ISLAMIAH WOMEN'S ARTS AND SCIENCE COLLEGE
Permanently Affiliated to Thiruvalluvar University
Recognized by UGC under sections 2(f) and 12(B) of the UGC Act 1956
Accredited with "B" Grade by NAAC
Approved by the Government of Tamil Nadu
Phone:04174-235266 Email: principaliwc@gmail.com
www.islamiahwomensartsandsciencecollege.com

DEPARTMENT OF CHEMISTRY

PSOs and COs

REGULATION(2017-2018)

Program specific outcomes (PSO)

PSO1: Understand the basic concepts of organic, inorganic, analytical, and pharmaceutical.

PSO2: Evaluate the practical knowledge about gravimetrical analysis, inorganic analysis andinstrumental knowledge.

PSO3: Understand water treatment and analysis.

PSO4: Understand nutritive value of food items and diet. PSO5: Apply industrial and pharmaceutical related sectors.

COURSE OUTCOME

SEMESTER – I

COURSE: GENERAL CHEMISTRY-I **CREDIT: 6**

CO1: Identify electronic configuration and periodic properties.

CO2: Understand the different types of chemical bonds.

CO3: Describe about nomenclature of aliphatic and alicyclic compounds.CO4: Analyze different types of states of matter

CO5: Describe basic concepts of bonding in Organic Chemistry

CO6: Explain about different types of Volumetric Analysis

CO7: Analyze classification of elements and factors affecting atomic radii.

COURSE: ALLIED ZOOLOGY-I **CREDIT : 4**

CO1: Acquire Knowledge about different kinds of animal species.

CO2: Understand the systematic and functional morphology of invertebrates and chordate

CO3: Acquire practical skills to comprehend the psychology of each and every vital system.

CO4: Understand the systematic morphology of reptiles.

CO5: Acquire knowledge about different species of Mammalia.

SEMESTER - II

COURSE: GENERAL CHEMISTRY-II **CREDIT : 5**

CO1: Discuss about s and p-block elements group study.

CO2: Analyse the comparative study of alkane

CO3: Explain about dienes and stability of cycloalkanes

CO4: Discuss about quantum mechanics and thermodynamics

CO5: Describe about first law of thermodynamics.

CO6: Discuss about thermochemical equations.

COURSE: ALLIED ZOOLOGY-II **CREDIT : 3**

CO1: Understand the principles of cell biology, genetics, development biology, physiology, ecology and evolution.

CO2: Explain the study of the internal structure of animals.

CO3: Explain the relationship between the organisms and their surrounding environments

CO4: Understand heredity and its vibrations.

COURSE: VOLUMETRIC ANALYSIS CORE PRACTICAL-I **CREDIT: 3**

CO1: Understand lab safety and handling of apparatus.

CO2: Estimate Acidimetry.

CO3: Estimate Precipitation Titration.

CO4: Evaluate Permanganometry.

COURSE: ALLIED BIO-CHEMISTRY-III **CREDIT :4**

CO1: Classify the structure and functions of carbohydrates

CO2: Understand the reactions and properties of Amino Acids

CO3: Discuss about the various structures of Proteins

CO4: Outline biological functions and classification of peptides.

COURSE: WATER TREATMENT & ANALYSIS (SBS-I) **CREDIT : 3**

CO1: Discuss about water softening methods.

CO2: Explains about desalination of brackish water.

CO3: Deals with sterilization and disinfection of water.

CO4: Discuss about water softening methods.

COURSE: HEALTH AND NUTRITION **CREDIT : 2**

CO1: Understand food groups

CO2: Outline food processing and food preservation

CO3: Estimate food malnutrition

SEMESTER - IV

COURSE: GENERAL CHEMISTRY-IV **CREDIT : 3**

CO1: Describe about noble gases their inertness and clatharites.

CO2: Discuss about monody carbocarboxylic acids and amities.

CO3: Concept related to alcohols phenols and properties.

CO4: Evaluate Gibbs-Helmholtz evolution Maxwell relations.

COURSE: ALLIED BIO-CHEMISTRY-II **CREDIT : 4**

CO1: Discuss about TCA Cycle and Glucose Metabolism

CO2: Outline metabolic disorders like diabetes, jaundice.

CO3: Classify the enzymes and mechanism of enzyme action.

CO4: Understand the central dogma of Molecular biology.

CO5: Outline requirement and biological functions of VITAMINS.

COURSE: FOOD CHEMSITRY (SBS-II) CREDIT : 3

CO1: Discuss about food prevention food additives packaging of foods.

CO2: Understand food colours, food processing

CO3: Estimate nutritive value of food and food preservation.

CO4: Discuss about food prevention food additives packaging of foods.

COURSE: INORGANIC QUALITATIVE ANALYSIS & PREPATATION (CORE PRACTICAL-II) CREDIT : 3

CO1: Understand Inorganic qualitative analysis and preparation

CO2: Provide analysis of two cations and two anions.

CO3: Explain semimicro methods using conventional scheme to be adopted

CO4: Evaluate preparation of different inorganic compounds

COURSE: ALLIED BIOCHEMISTRY I & II (ALLIED PRACTICAL) CREDIT : 2

CO1: Evaluate volumetric estimation

CO2: Estimate Glucose by Benedict's Method

CO3: Evaluate Glycine by Formal Titration

COURSE: NON MAJOR ELECTIVE FIRST –AID CREDIT : 2

CO1: Explain the importance of giving first-aid.

CO2: Understand knowledge on basic for first-aid treatment in case of injury or accidents.

CO3: Explain the simple life saving techniques that would greatly help in case of emergency.

CO4: Understand to react to a given emergency situations correctly.

SEMESTER - V

COURSE: INORGANIC CHEMISTRY-I **CREDIT: 4**

CO1: Describes halogens classification of halides comparative study of interhalogen compounds.

CO2: Understand about coordination compounds, nomenclature and isomerism.

