PSGR Krishnammal College for Women

DEPARTMENT OF CHEMISTRY

CHOICE BASED CREDIT SYSTEM &

OUTCOME BASED CURRICULAR FRAMEWORK

BACHELOR OF SCIENCE IN CHEMISTRY

2024-2027

PROGRAMME LEARNING OUTCOMES (PLO's)

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

PLO1 : accept the common responsibility to preserve the environment and to contribute to the development

PLO2 : acquire in depth knowledge on core concepts of theoretical and practical chemistry to the subject areas namely organic, inorganic, physical, analytical and computational chemistry

PLO3 : attain communication skill- written, verbal, logical and digital

PLO4 : explore the relative choice of Generic Electives (GE), Skill Enhancement Courses (SEC) and Ability Enhancement Courses (AEC)

PLO5 : enhance the ability to execute Laboratory procedures of organic, inorganic and physical systems and setting standard procedures

PLO6 : apply the understandings and the knowledge gained, to solve the quantitative and qualitative problems and to emerge as potential entrepreneur.

PROGRAMME SPECIFIC OUTCOME (PSO's)

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 : able to apply the theoretical concepts of instrument that are commonly used in most chemistry fields as well as interpret and use data generated in instrumental chemical analyses.

PSO3 : be capable 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

PSGR Krishnammal College for Women

DEPARTMENT OF CHEMISTRY

CHOICE BASED CREDIT SYSTEM (CBCS) & LEARNING OUTCOME BASED CURRICULAR FRAMEWORK (LOCF)

SYLLABUS & SCHEME OF EXAMINATION

BACHELOR OF SCIENCE IN CHEMISTRY – 2024-27 BATCH and onwards

SEMESTER I

SEM	Part	Course Code	Title of the Paper	Course Type	Instruction hours/week	Contact hours	Tutorial Hours	Duration of Examination	Examination Marks			Credits
									CA	ESE	TOTAL	
I	I	TAM2301/ HIN2301/ FRE2301	Language I – Tamil Paper I/ Hindi Paper I/ French 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
	III	CE23C01	General Chemistry Paper -I	CC	6	88	2	3	25	75	100	5
	III	CE23CP1	Chemistry Practical - I	CC	3	45	-	-	-	-	-	-
	III	PS24A01/ TH23A12	Physics Paper - I / Mathematics for Physics	GE	4 / 7	58 / 103	2 / 2	3 / 3	20 / 25	55 / 75	75 / 100	4 / 5
	III	PS23AP1	Physics Practical	GE	3	45	-	-	-	-	-	-
	Non Tamil Students											
	IV	NME23B1/ NME23A1	Basic Tamil I / Advance Tamil I	AEC	2	28	2	-	100	-	100	2
	Students with Tamil as Language											
	IV	NME23ES	Introduction to Entrepreneurship	AEC	2	30	-	-	100	-	100	
I-V	VI	24BONL1 24BONL2 24BONL3	Online Course 1 Online Course 2 Online Course 3	ACC	-	-	-	-	-	-	-	
I-V	VI	COM15SER	Community Services 30 Hrs									

CC – Core Courses
GE – Generic Elective
AEC – Ability Enhancement Course
ACC – Additional Credit Course

CA – Continuous Assessment
ESE–End Semester Examination

QUESTION PAPER PATTERN

CA Question Paper Pattern and distribution of marks

UG - Core and Allied - (First 3 Units)

CA Question from each unit comprising of

One question with a weightage of 2 Marks :2 x 3 = 6

One question with a weightage of 5 Marks (Internal Choice at the same CLO level) :5 x 3 =15

One question with a weightage of 8 Marks (Internal Choice at the same CLO level) :8 x 3 =24

Total :45 Marks

End Semester Examination – Question Paper Pattern and Distribution of Marks

Core and Allied courses

ESE Question Paper Pattern: 5 x 15 = 75 Marks

Question from each unit comprising of

One question with a weightage of 2 Marks : 2 x 5=10

One question with a weightage of 5 Marks (Internal Choice at the same CLO level): 5 x 5 =25

One question with a weightage of 8 Marks (Internal Choice at the same CLO level): 8 x 5 =40

Continuous Internal Assessment Pattern

Theory

I Year UG / PG (23 Batch)

CIA Test : 5 marks **(conducted for 45 marks after 50 days)**

Model Exam : 7 marks **(Conducted for 75 marks after 85 days (Each Unit 15 Marks))**

Seminar/Assignment/Quiz : 5 marks

Class Participation : 5 marks

Attendance : 3 marks

Total : 25 Marks

Practical

Lab Performance : 7 marks

Regularity : 5 marks

Model Exam : 10 marks

Attendance : 3 marks

Total : 25 marks

ESE Practical Pattern

The End Semester Examination will be conducted for a maximum of 75 marks respectively with a maximum 15 marks for the record and other submissions if any.

