



PSGR
Krishnammal College for Women



DEPARTMENT OF CHEMISTRY

**CHOICE BASED CREDIT SYSTEM &
OUTCOME BASED CURRICULAR FRAMEWORK**

BACHELOR OF CHEMISTRY

2023 - 2026



PROGRAMME OUTCOMES

After completion of the programme, the student will be able to

- PO1** : accept the common responsibility to preserve the environment and to contribute to the development of societal concerns.
- PO2** : acquire communication skill- written, verbal and digital
- PO3** : demonstrate knowledge and understanding of essential facts, concepts, principles and theories relating to the subject areas namely organic, inorganic, physical, analytical chemistry, Mathematics, Physics and Biology.
- PO4** : apply such knowledge and understanding to the solution of qualitative and quantitative problems of familiar and unfamiliar.
- PO5** : handle chemical materials safely by taking into account their physical and chemical properties including any specific hazards associated with their use.
- PO6** : conduct standard laboratory procedures for the synthesis and analysis of organic, inorganic systems, monitor, record document in a reliable manner, chemical properties, events and changes by observation and measurement.

PROGRAMME SPECIFIC OUTCOME

The students at the time of graduation will

- PSO1** : possess skills in safe handling of chemicals taking into account their physical and chemical properties
- PSO2** : be able to employ critical thinking and scientific inquiry in the performance, design, interpretation and documentation of laboratory experiments, at a level suitable to succeed at an entry-level position in chemical industry or a chemistry graduate program.
- PSO3** : be able to apply the theoretical concepts of instruments that are commonly used in most chemistry fields as well as interpret and use data generated in instrumental chemical analyses.



DEPARTMENT OF CHEMISTRY

2023-2026

SEM	Part	Subject Code	Title of the Paper		Instruction hours/week	Contact hours	Tutorial	Duration of Examination	Examination Marks			Credits
									C A	ES E	TOT AL	
I	I	TAM2301 / HIN2301/ FRE2301	Language T/H/F Paper I	Language	6	88	2	3	25	75	100	3
	II	ENG2301	English Paper-I	English	6	88	2	3	25	75	100	3
	IIIA	CE23C01	General Chemistry Paper -I	CC	6	88	2	3	25	75	100	5
	IIIA	CE23CP1	Chemistry Practical - I	CC	3	45	-	-	-	-	-	-
	IIIA	PS23A01	Allied Physics Paper - I	GE	4	58	2	3	20	55	75	4
	IIIA	PS23AP1	Allied Physics Practical	GE	3	45	-	-	-	-	-	-
	IV	NME23B1/ NME23A1/ NME23WS / NME23ES	Basic Tamil Paper -I / Advanced Tamil Paper-I / Women Studies*/ NEN- Introduction to Entrepreneurship*	AEC	2 2*	28 30*	2 -	- -	100 100	- -	100 100	2 2
II	I	TAM2302 / HIN2302/ FRE2302	Language T/H/F Paper - II	Language	6	88	2	3	25	75	100	3

	II	ENG2302	English Paper-II	English	5	73	2	3	25	75	100	3
	IIIA	CE23C02	General Chemistry Paper - II	CC	6	88	2	3	25	75	100	5
	IIIA	CE23CP1	Chemistry Practical I	CC	3	45	-	3	25	75	100	4
	IIIA	PS23A02	Allied Physics Paper - II	GE	5	73	2	3	20 [#]	55 [#]	75 [#]	4
		TH23A02	Allied Mathematical Statistics with R II		8	118	2	3	25	75	100	5
	IIIA	PS23AP1	Allied Physics Practical	GE	3	45	-	3	15 [*]	35 [*]	50 [*]	2
	IV		Open Course - Self Study Online Courses		-	-	-	-	-	-	-	-
	IV	NME23B2 / NME23A 2	Basic Tamil Paper-II /Advanced Tamil**	AEC	-	-	-	-	100	-	100	-
	V	23PEPS1	Professional English (Science /Management/ Humanities/Commerce)	AEC	-	25	5	-	100	-	100	2
	IIIB	NM21GAW	Foundation Course –1 (General Awareness) (Online)		Self study					Grade		