CO3: Analyze knowledge of VBT and CFT, hybridization and structures of carbonyls

CO4: Explain different theories of coordination chemistry

CO5: Explain the nature of the solid state

COURSE: ORGANIC CHEMISTRY-I **CREDIT: 4**

CO1: Understand the carbohydrates structure elucidation of glucose, sucrose.

CO2: Describes stereoisomerism elements of symmetry, chirality etc,

CO3: Explain conformational analysis axial and equatorial interconversions.

CO4: Outlines heterocyclic compounds, huckels rule, aromaticity

CO5: Explain electrophilic substitution reactions.

COURSE: PHYSICAL CHEMISTRY-I **CREDIT : 4**

CO1: Explain about azeotropic mixtures partially miscible liquids

CO2: Outline applications of phase rule, cooling curves, and Gibb's phase rule.

CO3: Discuss about equivalent conductance, kholraush's law ionic Mobility, hittorff's method.

CO4: Evaluate about cooligative properties, van't haff factors. CO5: Explain about conductometric measurements.

COURSE: ANALYTICAL CHEMISTRY-I (ELECTIVE-I) CREDIT : 3

CO1: Deals with data analysis, types of errors, solvent extraction

CO2: Describes gravimetric analysis. Ignition of precipitate.

CO3: Discuss about microwave spectroscopy, IR spectroscopy, raman spectroscopy and their applications.

COURSE: PHARMACEUTICAL CHEMISTRY (ELECTIVE-II) CREDIT : 3

CO1: Outline different types of drugs, various diseases and their treatment importance ofIndian medicinal plants.

CO2: Discuss about organic pharmaceutical aids, narcotic drugs.

CO3: Analyze different types of drugs like analgesics, anesthetics drugs affecting CNS

COURSE: APPLIED CHEMISTRY (SBS-III) CREDIT : 3

CO1: Classify petrochemicals deals with paper technology, sugar industry.

CO2: Analyze explosives, photography techniques, xerographic copying etc.

CO3: Determine the processing of milk, sterilization homogenization techniques.

VI SEMESTER

COURSE: INORGANIC CHEMISTRY-II CREDIT: 4

CO1: Evaluate nuclear stability, N/P ratio and nuclear binding energy magic numbers.

CO2: Describes nuclear radio activity, half life period, thermo nuclear reactions.

CO3: Analyze metallurgical process, zone refining, deals with comparative study of Ti. V.Cr, Mn.

CO4: Able to make a study of lanthanides and actinides, extraction of thorium and uranium.

CO5: Explain organometallic compounds.

COURSE: ORGANIC CHEMISTRY-II CREDIT : 4

CO1: Imparts knowledge on mechanism of rearrangement reactions differentiate intermolecular

CO2: Formulate amino acids and poly peptides, end group analysis.

CO3: Define proteins and nuclic acids, differentiates DNA and RNA

CO4: Discuss about organ o synthetic reagents and natural products

CO5: Explain chemistry of natural products.

COURSE: PHYSICAL CHEMISTRY-II CREDIT : 4

CO1: Outline galvanic cells, emf of a cell, standard hydrogen electrode, reference electrode

CO2: Define liquid junction potential, quinhydrone and glass electrodes

CO3: Evaluate kinetics of reaction by volumetric, polarimetric, spectrophotometric methods.

CO4: Classify adsorption, catalysis and deals with laws of photochemistry.

CO5: Explain kinetics of photochemical reactions.

COURSE: ANALYTICAL CHEMISTRY (ELECTIVE-II) CREDIT:4

CO1: Understand principles and techniques of chromatographic techniques,

CO2: Describe principles and applications of HPLC, gas, Liquid chromatography.

CO3: Apply to ESR spectroscopy and thermo analytical techniques.

CO4: Discuss about rig rule Mc Lafferty rearrangement

CO5: Discuss various components with block diagram.

COURSE: AGRICULTURE & LEATHER CHEMISTRY (SBS-I) CREDIT: 4

CO1: Outline soil fertility and productivity, soil chemistry

CO2: Outline classification of insecticides, environmental effects of pesticides.

CO3: Apply Dye manufacture of leather, dyeing of leather, treatment of tannery effluents

CO4: Outline effect of tannery effluents

CO5: Discuss vegetable tanning, chrome tanning and deliming.

COURSE: GRAVIMETRIC ESTIMATION (CORE PRACTICAL-IV) CREDIT: 3

CO1: Describe with gravimetric estimation of sulphate as Barium sulphate

CO2: Evaluate gravimetric estimation of lead as lead chromate

CO3: Discuss about estimation pf calcium as calcium oxalate monohydrate

COURSE: ORGANIC ANALYSIS & PREPARATIONS (CORE PRACTICAL-V) CREDIT: 3

CO1: Analyze organic compounds containing one functional group and characterization withone derivative

CO2: Analyze of aldehyde, ketone nitro compounds, ester amines.

CO3: Outline organic preparations by acylation, halogenations, diazotization

SUBJECT NAME: PHYSICAL CHEMISTRY EXPERIMENTS (CORE PRACTICAL-VI) CREDIT: 3

CO1: Determine order of reactions by kinetics

CO2: Determine cell constant equivalent conductivities by conductivity experiments.

CO3: Evaluate potentiometric titrations if strong acid against strong base.

REGULATION 2020-2021

PROGRAM SPECIFIC OUTCOME (PSO)

PSO1. Demonstrate systematic and coherent understanding of the fundamental concepts in Physical Chemistry, Organic Chemistry, Inorganic Chemistry and all other related allied chemistry subjects.

PSO2. Identify chemical formulae and acquire ability and skill to become expertise over solving both theoretical and applied chemistry problems.

PSO3. Apply laboratory skills, carry out experiments, record observations and inferences and analyze the results.

PSO4. Know and follow the correct procedures and regulations for safe handling and usage of chemicals.

PSO5. Communicate effectively various aspects of Chemistry using examples and their geometrical visualizations.

PSO6. Discuss and evaluate scientific information from different sources (internet, newspaper articles, television, scientific texts and publications) and assess its credibility.

