJOR ELECTIVE – CONSUMER AFFAIRS**		
Batch		**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024		2	30	2
Course Objectives				
1.	To familiarize the students with their rights and responsibilities as a consumer.			
2.	To understand the procedure of redress of consumer complaints.			
3.	To know more about decisions on Leading Cases by Consumer Protection Act.			
4.	To get more knowledge about Organizational set-up under the Consumer Protection Act			
5.	To impart awareness about the Role of Industry Regulators in Consumer Protection			
6.	To understand Contemporary Issues in Consumer Affairs			
Course Outcomes (CO)				
K1 – K5	CO1	Able to know the rights and responsibility of consumers.		
	CO2	Understand the importance and benefits of Consumer Protection Act.		
	CO3	Applying the role of different agencies in establishing product and service standards.		
	CO4	Analyse to handle the business firms' interface with consumers.		
	CO5	Assess Quality and Standardization of consumer affairs		

Programme Code: 04		B.Sc. Chemistry		
Title of the paper		**JOB ORIENTED COURSE (JOC) – TEXTILE CHEMISTRY**		
Batch		**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024		3	45	
Course Objectives				
1.	To know about manufacture and properties of natural fibres (vegetable fibres, animal fibres) and synthetic fibres.			
2.	To learn preparatory process before dying.			
3.	To know the principles of bleaching and dyeing.			
Course Outcomes (CO)				
K1 – K5	CO1	Gain the knowledge about both synthetic and natural fibres.		
	CO2	To know about Regenerated And Synthetic Fibres.		
	CO3	Understand about scouring and desizing.		
	CO4	Learn about bleaching.		
	CO5	Basic ideas about dyeing		

Subject code: 23UCH1A1/ 23UCH3A3

Programme Code: 04		B.Sc., Biotechnology (I Year), Physics (II year), Botany (II Year), Biochemistry (II Year)		
Title of the paper		**ALLIED PAPER – I CHEMISTRY - I**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	**I/ III**	4	60	**4**

Course Objectives

1.	To understand the fundamentals of Chemical bonding.
2.	To study various types of organic Reaction.
3.	To study the basic principles of thermodynamics and electrochemistry.

Course Outcomes (CO)

K1 – K5	CO1	Understanding the fundamental aspects of chemical bonding and Interhalogen compounds.
	CO2	To acquire knowledge of types for organic reaction
	CO3	Study on the various concepts in Thermodynamics.
	CO4	Study on the various concepts in Electrochemistry.
	CO5	Acquiring knowledge about Fuel gases and Petroleum.

Subject code: 23UCH2A2/ 23UCH4A4

Programme Code: 04		B.Sc., Biotechnology (I Year), Physics (II year), Botany (II Year), Biochemistry (II Year)		
Title of the paper		**ALLIED PAPER – II CHEMISTRY - II**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	II/ IV	4	60	**4**

Course Objectives

1.	To know the fundamentals of Coordination compounds.
2.	To learn about some natural products, amino acids and proteins.
3.	To study about quantitative and qualitative analysis and synthetic polymer.

Course Outcomes (CO)

K1 – K5	CO1	Understanding the fundamental aspects and applications of coordination Chemistry.
	CO2	Study on the various heterocyclic compounds, carbohydrates and amino acids which include their classification, preparation and properties.
	CO3	To gain knowledge about amino acids and vitamins.
	CO4	To understand theoretical aspects of quantitative and qualitative analysis
	CO5	Acquire the knowledge about synthetic polymers, fibers and plastics

Subject code: 23UCH2AL/ 23UCH4AL

Programme Code: 04		B.Sc., Biotechnology (I Year), Physics (II year), Botany (II Year), Biochemistry (II Year)		
Title of the paper		**ALLIED PRACTICAL – I VOLUMETRIC AND ORGANIC ANALYSIS**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2023 - 2024	**II/ IV**	3	90	4

Course Objectives

1.	To demonstrate the basic laboratory technique of titration.
2.	To gain deep knowledge about analysis of organic substances.
3.	To identify the functional groups of unknown compounds.

Course Outcomes (CO)

K1 – K5	CO1	Remember the basics of volumetric titrations.
	CO2	Studying the use of indicators for various titrations.
	CO3	Understanding about preliminary analysis of organic compounds.
	CO4	Identification of the functional groups.
	CO5	Practice for getting accuracy in volumetric estimations

Subject code: 23CDM101

<table>
<tr><td colspan="4">Disaster Management</td></tr>
<tr><td colspan="2">Title of the paper :</td><td colspan="2">THEORY 1 – DISASTER MANAGEMENT AND SUSTAINABLE DEVELOPMENT</td></tr>
<tr><td colspan="3">Hours / Week</td><td>Total Hours</td></tr>
<tr><td colspan="3">4</td><td>60</td></tr>
<tr><td colspan="4">Course Objectives</td></tr>
<tr><td>1.</td><td colspan="3">To understand the basic aspects of History and Case Studies of Disasters and PipelineDisasters and oil Spills.</td></tr>
<tr><td>2.</td><td colspan="3">To learn about Climate Changes and Disasters and gain knowledge about Disaster Management Education.</td></tr>
<tr><td>3.</td><td colspan="3">To study about Concept and benefits of Corporate Social Responsibility (CSR).</td></tr>
<tr><td colspan="4">Course Outcomes (CO)</td></tr>
<tr><td rowspan="5">K1 – K5</td><td>CO1</td><td colspan="2">Understand the History and Case Studies of Disasters</td></tr>
<tr><td>CO2</td><td colspan="2">To understand the Pipeline Disasters and oil Spills & Land degradation and Droughts.</td></tr>
<tr><td>CO3</td><td colspan="2">Gain the knowledge about Climate Changes and Disasters.</td></tr>
<tr><td>CO4</td><td colspan="2">Study the basic principles of Disaster Management Education.</td></tr>
<tr><td>CO5</td><td colspan="2">Explore the Concept and benefits of Corporate Social Responsibility (CSR).</td></tr>
</table>