CC –Core Courses

CA – Continuous Assessment

GE –Generic Elective

ESE - End Semester Examination

AEC – Ability Enhancing Course

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CE23C01	GENERAL CHEMISTRY PAPER - I	THEORY	88	2	-	5

Preamble

To enable the students to

- understand quantum mechanics as a mathematical model to produce wave functions and energies
- learn about the fundamental ideas, physical significance and theories of bonding in molecules
- gain knowledge about the polar effects and their importance in affecting the properties of compounds
- understand the principles of thermodynamics and thermo chemistry
- explore Industry 4.0 through physical-to-digital-to-physical connection which potentially transform the chemical industry

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	understand the basics of quantum mechanics, bonding, reactive intermediates, thermodynamics and Industry 4.0	K1
CLO2	discuss the atomic structure, types of bonding, electronic effects on reactivity, stability of aromatic compounds and state / path function using thermodynamics	K2
CLO3	examine the periodic properties, strength of bonding, and apply the principles in identifying reaction mechanism. Apply laws of thermodynamics and learn the physical processes involved. Practice to understand the concepts of Industry 4.0	K3
CLO4	Analyze and perform calculations on periodic properties, Aromaticity, bonding theories, thermodynamic and thermochemistry principles.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	H	H	H	H	H
CLO2	H	H	M	H	H
CLO3	H	H	H	H	H
CLO4	H	H	M	H	H

H-High; M-Medium; L-Low

GENERAL CHEMISTRY PAPER – I (CE23C01)

(88 Hrs)

Unit I

(18 hrs)

Atomic Structure

Wave mechanical concepts of Rutherford's Nuclear model of the atom and its limitations. Bohr's theory and its limitations, dual behaviour of matter and radiation, de Broglie's relation, Heisenberg Uncertainty principle. Hydrogen atom spectra. Atomic orbitals. Schrodinger wave equation, Significance of ψ and ψ^2 (no derivation required) , shapes of s, p and d orbitals. Aufbau and Pauli exclusion principles, Hund's multiplicity rule. Quantum numbers - Electronic configuration of elements, effective nuclear charge.

Periodic Properties

Atomic and ionic radii, ionization energy, electron affinity and electronegativity – definition, factors determining ionization energy and electro negativity, and their applications.

Unit II

(18 hrs)

Chemical Bonding & Molecular Structure

Introduction to different types of Bonding- **Covalent bonding** - Valence bond theory and its limitations, Hybridization- Types of overlap of atomic orbitals. Valence shell electron pair repulsion theory (VSEPR) to BF_3 , NH_3 , H_2O , ClF_3 , SF_4 , PF_5 , SF_6 .

Concept of resonance and resonating structures for CO_3 and CO .

MO Theory- Introduction, bonding and magnetic properties (for simple homo nuclear and hetero nuclear diatomic molecules)

Ionic bonding- Factors influencing the formation of ionic bonding. Ionic crystals NaCl , CsCl . Lattice energy of ionic crystals, statement of Born-Lande equation for calculation of ionization energy, Born-Haber cycle and its application, polarizing power and polarizability. Fajan's rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character.

Hydrogen bonding-Types with examples. Vander Waal's forces and London forces.

Co-ordinate covalent bond-with examples, Comparison between ionic, covalent and coordinate bonding.

Unit III

(17 hrs)

Thermodynamics-I

Definitions of terms involved, extensive and intensive properties, path functions vs state functions, exact and inexact differentials. First law of thermodynamics, adiabatic and isothermal processes, reversible and irreversible processes - Work done, Joule- Thomson effect, Joule Thomson Coefficient –Problems.

Thermo chemistry

Heat of neutralization, heat of solution, heat of combustion. Bomb calorimeter, determination of heat of combustion, heat of dilution. Integral and differentials. Hess's law- calculation of bond energy, bond length, dissociation energy, Kirchoff's equation- applications.

Unit IV

(17hrs)

Fundamental aspects of Organic reaction mechanisms

Nucleophiles and electrophiles, Reactive Intermediates: Carbocations, Carbanions and free radicals- Formation, structure and stability. Inductive Effect, Electromeric Effect, Resonance and Hyper conjugation, (Baker - Nathan effect), Steric effect-examples and effect on reactivity. Comparison of acid strength-halogen substituted acids. Basic strength of RNH_2 , R_2NH , R_3N and aniline and stability of alkenes based on hyper conjugation.