PSO7. Describe and discuss ways in which science is applied and used to solve local and global problems.

PSO8. Discuss how science and its applications interact with social, economic, political, environmental, cultural and ethical factors.

PSO9. Find employability in core chemistry and other related fields.

PSO10. Start their own industries / business in core-chemistry fields.

COURSE OUTCOME
SEMESTER - I

COURSE : GENERAL CHEMISTRY – I CREDIT: 4

CO1.Recollect the Chemistry of Quantum Numbers.

CO2. Review and apply periodicity of properties.

CO3. Discuss various types of bonding through VB & MO theories.

CO4 Name simple Aliphatic and Aromatic Compounds.

CO5 Illustrate and apply electron displacement effects and reaction mechanisms.

CO6 Elaborate the basic concepts of solid, liquid and gaseous states.

CO7 Apply the principles of Volumetric Analysis.

COURSE: ALLIED CHEMISTRY I CREDIT: 4

CO1. After studied unit-1, the student will be able to understand the life – cycle to and adaptations of protozoa, porifera coelenterata and platy helminthes

CO2. After studied unit-2, the student will be able to understand the functional morphology of Annelids, Arthropods , Molluscs and Echinoderms

CO3. After studied unit-3, the student will be able to acquire knowledge about the functional morphology of chordata, prochordatas and pisces

CO4. After studied unit-4, the student will be able to have a thorough knowledge about Frog and Calotes

CO5. After studied unit-5, the student will be able to understand the functional morphology of Aves and Mammals. Matching Table (put Yes / No in the appropriate box)

SEMESTER – II

COURSE : GENERAL CHEMISTRY – II CREDIT:4

CO1 Compare the basic properties of elements and their Compounds of s & p – block elements.

CO2 Explain the reaction mechanisms of alkanes, alkenes and alkynes and predict the products.

CO3 Classify dienes and analyze the stability of alkanes, alkenes and cycloalkanes.

CO4 Recollect the basic concepts of Quantum Theory and Thermodynamics.

CO5 Calculate the thermodynamic parameters using thermo chemical equations and data.

COURSE: ALLIED CHEMISTRY II **CREDIT: 4**

CO1. After studied unit-1, the student will be able to acquire knowledge about cell structure, gene function and Genetic engineering

CO2. After studied unit-2, the student will be able to understand the cleavage pattern and gastrulation in Amphioxus.

CO3. After studied unit-3, the student will be able tohave a thorough knowledge about the diseases of circulatory systems and urine formation

CO4. After studied unit-4, the student will be able to have an awareness about the environment.

CO5. After studied unit-5, the student will be able to understand the basic concepts of evolution.

SEMESTER – III

COURSE : GENERAL CHEMISTRY – III CREDIT:4

CO1 Explain the basic principles of Inorganic Qualitative Analysis.

CO2 Compare the properties of Carbon, Nitrogen and Oxygen elements and their compounds.

CO3 Apply Huckel's rule and predict the Aromaticity of compounds.

CO4 Discuss the mechanism of substitution and elimination reactions of Aliphatic and Aromatic compounds.

CO5 Explain the Thermodynamic second law and predict the spontaneity of a process.

COURSE : WATER TREATMENT ANALYSIS (SBS-I)

CREDIT:2

CO1 Classify water based on the presence of dissolved salts in it.

CO2 Explain the various methods to make the water potable.

CO3 Discuss the softening methods of hardwater and determine hardness of water.

CO4 Understand electrodialysis and RO methods to desalinate Brackish water.

CO5 Analyse the presence of Chemical substances in water indicative of pollution by measuring BOD and COD.

CO6 Illustratrate the methods used for biological examination of water.

SEMESTER – IV

COURSE : GENERAL CHEMISTRY – IV CREDIT:4

CO1 Classify water based on the presence of dissolved salts in it.

CO2 Explain the various methods to make the water potable.

CO3 Determine the hardness of water and discuss the softening methods of hard water.

CO4 Discuss electro dialysis and RO methods to desalinate brackish water.

CO5 Analyze the presence of chemical substances in water indicative of pollution by measuring BOD and COD.

CO6 Illustrate the methods used for biological examination of water.

SEMESTER – V

COURSE: INORGANIC CHEMISTRY – I CREDIT:5

CO1 Compare the properties of Halogens and their Compounds.

CO2 Recollect the basic concepts and nomenclature of Co-ordination Compounds.

CO3 Explain the theories of Co-ordination Compounds.

CO4 Compare VBT with MOT and apply Complexes in qualitative and quantitative analyses.

CO5 Calculate the CFSE Values of Octahedral and Tetrahedral Complexes.

CO6 Analyze the bonding and structure of metallic carbonyls.

CO7 Draw the structures of ionic crystals and explain the defects in solids.

COURSE : ORGANIC CHEMISTRY – I CREDIT:5

CO1 Elucidate the structures of saccharides.

CO2 Assign the stereo configuration of Organic Compounds.

CO3 Compare the Conformation and Configuration of cyclohexanes and substituted cyclohexanes.

CO4 Explain the preparation, properties and uses of Nitro alkanes.

CO5 Apply different reagents in studying various Organic reactions.

CO6 Explain the mechanism of Organic named reactions.

CO7 Explain the synthesis and properties of five and six membered heterocyclic compounds and condensed heterocyclic compounds.

CO8 Compare the basicity of heterocyclic Compounds

COURSE : PHYSICAL CHEMISTRY – I CREDIT:4

CO1 Explain the Thermodynamics of ideal and Non-ideal solutions, Nernst distribution law and its applications.

CO2 Draw and explain phase diagrams of one Component and two Component systems having congruent and incongruent melting points.

CO3 Derive law of Chemical equilibrium and Van't Hoff isotherm.

CO4 Determine molar mass from the colligative properties.

CO5 Explain variation of conductivity with dilution, measurement of conductivity and concept of Transport Number and its determination.

CO6 Explain Debye-Huckel Theory of strong electrolytes.