Subject code: 23CDM102

Disaster Management		
Title of the paper :	**THEORY 2 – DISASTER PREPAREDNESS AND RESPONSE**	
Hours / Week		**Total Hours**
4		60
Course Objectives		
1.	To know about the region of Natural disasters and study Safety engineering and analysis techniques.	
2.	To have insight about Natural disaster effects and fighting against threats and acquire knowledge about Health care and safety.	
3.	To know about National disaster relief strategy and general preparedness.	
Course Outcomes (CO)		
K1 – K5	CO1	Understand the Types of disasters and causes of disasters.
	CO2	Gain the knowledge about Safety engineering and analysis techniques.
	CO3	Study about the Natural disaster effects and fighting against threats.
	CO4	Know about Health care and safety.
	CO5	Exploring the various National disaster relief strategy and general preparedness.

Subject code: 23CDM103

Disaster Management		
Title of the paper :	**THEORY 3 – DISASTER RECOVERY**	
Hours / Week		**Total Hours**
4		60
Course Objectives		
1.	To learn group Causes of disaster and study about Disaster recovery plan.	
2.	To know about Role of technology in disaster recovery management and study about Environmental disaster management.	
3.	To learn about Disaster management to psychological perspectives.	
Course Outcomes (CO)		
K1 – K5	CO1	Gain the knowledge about Disaster recovery.
	CO2	Understand the basic aspects of Disaster recovery plan.
	CO3	Analyze and apply Role of technology in disaster recovery management.
	CO4	Understand about Brief history of the environment movement.
	CO5	To meet the contemporary challenges on Disaster management to psychological perspectives.

Subject code: 23CIM101

Instrumental Methods Of Chemical Analysis		
Title of the paper :	**THEORY 1 – ANALYTICAL CHEMISTRY**	
Hours / Week		**Total Hours**
4		60
Course Objectives		
1.	To understand the key features of Analytical chemistry and know the basics of Errors, Accuracy and Precision.	
2.	To identify different Separation techniques and describe about important purification techniques.	
3.	To understand important of Analytical biochemistry and industrial process.	
Course Outcomes (CO)		
K1 – K5	CO1	Understand the various types of analytical methods.
	CO2	To know the Knowledge about basics of Errors, Accuracy and Precision.
	CO3	Analyze the importance of Separation techniques.
	CO4	Describe about various types of purification techniques.
	CO5	To gain knowledge about Analytical biochemistry and industrial process

Subject code: 23CIM102

Instrumental methods of chemical analysis		
Title of the paper :	**THEORY 2 – SPECTROSCOPY AND CHROMATOGRAPHIC TECHNIQUES**	
Hours / Week	**Total Hours**	
4	60	
Course Objectives		
1.	To study Ultra – Violet and visible spectroscopy and study about Infrared spectroscopy.	
2.	To understand about Nuclear Magnetic Resonance (NMR) spectroscopy.	
3.	To study about various types chromatography and understand experimental techniques of column chromatography,	
Course Outcomes (CO)		
K1 – K5	CO1	Understanding the fundamental aspect Ultra – violet and visible spectroscopy.
	CO2	Learn about Fundamental concepts of Infrared spectroscopy
	CO3	Acquire the knowledge of Nuclear Magnetic Resonance (NMR) spectroscopy.
	CO4	Study on the various types of chromatography.
	CO5	To inculcate knowledge about Column chromatography.

Subject code: 23CIM1CL

<table>
<tr><td colspan="4">Instrumental methods of chemical analysis</td></tr>
<tr><td colspan="2">Title of the paper :</td><td colspan="2">PRACTICAL - 1 INSTRUMENT AND CHEMICAL METHODS IN DAY TO DAY ACTIVITY</td></tr>
<tr><td colspan="3">Hours / Week</td><td>Total Hours</td></tr>
<tr><td colspan="3">4</td><td>60</td></tr>
<tr><td colspan="4">Course Objectives</td></tr>
<tr><td>1.</td><td colspan="3">Transformation of theoretical knowledge gain to practical aspects and have experience in handling organic compounds.</td></tr>
<tr><td>2.</td><td colspan="3">To determine the dissolved oxygen in different types of water.</td></tr>
<tr><td>3.</td><td colspan="3">To know about fat content in milk using Lactometer and analysis techniques and understand about Estimation of Hardness of water.</td></tr>
<tr><td colspan="4">Course Outcomes (CO)</td></tr>
<tr><td rowspan="5">K1 – K5</td><td>CO1</td><td colspan="2">Understand the basic principles of Instrumental Methods of Chemical Analysis.</td></tr>
<tr><td>CO2</td><td colspan="2">Understand about the Colorimetric experiments.</td></tr>
<tr><td>CO3</td><td colspan="2">Determination of boiling point of organic compounds.</td></tr>
<tr><td>CO4</td><td colspan="2">Improve the accuracy of analysis.</td></tr>
<tr><td>CO5</td><td colspan="2">To gain knowledge about Biological Oxygen Demand (BOD).</td></tr>
</table>