Cycloalkanes-Nomenclature, methods of preparation, chemical reactions, Baeyer's strain theory and its limitations.

Unit V

(18hrs)

Aromaticity

Structure of benzene, Dewar structure, isomer number, resonance structure of benzene. Kekule structure, resonance energy and stability of benzene, reactions of benzene, orbital picture of benzene, aromatic character- Huckel's rule, non-benzenoid aromatic compounds.

Aromatic electrophilic substitution- mechanism of nitration, sulphonation, halogenation, Friedel craft's alkylation, acylation and diazonium coupling

Industry 4.0

Introduction to Industry 4.0- Need – Reasons for Adopting Industry 4.0 - Definition – Goals Technologies of Industry 4.0- Applications of Artificial Intelligence in chemistry for predicting the properties of molecular structure – Chem sketch, Chem Draw, MOPAC, Avagadro.

Text Books

S. No	Author	Title of the Book	Publishers	Year of Publication
1	ArunBahl B. S. Bahl	Advanced Organic Chemistry	S. Chand Sons Company Pvt Ltd	2016
2	Jagdamba Singh	Undergraduate Organic Chemistry Vol I	Pragathi Prakahasan	2010
2	P. L. Soni	Text Book of Inorganic Chemistry	Sultan Chand and Sons	2013

4	B. R. Puri, L. R. Sharma, M. S. Patania	Principles of Physical Chemistry	Vishal Publishing & Co	2017
5	P. Kaliraj, T. Devi,	Higher Education for Industry 4.0 and Transformation to Education 5.0		

Reference Books

S. No	Author	Title of the Book	Publishers	Year of Publication
1	B. R. Puri, L. R. Sharma, K. K. Kalia	Principles of Inorganic Chemistry	Milestone Publishers and Distributors	2011
2	R. T. Morrison and R. N. Boyd	Organic Chemistry	Pearson India Education Services	2010
3	R. D. Madan	Modern Inorganic Chemistry	S. Chand Sons Company Pvt Ltd	2014
4	Alasdair Gilchrist.	Industry 4.0: The Industrial Internet of Things, Apress Publications		

Related Online References:

1. Introduction to Industry 4.0 and Industrial Internet of Things by Prof.Sudip Mishra, IIT Kharagpur.
2. A Complete Guide to Industry 4.0-Udemy

Pedagogy:

Lecture by chalk and talk, power point presentation, e-content, Numerical exercise, group discussion, assignment, quiz, peer learning, seminar

Course Designers

1. Dr. N. Shyamala Devi
2. Dr. S. Jone Kirubavathy

Question Paper Pattern End Semester Examination

SECTION	WORD LIMIT	MARKS	TOTAL
A - 5 x 2 Marks (No Choice)	One or Two Sentences	10	75
B -5 x 5 Marks (Internal Choice at same CLO Level)	300	25	
C – 5x 8 Marks (Internal Choice at same CLO Level)	600-800	40	

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CE23A01	IDC - CHEMISTRY FOR BIOLOGISTS– I (Offered to B.Sc Botany/Zoology)	THEORY	58	2	-	4

Preamble

To enable the students to

- gain knowledge about the nature of bonding and hybridization
- learn the importance of aromaticity and isomerism
- understand the preparation of standard solutions and chromatographic techniques
- acquire knowledge on the significance of aminoacids and proteins
- familiarize the applications of solar energy and water treatment techniques

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	recall the types of bonding, organic reagents, aminoacids and define the terms involved in analytical /environmental chemistry	K1
CLO2	Understand the concept of hybridization, classify aromatic/non-aromatic compounds, aminoacids/proteins and demonstrate the preparation of standard solutions.	K2
CLO3	Interpret the structure & stereo isomerism of organic compounds and illustrate the importance of chromatographic techniques/renewable sources and water treatment technologies	K3
CLO4	Appraise the theories of bonding, conformational analysis and experiment the role of analytical techniques and softening process in various applications	K4

Mapping with programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	H	H	H	H	H
CLO2	H	H	H	H	H
CLO3	H	H	H	H	H
CLO4	H	H	H	H	H

H- High; M-Medium; L-Low

IDC – CHEMISTRY FOR BIOLOGISTS - I (CE23A01)

(Offered to B.Sc Botany / Zoology)

(58 hrs)

UNIT I

(12 hrs)

Bonding

Types of bonding - Covalent bond - nature, structure and hybridization of CH₄, C₂H₄, C₂H₂ and C₆H₆ molecule. Ionic bond - Nature of ionic bond, structure of NaCl and CsCl.