CO7 Apply conductivity measurements and explain conductometric titrations.

CO8 Explain buffer action and derive Henderson equation and pH of aqueous salt solutions

COURSE : ANALYTICAL CHEMISTRY – I CREDIT:3

CO1 Analyze Data and explain the methods of purification of solids.

CO2 Purify solid and liquid Organic Compounds.

CO3 Explain the concept of Gravimetric Analysis.

CO4 Describe the principles, Instrumentation and applications of UV, Visible, Microwave, IR and Raman Spectroscopy.

CO5 Determine the structure of Organic Compounds using various spectral techniques.

COURSE : APPLIED CHEMISTRY – I CREDIT:2

CO1 Explain the refining process of petroleum and differentiate between Thermal and Catalytic Cracking.

CO2 Explain the various processes involved in paper technology.

CO3 Recover glucose from molasses and estimate sugar.

CO4 Prepare alcohol from molasses.

CO5 Explain the Proximate and Ultimate analysis of Coal.

CO6 Describe Chemical changes occurring in Milk during processing.

CO7 Define the principle involved in photography.

CO8 Explain the need for making milk powder and principle involved in drying process.

SEMESTER – VI

COURSE : INORGANIC CHEMISTRY – II CREDIT:4

CO1 Explain the stability of nuclides in terms of N/P ratio, mass defect, binding energy and packing fraction.

CO2 Describe natural and artificial radioactivity and compare high energy nuclear reactions.

CO3 Describe the various processes involved in Metallurgy.

CO4 Compare the properties of d-block elements.

CO5 Compare the properties of lanthanides and actinides.

CO6 Classify Organometallic Compounds and discuss the biological importance of Fe, Cu and Zn.

COURSE : ORGANIC CHEMISTRY – II CREDIT:4

CO1 Explain the mechanisms of inter and intra molecular rearrangements.

CO2 Classify amino acids and explain their preparation and properties and synthesis of Peptides.

CO3 Differentiate between DNA and RNA.

CO4 Explain primary and secondary structures of proteins.

CO5 Elucidate the structures of Antibiotics, Alkaloids and Terpenoids.

COURSE : PHYSICAL CHEMISTRY – II CREDIT:4

CO1 Derive Nernst equation and explain Cell reactions.

CO2 Explain Concentration Cells and polarization.

CO3 Derive rate constant expressions for zero, first, second and third order reactions and determine the order of a reaction.

CO4 Compare Collision theory and ARRT.

CO5 Explain Lindemann's theory of unimolecular reactions.

CO6 Explain Langmuir Theory of Adsorption.

CO7 Derive Michaelis-Menten equation for enzyme catalyzed reactions.

CO8 State laws of photochemistry and explain the kinetics of photo chemical reactions.

CO9 Explain various Photo physical processes and Photosensitized reactions.

COURSE : ANALYTICAL CHEMISTRY – II CREDIT:3

CO1 Explain the principles and techniques of column, paper and thin layer chromatography,ion-exchange, high - pressure liquid and gas chromatography

CO2 Elucidate the structure of organic compounds using NMR,Mass and ESR spectroscopy .

CO3 Discuss the principle and applications of TGA, DTA and thermometric titrations.

CO4 Explain the principle of polarography and amperometric titrations .

COURSE : PHARMACEUTICAL CHEMISTRY – II CREDIT:3

CO1 Define the terms involved in pharmaceutical chemistry.

CO2 Explain the causes, symptoms and treatment of common diseases.

CO3 Explain the composition of blood.

CO4 Explain the role of antibacterial, antiseptics, vitamins, analgesics and anesthetics.

CO5 Apply the therapeutic importance of Indian medicinal plants.

CO6 Classify hormones and explain their function

REGULATION 2022-2023

PROGRAM SPECIFIC OUTCOME (PSO)

CO1. Demonstrate systematic and coherent understanding of the fundamental concepts in Physical Chemistry, Organic Chemistry, Inorganic Chemistry and all other related allied chemistry subjects.

CO2. Identify chemical formulae and acquire ability and skill to become expertise over solving both theoretical and applied chemistry problems.

CO3. Apply laboratory skills, carry out experiments, record observations and inferences and analyze the results.

CO4. Know and follow the correct procedures and regulations for safe handling and usage of chemicals.

CO5. Communicate effectively various aspects of Chemistry using examples and their geometrical visualizations.

CO6. Discuss and evaluate scientific information from different sources (internet, newspaper articles, television, scientific texts and publications) and assess its credibility.

CO7. Describe and discuss ways in which science is applied and used to solve local and global problems.

CO8. Discuss how science and its applications interact with social, economic, political, environmental, cultural and ethical factors.

CO9. Find employability in core chemistry and other related fields.

CO10. Start their own industries / business in core-chemistry fields.

COURSE OUTCOME
SEMESTER – I

COURSE : GENERAL CHEMISTRY – I **CREDIT: 4**

CO1 Recollect the Chemistry of Quantum Numbers.

CO2 Review and apply periodicity of properties.

CO3 Discuss various types of bonding through VB & MO theories.

CO4 Name simple Aliphatic and Aromatic Compounds.

CO5 Illustrate and apply electron displacement effects and reaction mechanisms.

CO6 Elaborate the basic concepts of solid, liquid and gaseous states.

CO7 Apply the principles of Volumetric Analysis.

COURSE: ALLIED CHEMISTRY I **CREDIT: 4**

CO1. After studied unit-1, the student will be able to understand the life – cycle to and adaptations of protozoa, porifera coelenterata and platy helminthes

CO2. After studied unit-2, the student will be able to understand the functional morphology of Annelids, Arthropods , Molluscs and Echinoderms

CO3. After studied unit-3, the student will be able to acquire knowledge about the functional morphology of chordata, prochordatas and pisces

CO4. After studied unit-4, the student will be able to have a thorough knowledge about Frog and Calotes

CO5. After studied unit-5, the student will be able to understand the functional morphology of Aves and Mammals. Matching Table (put Yes / No in the appropriate box)

SEMESTER – II

COURSE : GENERAL CHEMISTRY – II **CREDIT:4**

CO1 Compare the basic properties of elements and their Compounds of s & p –block elements.

CO2 Explain the reaction mechanisms of alkanes, alkenes and alkynes and predict the products.

CO3 Classify dienes and analyze the stability of alkanes, alkenes and cycloalkanes.

CO4 Recollect the basic concepts of Quantum Theory and Thermodynamics.

CO5 Calculate the thermodynamic parameters using thermo chemical equations and data.

COURSE: ALLIED CHEMISTRY II **CREDIT: 4**

CO1. After studied unit-1, the student will be able to acquire knowledge about cell structure, gene function and Genetic engineering

CO2. After studied unit-2, the student will be able to understand the cleavage pattern and gastrulation in Amphioxus.

CO3. After studied unit-3, the student will be able tohave a thorough knowledge about the diseases of circulatory systems and urine formation

CO4. After studied unit-4, the student will be able to have an awareness about the environment.

CO5. After studied unit-5, the student will be able to understand the basic concepts of evolution.

SEMESTER III

COURSE : GENERAL CHEMISTRY – III **CREDIT:4**

CO1. Explain the basic principles of Inorganic Qualitative Analysis.

CO2. Compare the properties of Carbon, Nitrogen and Oxygen elements and their compounds.

CO3. Apply Huckel's rule and predict the Aromaticity of compounds.

CO4. Discuss the mechanism of substitution and elimination reactions of Aliphatic and Aromatic compounds.

CO5. Explain the Thermodynamic second law and predict the spontaneity of a process.

SEMESTER IV

COURSE : GENERAL CHEMISTRY – IV **CREDIT:4**

CO1. The chemistry of noble gases and structure and properties of their compounds.

CO2. Preparation and properties of monocarboxylic and dicarboxilic acids.

CO3. Preparation and properties of alcohols and phenols..

CO4. Thermodynamic Equation of Stateand Free energy and Work function.

CO5. Third law of thermodynamics and its applications.

SEMESTER V

COURSE : INORGANIC CHEMISTRY – I **CREDIT:5**

CO1 Compare the properties of Halogens and their Compounds.

CO2 Recollect the basic concepts and nomenclature of Co-ordination Compounds.

CO3 Explain the theories of Co-ordination Compounds.

CO4 Compare VBT with MOT and apply Complexes in qualitative and quantitative analyses.

CO5 Calculate the CFSE Values of Octahedral and Tetrahedral Complexes.

CO6 Analyze the bonding and structure of metallic carbonyls.

CO7 Draw the structures of ionic crystals and explain the defects in solids.

COURSE : ORGANIC CHEMISTRY – I **CREDIT:5**

CO1 Elucidate the structures of saccharides.

CO2 Assign the stereo configuration of Organic Compounds.

CO3 Compare the Conformation and Configuration of cyclohexanes and substituted cyclohexanes.

CO4 Explain the preparation, properties and uses of Nitro alkanes.

CO5 Apply different reagents in studying various Organic reactions.

CO6 Explain the mechanism of Organic named reactions.

CO7 Explain the synthesis and properties of five and six membered heterocyclic compounds and condensed heterocyclic compounds.

CO8 Compare the basicity of heterocyclic Compounds.

COURSE : PHYSICAL CHEMISTRY – I **CREDIT:4**

CO 1.Explain the Thermodynamics of ideal and Non-ideal solutions, Nernst distribution law and its applications.

CO 2.Draw and explain phase diagrams of one Component and two Component systems having congruent and incongruent melting points.

CO 3.Derive law of Chemical equilibrium and Van't Hoff isotherm.

CO 4. Determine molar mass from the colligative properties.

CO 5.Explain variation of conductivity with dilution, measurement of conductivity and concept of Transport Number and its determination.

CO 6. Explain Debye-Huckel Theory of strong electrolytes.

CO 7.Apply conductivity measurements and explain conductometric titrations.

CO 8.Explain buffer action and derive Henderson equation and pHof aqueous salt solutions.

COURSE : ANALYTICAL CHEMISTRY – I **CREDIT:3**

CO1 Analyze Data and explain the methods of purification of solids.

CO2 Purify solid and liquid Organic Compounds.

CO3 Explain the concept of Gravimetric Analysis.

CO4 Describe the principles, Instrumentation and applications of UV,Visible,Microwave, IR and Raman Spectroscopy.

CO5 Determine the structure of Organic Compounds using various spectral techniques

SEMESTER VI

COURSE:INORGANIC CHEMISTRY – II **CREDIT:4**

CO1 Explain the stability of nuclides in terms of N/P ratio, mass defect, binding energy and packing fraction.

CO2 Describe natural and artificial radioactivity and compare high energy nuclear reactions.

CO3 Describe the various processes involved in Metallurgy.

CO4 Compare the properties of d-block elements.

CO5 Compare the properties of lanthanides and actinides.

CO6 Classify Organometallic Compounds and discuss the biological importance of Fe, Cu and Zn.

COURSE: ORGANIC CHEMISTRY – II **CREDIT:4**

CO1 Elucidate the structures of saccharides.

CO2 Assign the stereo configuration of Organic Compounds.

CO3 Compare the Conformation and Configuration of cyclohexanes and substituted cyclohexanes.

CO4 Explain the preparation, properties and uses of Nitro alkanes.

CO5 Apply different reagents in studying various Organic reactions.

CO6 Explain the mechanism of Organic named reactions.

CO7 Explain the synthesis and properties of five and six membered heterocyclic compounds and condensed heterocyclic compounds.

CO8 Compare the basicity of heterocyclic Compounds.

COURSE: PHYSICAL CHEMISTRY – II **CREDIT:4**

CO1: Explain the Thermodynamics of ideal and Non-ideal solutions, Nernst distribution law and its applications.

CO2: Draw and explain phase diagrams of one Component and two Component systems having congruent and incongruent melting points.