Hydrogen bonding - inter and intra molecular, nature and its effect on its structure and its consequences.

Shapes and hybridization of BeCl₂, H₂O, NH₃ and PCl₅ based on VSEPR theory.

UNIT II

(12 hrs)

Organic reactions and Stereoisomerism

Types of organic reagents - electrophiles, nucleophiles and free radicals.

Aromaticity - Huckel's rule, mechanism of nitration, sulphonation, halogenation, Friedel craft's alkylation and acylation of benzene.

Stereoisomerism - geometrical isomerism (cis - trans isomerism only), optical isomerism (lactic acid and tartaric acid). Conformation - a simple treatment of ethane and n-butane .

UNIT III

(11 hrs)

Analytical Chemistry

Role and importance of analytical chemistry –principle of volumetric analysis - calibration of glasswares, standardization - experimental requirements -concentration units (normality and molarity) –types and preparation of standard solutions (primary and secondary standards). Types of titrations - indicators for acid-base titrations. Chromatography– principle and classification- paper, column, thin layer, electrophoresis and ion-exchange chromatography and its applications.

UNIT IV

(11 hrs)

Amino acids and Proteins

Amino acids -classification, preparation of amino acids by Gabriel phthalimide synthesis, Erlen Meyer azlactone synthesis. Properties of amino acids and action of heat on α , β , γ amino acids -dipeptide synthesis.

Protein- classification according to composition and function, primary and secondary structures, properties and colour reactions of proteins.

UNIT V

(12 hrs)

Solar energy and Water treatment

Solar energy - renewable energy and non - renewable energy sources - solar energy - solar cells, solar heating, solar collector (flat plate collector only), applications.

Water treatment - hardness of water- temporary and permanent hardness, disadvantages of hard water.

Softening methods - reverse osmosis, zeolite and demineralization process. Purification of water for domestic purpose - disinfection by chlorine, ozone and UV light.

Text Books :

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1.	Dr. V. Veeraiyan	Textbook of Allied Chemistry	High mount Publishing house, triplicane, Chennai.	Reprint 2006
2.	R. Gopalan. P.S. Subramanian and K. Rengarajan	Elements of Analytical Chemistry	Sultan Chand & Sons, Educational Publishers, New Delhi	Reprint 2013
3.	Arun Bahl B. S. Bahl	Advanced Organic Chemistry	S. Chand Sons Company Pvt Ltd,	Reprint 2009
4.	P.C Jain & Monika Jain	Engineering chemistry	Dhanpat Rai Publishing Co Pvt Ltd.	Reprint 2003

Pedagogy:

Lecture by chalk and talk, power point presentation, e-content, numerical exercise, group discussion, assignment, quiz, peer learning, seminar

Course Designers

1. Dr.R.Revathi
2. Dr.N.Anusuya

**Question Paper Pattern
End Semester Examination**

SECTION	WORD LIMIT	MARKS	TOTAL
A - 5 x 2 Marks (No Choice)	One or Two Sentences	10	75
B -5 x 5 Marks (Internal Choice at same CLO Level)	300	25	
C – 5x 8 Marks (Internal Choice at same CLO Level)	600-800	40	

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
CE23A03	IDC – ALLIED CHEMISTRY PAPER –I (offered to B.Sc Physics)	Theory	58	2	-	4

Preamble

To enable the students to

- understand the concepts of organic chemistry
- gain knowledge about the theories of chemical bonding.
- understand the different terms in phase rule and its applications
- learn the concepts of chemical kinetics, photo chemistry, solid state chemistry.