CO3: Derive law of Chemical equilibrium and Van't Hoff isotherm.

CO4: Determine molar mass from the colligative properties.

CO5: Explain variation of conductivity with dilution, measurement of conductivity and concept of Transport Number and its determination.

CO6: Explain Debye-Huckel Theory of strong electrolytes.

CO7: Apply conductivity measurements and explain conductometric titrations

CO8: Explain buffer action and derive Henderson equation and pHof aqueous salt solutions.

COURSE: ANALYTICAL CHEMISTRY – II **CREDIT:3**

CO1: Analyze Data and explain the methods of purification of solids.

CO2 :Purify solid and liquid Organic Compounds.

CO3 :Explain the concept of Gravimetric Analysis.

CO4: Describe the principles, Instrumentation and applications of UV, Visible, Microwave, IR and Raman Spectroscopy.

CO5: Determine the structure of Organic Compounds using various spectral techniques.

REGULATION 2023-2024

PROGRAMME OUTCOMES(PO):

PO1: Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study

PO2: Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.

PO3: Critical thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development

PO4: Problem solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.

PO5: Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.

PO6: Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation

PO7: Cooperation/Team work: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team

PO8: Scientific reasoning: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.

PO9: Reflective thinking: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society. PO10 Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.

PO 11: Self-directed learning: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.

PO12: Multicultural competence: Possess knowledge of the values and beliefs of 5 multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

PO13: Moral and ethical awareness/reasoning: Ability toembrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstratingthe ability to identify ethical issues related to one‟s work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.

PO14: Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.

PO15: Lifelong learning: Ability to acquire knowledge and skills, including „learning how to learn", that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.

PROGRAMME SPECIFIC OUTCOME(PSO):

PSO1: Disciplinary Knowledge: Understand the fundamental principles, concepts, and theories related to physics and computer science. Also, exhibit proficiency in performing experiments in the laboratory.

PSO2: Critical Thinking: Analyse complex problems, evaluate information, synthesize information, apply theoretical concepts to practical situations, identify assumptions and biases, make informed decisions and communicate effectively

PSO3: Problem Solving: Employ theoretical concepts and critical reasoning ability with physical, mathematical and technical skills to solve problems, acquire data, analyze their physical significance and explore new design possibilities.

PSO4: Analytical & Scientific Reasoning: Apply scientific methods, collect and analyse data, test hypotheses, evaluate evidence, apply statistical techniques and use computational models.

PSO5: Research related skills: Formulate research questions, conduct literature reviews, design and execute research studies, communicate research findings and collaborate in research projects.

PSO6: Self-directed & Lifelong Learning: Set learning goals, manage their own learning, reflect on their learning, adapt to new contexts, seek out new knowledge, collaborate with others and to continuously improve their skills and knowledge, through ongoing learning and professional development, and contribute to the growth and development of their field.

COURSE LEARNING OUTCOMES

SEMESTER – I

COURSE: GENERAL CHEMISTRY-I **CREDIT: 8**

CO1: Explain the atomic structure, wave particle duality of matter, periodic properties bonding, and properties of compounds.

CO2: Classify the elements in the periodic table, types of bonds, reaction intermediates electroniceffects in organic compounds, types of reagents.

CO3: Apply the theories of atomic structure, bonding, to calculate energy of a spectral transition, _x,_p electronegativity, percentage ionic character and bond order.

CO4: Evaluate the relationship existing between electronic configuration, bonding, geometry of molecules and reactions; structure reactivity and electronic effects

CO5: Construct MO diagrams, predict trends in periodic properties, assess the properties of elements, and explain hybridization in molecules, nature of H – bonding and organic reaction mechanisms.

COURSE:QUANTITATIVE INORGANIC ESTIMATION (TITRIMETRY) AND INORGANIC PREPARATIONS PRACTICAL CREDIT:4

CO1: Explain the basic principles involved in titrimetric analysis and inorganic preparations.

CO2: Compare the methodologies of different titrimetric analysis.

CO3: Calculate the concentrations of unknown solutions in different ways and develop the skill to estimate the amount of a substance present in a given solution.

CO4: Assess the yield of different inorganic preparations and identify the end point of various titrations.

COURSE : FOOD CHEMISTRY CREDIT:2

CO1: Learn about Food adulteration - contamination of Wheat, Rice, Milk, Butter.

CO2: Get an awareness about food poisons like natural poisons (alkaloids - nephrotoxin) pesticides, DDT, BHC, Malathion

CO3: Get an exposure on food additives, artificial sweeteners, Saccharin, Cyclomate and Aspartate in the food industries.

CO4: Acquire knowledge on beverages, soft drinks, soda, fruit juices and alcoholic beverages examples.

CO5: Study about fats and oils - Sources of oils - production of refined vegetable oils - preservation. Saturated and unsaturated fats –MUFA and PUFA **.**

COURSE : FOUNDATION COURSE IN CHEMISTRY CREDIT:2

CO1: Understand the concepts of periodic table.

CO2: To know the naming of compounds and its nature.

CO3: Understand the mathematical concepts.

CO4: to describe the errors and it’s minimized.

CO5: To know the chromatography technique.

COURSE : ELECTIVE ZOOLOGY - I **CREDIT:3**

CO1: Recall the characteristic features invertebrates and chordates.

CO2: Classify invertebrates up to class level and chordates up to order level

CO3: Explain and discuss the structural and functional organisation of some invertebrates and chordates.

CO4: Relate the adaptations and habits of animals to their habitat.

CO5: Analyse the taxonomic position of animals.

SEMESTER – II

COURSE: GENERAL CHEMISTRY-II **CREDIT:8**

CO1: 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: Discuss the periodic properties of sand p- block elements, reactions of aliphatic and aromatic hydrocarbons and strength of acids.

CO3: Classify hydrocarbons, types of reactions, acids and bases, examine the properties s and p-block elements, reaction mechanisms of aliphatic and aromatic hydrocarbons.

CO4: Explain theories of acids, bases and indicators, buffer action and important compounds of s-block elements.

CO5: Assess the application of hard and soft acids indicators, buffers, compounds of s and block elements and hydrocarbons.

COURSE: DAIRY CHEMISTRY **CREDIT: 2**

CO 1: Understand about general composition of milk – constituents and its physical properties.

CO 2: Acquire knowledge about pasteurization of Milk and various types of pasteurization - Bottle, Batch and HTST Ultra High Temperature Pasteurization.

CO 3: Learn about Cream and Butter their composition and how to estimate fat in cream and Ghee.

CO 4: Explain about Homogenized milk, flavoured milk, vitaminised milk and toned milk.

CO 5: Have an idea about how to make milk powder and its drying process - types of drying Process.

COURSE:COSMETICS AND PERSONAL GROOMING CREDIT:2

CO1: Explain the kinetic properties of gases by using mathematical concepts.

CO2: Describe the physical properties of liquid and solids; identify various types of crystals with respect to its packing and apply the XRD method for crystal structure determinations.

CO3: Investigate the radioactivity, nuclear energy and it's production, also the nuclear waste management.

CO4: Write the nomenclature, physical & chemical properties and basic mechanisms of halo organic compounds and alcohols.

CO5: Investigate the named organic reactions related to phenol; explain the preparation and properties of aromatic alcohol including thiol.

COURSE: QUALITATIVE ORGANIC ANALYSIS AND PREPARATION OF ORGANIC COMPOUNDS CREDIT: 3

CO1: Observe the physical state, odour, colour and solubility of the given organic compound.

CO2: Identify the presence of special elements and functional group in an unknown organic compound performing a systematic analysis.

CO3: Compare mono and dicarboxylic acids, primary, secondary and tertiary amines, mono and diamides, mono and polyhydric phenols, aldehyde and ketone, reducing and non-reducing sugars and explain the reactions behind it.

CO4: Exhibit a solid derivative with respect to the identified functional group.

COURSE : ELECTIVE ZOOLOGY - II CREDIT: 3

CO1: Recall the parts and working of body organs and developmental stages, name the patterns of inheritance and list different types of animal behaviour

CO2: Analyse the different developmental stages

CO3: Analyse the working of body and immune systems

CO4: Analyse the different patterns of inheritance

CO5: Relate the behaviour of animals to physiology. Analyse the different types of behaviour

SEMESTER – III

COURSE : GENERAL CHEMISTRY -III CREDIT: 5

CO1: Explain the kinetic properties of gases by using mathematical concepts.

CO2: Describe the physical properties of liquid and solids; identify various types of crystals with respect to its packing and apply the XRD method for crystal structure determinations.

CO3: Investigate the radioactivity, nuclear energy and it's production, also the nuclear waste management.

CO4: Write the nomenclature, physical & chemical properties and basic mechanisms of halo organic compounds and alcohols.

CO5: Investigate the named organic reactions related to phenol; explain the preparation and properties of aromatic alcohol including thiol.

COURSE : ENTREPRENEURIAL SKILLS IN CHEMISTRY CREDIT: 1

CO 1: Identify adulterated food items by doing simple chemical tests.

CO 2: Prepare cleaning products and become entrepreneurs

CO 3: Educate others about adulteration and motivate them to become entrepreneurs.

COURSE : PESTICIDE CHEMISTRY CREDIT: 2

CO 1: Teach about the pesticides and their toxicity with respect to structure and category.

CO 2: Explain the preparation and property of pesticides

CO 3: Investigate the pesticide residues, prevention and care

CO 4: Demonstrate the extraction and analytical methods of pesticide residues

CO 5: Make awareness to the public on bio-pesticides

COURSE : QUALITATIVE INORGANIC ANALYSIS PRACTICAL CREDIT: 2

CO 1: Acquire knowledge on the systematic analysis of Mixture of salts.

CO 2: Identify the cations and anions in the unknown substance.

CO 3: Identify the cations and anions in the soil and water and to test the quality of water.

CO4: Assess the role of common ion effect and solubility product

SEMESTER – IV

COURSE : GENERAL CHEMISTRY-IV CREDIT: 4

CO1: Explain the terms and processes in thermodynamics; discuss the various laws of thermodynamics and thermo chemical calculations.

CO2: Discuss the second law of thermodynamics and its application to heat engine; discuss third law and its application on heat capacity measurement.

CO3: Investigate the chemistry of transition elements with respect to various periodic properties and group wise discussions.

CO4: Discuss the fundamental organic chemistry of ethers, epoxides and carbonyl compounds including named organic reactions.

CO5: Discuss the chemistry and named reactions related to carboxylic acids and their derivatives; discuss chemistry of active methylene compounds, halogen substituted acids and hydroxyl acids.

COURSE : INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS

CREDIT: 2

CO1: Apply error analysis in the calibration and use of analytical instruments, explain theory, instrumentation and application of flame photometry and Atomic Absorption spectrometry

CO2: Explain theory, instrumentation and application of UV visible and Infrared spectroscopy.

CO3: Able to discuss instrumentation, theory and applications of thermal and electrochemical techniques.

CO4: Explain the use of chromatographic techniques in the separation and identification of Mixtures.

CO5: Explain preparation of solutions, stoichiometric calculations.

COURSE : FORENSIC SCIENCE CREDIT: 2

CO 1: Learn about the Poisons - types and classification of poisons in the living and the dead organisms and also get information about Postmortem.

CO 2: Get awareness on Human bombs, possible explosives (gelatin sticks and RDX) and metal defector devices and other security measures for VVIP - composition of bullets and detecting powder burns

CO 3: Detect the forgery documents, different types of forged signatures

CO4: Have an idea about how to tracks and trace using police dogs, foot prints identification and gain the knowledge in analyzing biological substances - blood, semen, saliva, urine and hair - DNA Finger printing for tissue identification in dismembered bodies

CO 5: Get the awareness on Aids - causes and prevention and also have an exposure on handling fire explodes.