Course Outcomes

On the successful completion of the course, students will be able to

CLO Number	CO Statement	Knowledge Level
CLO1	recollect the types of bonding, classify organic reactions, types and examples of solutions, the terminologies in thermodynamics, and the basics on the rate of a chemical reaction	K1
CLO2	relate the electronic factors that influence organic reactions, the types of chemical bonding with its effect on structure and property, law of thermodynamics on systems, theories of chemical kinetics & photo chemistry, elements of symmetry in crystal lattice	K2
CLO3	apply the concept of hybridization to organic molecules, theories of bonding in predicting the structure of a molecule, laws of thermodynamics to analyze the feasibility of reactions, concept of energy of activation on reaction rate, laws in explain the ideal behavior of solutions	K3
CLO4	analyze the nature of the organic molecule based on its hybridization, electronic effect, predict the conducting behavior of materials, calculate the enthalphy, bond energy, entropy of a system, construct the phase diagram of simple eutectic system and analyze the typical crystal lattices	K4

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	M	H	H	M	M	M
CLO2	M	H	H	M	M	M
CLO3	M	H	H	M	M	M
CLO4	M	H	H	M	M	M

H- High; M-Medium; L-Low

IDC – Allied Chemistry Paper –I (For BSc Physics) CE23A03 (58 Hrs)

UNIT I

(12 Hrs)

Basics of Organic Chemistry

Classification of organic compound- types of reagents- electrophiles, nucleophiles and free radicals, Classification of reactions - addition, substitution, elimination, condensation, polymerisation and rearrangements, polar effects, inductive effect, resonance, hyper-conjugation. steric effect.

Hybridization and geometry of organic molecules - CH_4 , C_2H_4 , C_2H_2 , C_6H_6 molecules, structure of graphite and diamond.

UNIT II

(12 Hrs)

Chemical Bonding

Ionic bond- nature of ionic bond, structure of NaCl , KCl and CsCl , factors influencing the formation of ionic bond. Covalent bond-nature of covalent bond, structure and shapes of BeCl_2 , BF_3 , CH_4 , PCl_5 , NH_3 , H_2O , IF_7 based on VSEPR theory and hybridization. Hydrogen bonding - inter and intra molecular, nature and its effect on structure and properties. Vander Waal's forces- dipole-dipole, dipole-induced dipole interactions. Metallic bonding-semiconductors - intrinsic, extrinsic n-type and p-type semiconductors.

UNIT III

(11 hrs)

Energetics

Definition of certain terms - system, surrounding, reversible and irreversible process, First law of thermodynamics, limitations of I law, need for II law - different statements of II law - Carnot cycle - efficiency - carnot theorem - thermodynamic scale of temperature –Joule-Thomson effect- enthalphy - bond energy – definitions of entropy and free energy.

UNIT IV

(11 Hrs)

Chemical Kinetics & Photochemistry

Chemical kinetics- order and molecularity, rate expression for I, II and III order (derivation not required), methods of determining order of a reaction.

Concept of energy of activation and Arrhenius equation, effect of temperature on reaction rate.

Catalysis- homogeneous and heterogeneous catalysis, theories of catalytic activity, catalyst used in industrial processes.

Photochemistry- comparison between thermal and photochemical reactions, Beer-Lambert's law, Grotthus-Drapper's law, Einstein's law, quantum yield. Phosphorescence, fluorescence, chemiluminescence and photosensitization - definitions with examples.

UNIT V**(12 Hrs)****Solutions and Solid State**

Solution- types and examples of solutions - liquid in liquid, Raoult's laws, deviation from ideal behavior, vapour- pressure curve for a totally miscible binary liquid systems obeying Raoult's law, partially miscible liquid system (phenol-water system)

Solid state- typical crystal lattices - unit cell, elements of symmetry, Bragg's equation, Weiss Indices, Miller indices, simple body centered and face centered lattices

Text Books

S.No	Authors	Title of the Book	Publishers	Year of Publication
1.	Dr. Veeraiyan V	Text book of Allied Chemistry	Highmount Publishing House, Chennai-14	Reprint 2006
2.	B.R.Puri, L.R.Sharma, L.S.Pathania	Principles of Physical chemistry	Vishal Publishing Co, Jalandhar, New Delhi	Reprint 2013
3.	SatyaPrakash, G.D. Tuli, S.K. Basu, R.D. Madan	Advanced Inorganic Chemistry – Vol. I	S.Chand & Co. Ltd.	Reprint 2012

Pedagogy

Lecture by chalk and talk, power point presentation, e-content, numerical exercise, group discussion, assignment, quiz, peer learning, seminar.

Course Designers:

Dr.Sowmya Ramkumar

Dr.S.Charulatha

**Question Paper Pattern
End Semester Examination**

SECTION	WORD LIMIT	MARKS	TOTAL
A - 5 x 2 Marks (No Choice)	One or Two Sentences	10	75
B - 5 x 5 Marks (Internal Choice at same CLO Level)	300	25	
C – 5x 8 Marks (Internal Choice at same CLO Level)	600-800	40	

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CE23CP1	CHEMISTRY PRACTICAL - I	THEORY	-	-	90	4

Preamble

To enable the students to

- learn the theoretical basis of qualitative inorganic analysis containing simple and interfering radicals and analyze a mixture containing two anions, one of which is interfering and two cations.
- Learn the quantitative estimations and calculation of pH

Course Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	identify, separate the cations into groups and report the acid and basic radicals	K1, K2
CLO2	estimate the percentage amount of chlorine, carbonates, Mg, Na in bleaching powder, hard water, detergent	K4
CLO3	estimate the percentage amount of chlorine, carbonates, Mg, Na in bleaching powder, hard water, detergent	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	H	H	H	H	H
CLO2	H	H	H	H	H
CLO3	H	H	H	H	H

H-High; M-Medium; L-Low

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CE23CP1	CHEMISTRY PRACTICAL - I	THEORY	-	-	90	4

Preamble

To enable the students to

- learn the theoretical basis of qualitative inorganic analysis containing simple and interfering radicals and analyze a mixture containing two anions, one of which is interfering and two cations.
- Learn the quantitative estimations and calculation of pH

Course Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	identify, separate the cations into groups and report the acid and basic radicals	K1, K2
CLO2	estimate the percentage amount of chlorine, carbonates, Mg, Na in bleaching powder, hard water, detergent	K4
CLO3	estimate the percentage amount of chlorine, carbonates, Mg, Na in bleaching powder, hard water, detergent	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	H	H	H	H	H
CLO2	H	H	H	H	H
CLO3	H	H	H	H	H

H-High; M-Medium; L-Low

Chemistry Practical – I (CE23CP1)**(90 Hrs)****Credits: 4**

1. Analysis of mixture containing two anions one of which is interfering in nature and two cations:
The following cations and anions may be given

Anions : Cl^- , CO_3^{2-} , Br^- , NO_3^- , SO_4^{2-} , F^- , BO_3^{2-} , $\text{C}_2\text{O}_4^{2-}$, CrO_3^{2-} , PO_4^{3-}

Cations : Pb^{2+} , Cu^{2+} , Zn^{2+} , Mn^{2+} , Co^{2+} , Ni^{2+} , Ca^{2+} , Ba^{2+} , NH_4^+ , Mg^{2+} , Cd^{2+} , Sr^{2+}

GROUP EXPERIMENTS:

2. (i) Estimation of available chlorine in bleaching powder
(ii) Estimation of hardness of water
3. pH Measurements
 - (i) Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps using pH meter (Note: Use dilute solutions of soaps and shampoos)
 - (ii) Preparation of buffer solutions
 - a. Sodium acetate-acetic acid
 - b. Ammonium chloride-Ammonium hydroxide

Text Book

Lab Manual - Prepared by Faculty, Department of Chemistry, PSGRKCW

Reference book:

S.No	Authors	Title of the Book	Publishers	Year of Publication
1	V. V. Ramanujam	Inorganic semi micro qualitative analysis,	The National Publishing Co.	Revised 3 rd Edn., 1974
2	Jain P. C and Jain M	Engineering Chemistry	Dhanpat Rai and Sons	16 th edition, 2013
3	Vogel A. I	Text Book of Practical Organic Chemistry	Prentice Hall	2011, 5 th edition
4	Khosla B D, Garg V C, Gulati A	Senior Practical Physical Chemistry	R Chand & Co	2011

Pedagogy:

Demonstration and individual hands on practical's

Course Designers

1. Dr. N. Shyamaladevi
2. Dr. S. Jone Kirubavathy

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CE23AP1	IDC –CHEMISTRY PRACTICAL FOR BIOLOGISTS (offered to B.Sc Botany / Zoology)	PRACTICAL	-	-	90	2