COURSE : PHYSICAL CHEMISTRY PRACTICAL – I CREDIT: 2

CO1: Describe the principles and methodology for the practical work

CO2: Explain the procedure, data and methodology for the practical work.

CO3: Apply the principles of electrochemistry, kinetics for carrying out the practical work.

CO4: Demonstrate laboratory skills for safe handling of the equipment and chemicals

SEMESTER – V

COURSE: INORGANIC CHEMISTRY –I CREDIT: 4

CO1: Explain isomerism, Werner's Theory and stability of chelate complexes

CO2: Discuss crystal field theory, magnetic properties and spectral properties of complexes.

CO3: Explain preparation and properties of metal carbonyls

CO4: Give a comparative account of the characteristics of lanthanoids and actinoids

CO5: Explain properties and uses of inorganic polymers of silicon, sulphur, boron and phosphorous

COURSE : ORGANIC CHEMISTRY – I CREDIT: 4

CO1: Assign RS notations to chirals and EZ notations to olefins and explain conformations of ethane and butane.

CO2: Explain preparation and properties of aromatic and aliphatic nitro compounds and amines.

CO3: Explain colour and constitution of dyes and food additives

CO4: Discuss preparation and properties of five membered heterocycles like pyrrole, furan and thiophene.

CO5: Discuss preparation and properties of six membered heterocycles like pyridine, quinolone and isoquinoline.

COURSE: PHYSICAL CHEMISTRY -I CREDIT: 4

CO1: Explain Gibbs and Helmholtz free energy functions, partial molar quantities and Ellinghams

CO2: Apply the concepts of chemical kinetics to predict the rate of the reaction and order of the reaction, demonstrate the effect of temperature on reaction rate, and the significance of free energy and entropy of activation.

CO3: Compare chemical and physical adsorption, Freundlich and Langmuir adsorption isotherms, and differentiate between homogenous and heterogeneous catalysis.

CO4: Demonstrate the types and characteristics of colloids, preparation of sols and emulsions, and determine the molecular weights of macromolecules.

CO5: Utilize the concepts of photochemistry in fluorescence, phosphorescence, chemiluminescence and color perception of vision.

COURSE:INDUSTRIAL CHEMISTRY CREDIT: 3

CO1: Summarize the properties of fuels which include petroleum, water gas, natural gas and Propellents.

CO2: Evaluate cosmetic products, soaps, detergents.

CO3: Explain manufacture of sugar, food spoilages and food additives.

CO4: Explain properties of abrasives, manufacture of leather and paper.

CO5: Explain properties and manufacture of lubricants and cement, and intellectual property rights.

COURSE: BIOCHEMISTRY CREDIT: 4

CO1: Explain molecular logic of living organisms, composition of blood and blood coagulation.

CO2: Explain synthesis and properties of amino acids, determination of structure of peptides and proteins.

CO3: Explain factors influencing enzyme activity and vitamins as coenzymes.

CO4: Explain RNA and DNA structure and functions.

CO5: Explain biological significance of simple and compound lipids.

SEMESTER – VI

COURSE: ORGANIC CHEMISTRY - II CREDIT: 3

CO1: Explain isolation and properties of alkaloids and terpenes.

CO2: Explain preparation and reactions of mono and disaccharides.

CO3: Classify biomolecules and natural products based on their structure, properties, reactions and uses.

CO4: Explain molecular rearrangements like benzidine, Hoffmann etc.,

CO5: Preparation and properties of organolithium compounds.

COURSE: INORGANIC CHEMISTRY –II CREDIT: 3

CO1: Ability to explain the importance of tracer elements on biological system.

CO2: Explain the metal ion transport, Bohr effect, Na, K, Ca pump.

CO3: Explain the function of Vitamin B12, Zn-Cu enzyme, ferredoxin, cluster enzymes.

CO4: Classification and structure of silicates.

CO5: Explain the manufacture of refractories, explosives, paints and pigments.

COURSE: PHYSICAL CHEMISTRY-II CREDIT: 3

CO1: Construct the phase diagram for one component and two component systems, explain the properties of freezing mixture, component with congruent melting points and solid solutions.

CO2: Apply the concepts of chemical equilibrium in dissociation of PCl5, N2O4 and formation of HI, NH3, SO3 and decomposition of calcium carbonate. Demonstrate important principles such as Le chatelier principle, van't Hoff reaction isotherm and Clausius-Clayperon equation.

CO3: Identify an appropriate distillation method for the separation of binary liquid mixtures such as azeotropic mixtures, partially miscible mixtures and immiscible liquids.

CO4: Explain the significance of Arrhenius theory, Debye-Huckel theory, Onsager equation and Kohlrausch's law in conductance.

CO5: Construct electrochemical cell with the help of electrochemical series and calculate cell EMF. Demonstrate the applications of EMF and significance of potentiometric titrations.

COURSE:FUNDAMENTALS OF SPECTROSCOPY CREDIT: 3

CO1: Explain electrical and magnetic properties of materials and microwave spectroscopy.

CO2: Explain theory, instrumentation and applications of Infrared and Raman spectroscopy.

CO3: Apply selection rules to understand spectral transitions, explain Woodward – Fieser's rule for the calculation of wavelength maximum of conjugated dienes

CO4: explain theory,instrumentation and applications of NMR spectroscopy.

CO5: Explain theory, instrumentation and applications of Mass spectrometry.

COURSE:PROFESSIONAL COMPETENCY SKILL CREDIT: 2

CO 1: Identify adulterated food items by doing simple chemical tests.

CO 2: Prepare cleaning products and become entrepreneurs.

CO 3: Educate others about adulteration and motivate them to become entrepreneurs.

COURSE: PHYSICAL CHEMISTRY PRACTICAL – II CREDIT: 2

CO1: Describe the principles and methodology for the practical work.

CO2: Explain the procedure, data and methodology for the practical work.

CO3: Apply the principles of phase rule and electrochemistry for carrying out the practical work.

CO4: Demonstrate laboratory skills for safe handling of the equipment and chemicals.