Preamble

To enable the students to

- estimate the given substance volumetrically.
- analyse and identify the organic compounds qualitatively

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	define the various terms in volumetric analysis	K1
CLO2	perform the volumetric analysis and estimate the quantity present.	K2, K3
CLO3	identify and analyse organic compounds	K3

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	H	H	H	H	H
CLO2	H	H	H	H	H
CLO3	H	H	H	H	H

H - High; M-Medium; L-Low

IDC –CHEMISTRY PRACTICAL FOR BIOLOGISTS (CE23AP1)

(offered to B.Sc Botany /Zoology)

(90hrs)

1. Volumetric Analysis

- i. Estimation of sodium hydroxide using standard sodium carbonate.
- ii. Estimation of Carbonate, bicarbonate mixture using sodium hydroxide
- iii. Estimation of hydrochloric acid using standard oxalic acid.
- iv. Estimation of oxalic acid using standard sulphuric acid.
- v. Estimation of ferrous sulphate using standard Mohr's salt solution.
- vi. Estimation of potassium permanganate using standard oxalic acid.
- vii. Estimation of hardness of water (Temporary and permanent).

2. Organic Compound Analysis

Systematic analysis of organic compounds containing one functional group and characterization by confirmatory tests and preparing suitable derivative - Phenols, Acids (mono and di), Aromatic primary amine, Amides (mono and diamide) and Glucose.

Text Book:

Lab Manual- Prepared by Faculty, Department of Chemistry, PSGRKCW

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	N.S.Gnanapragasam, G.Ramamurthy	Organic Chemistry Lab Manual	S.Viswanathan Printers & Publishers Pvt Ltd	3 rd Edn.,2011
2	A.I. Vogel	A text book of quantitative inorganic analysis	Longman publishers	12 th Edn., 2011

Pedagogy

Demonstration and individual hands on practical's.

Course Designers:

Dr.R.Revathi

Dr.N.Anusuya

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CE23AP2	IDC – ALLIED CHEMISTRY PRACTICAL (offered for B.Sc Physics)	PRACTICAL	-	-	90	2

Preamble

To enable the students to

- estimate the given substance volumetrically
- understand the principle and carry out potentiometric / conductometric titrations

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	define the various terms in volumetric analysis	K1
CLO2	perform the volumetric analysis and estimate the quantity present.	K2, K3
CLO3	Calculate the hardness of water samples	K4
CLO4	recall the various terms in conductometric and potentiometric experiments	K1

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	H	H	H	H	H
CLO2	H	H	H	H	H
CLO3	H	H	H	H	H
CLO4	H	H	H	H	H

H - High; M-Medium; L-Low

IDC – ALLIED CHEMISTRY PRACTICAL (CE23AP2) (90hrs)
(offered for B.Sc Physics)

1. Volumetric Analysis

- i. Estimation of sodium hydroxide using standard sodium carbonate.
- ii. Estimation of carbonate, bicarbonate mixture using sodium hydroxide
- iii. Estimation of hydrochloric acid using standard oxalic acid.
- iv. Estimation of oxalic acid using standard sulphuric acid.
- v. Estimation of ferrous sulphate using standard Mohr's salt solution.
- vi. Estimation of potassium permanganate using standard oxalic acid.
- vii. Estimation of hardness of water (temporary and permanent).

2. Conductivity Experiments

1. Determination of cell constant
2. Determination of dissociation constant of a weak acid.
3. Conductometric titration: Acid – base

3. Potentiometric Titration

1. Acid - base
2. Redox titration

Text Book : Lab Manual- prepared by faculty, Department of Chemistry, PSGR Krishnammal College for Women, Coimbatore

Reference Books

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	V.Venkateswaran, R. Veeraswamy & A.R. Kulandaivelu	Basic Principles of Practical Chemistry	S.Chand & Co.	2012 Reprint 2 nd Edn.
2	B. Vishwanathan, P.S. Raghavan	Practical Physical Chemistry	Viva Books	2014 Reprint

Pedagogy

Demonstration and individual hands on practical's

Course Designers

Dr. Sowmya Ramkumar

Dr.S.Charulatha