Part IV

Introduction to Entrepreneurship / Women Studies / Value education / Environmental Studies / Design Thinking

Quiz : 50 marks

Assignment : 25marks

Project / Case Study : 25 marks

Total : 100 Marks

MAPPING OF POs WITH COs

COURSE	PROGRAMME OUTCOMES				
	PLO1	PLO2	PLO3	PLO4	PLO5
COURSE - CE23C01					
CLO1	S	S	S	S	S
CLO2	S	S	M	S	S
CLO3	S	S	S	S	S
CLO4	S	S	M	S	S
COURSE – CE23CP1					
CLO1	S	S	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

COURSE CODE	COURSE NAME	CATEGO	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 4.0through physical-to-digital-to-physical connection which potentially transform the chemical industry

Course Learning Outcomes

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 usi thermodynamics	K2
CLO3	examine the periodic properties, strength of bonding, and apply principles in identifying reaction mechanism. Apply laws thermodynamics and learn the physical processesinvolved.Practic understand the concepts of Industry 4.0	K3
CLO4	Analyze and perform calculations on periodic properties, Aromati bonding theories, thermodynamic and thermochemistry principles.	K4

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

Mapping with Programme Learning Outcomes

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

s – Strong ; M-Medium

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,dorbitals.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, Hybridisation - Types of overlap of atomic orbitals.Valence shell electron pair repulsion theory (VSEPR) to BF_3, NH_3, H_2O, CIF_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.Vanderwaal's forces and Loondon 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 andaniline and stability of alkenes based on hyper conjugation.

Cycloalkanes-Nomenclature, methods of preparation, chemical reactions, Baeyer's strain theoryand 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. N	Author	Title of the Book	Publishers	Year of Publication & Edition
1	ArunBahl B. S. Bahl	Advanced Organic Chemistry	S. Chand Sons Com Pvt Ltd	2016 Reprint
2	Jagdamba Singh	Undergraduate Organic Chemis Vol I	Pragathi Prakahasan	2010 3rd Edn
2	P. L. Soni	Text Book of Inorganic Chemis	Sultan Chand and Sons	2013 Reprint
4	B. R. Puri, L. R. Sharma S. Patania	Principles of Physical Chemistr	Vishal Publishing & Sons	2017 47th Edn
5	P. Kaliraj, T. Devi,	Higher Education for Industry 4 and Transformation to Educatio 5.0		

Reference Books

S. N	Author	Title of the Book	Publishers	Year of Publication & Edition
1	B. R. Puri, L. R. Sharma K. Kalia	Principles of Inorganic Chemist	Milestone Publishers and Distributors	2011 & 32 Edn
2	R. T. Morrison and R. N Boyd	Organic Chemistry	Pearson India Educa Services	2010 & 6th Edn
3	R. D. Madan	Modern Inorganic Chemistry	S. Chand Sons Com Pvt Ltd	2014 & 3rd Edn
4	Alasdair Gilchrist.	Industry 4.0: The Industrial Inte of Things, Apress Publications		

Related Online References:

1. Introduction to Industry 4.0 and Industrial Internet of Things by Prof.SudipMishra,IITKharagpur.

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 CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
CE24A01	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 amino acids 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 d the terms involved in analytical /environmental chemistry	K1
CLO2	Understand the concept of hybridization, classify aromatic/ aromatic compounds, aminoacids/proteins and demonstrate preparation of standard solutions.	K2
CLO3	Interpret the structure & stereo isomerism of organic compo and illustrate the importance of chromatogra 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 various applications	K4

Mapping with programme Learning Outcomes

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

- S- Strong ; M-Medium

IDC – CHEMISTRY FOR BIOLOGISTS - I (CE24A01)
(offered to B.Sc Botany / Zoology) (58 hrs)

UNIT I **(12 hrs)**

Bonding

Types of bonding - Covalent bond - nature, structure and hybridization of CH_4, C_2H_4, $C_2H_2$and C_6H_6molecule.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 $BeCl_2$, H_2O, NH_3 and PCl_5based 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 Boo	Publishers	Year of Publication & Edition
1.	Dr. V. Veeraiyan	Textbook of Allied Chemistry	High mount Publis house, triplic Chennai.	Reprint 2006
2.	R. Gopalan. P.S. Subramani and K. Rengarajan	Elements of Analyti Chemistry	Sultan Chand & Sons Educational Publisher New Delhi	Reprint 2013
3.	ArunBahl B. S. Bahl	Advanced Organic Chemistry	S. Chand Sons Comp Pvt Ltd,	Reprint 2009
4.	P.C Jain & Monika Jain	Engineering chemis	DhanpatRai Publishin 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 CODE	COURSE NAME	Category	L	T	P	Credit
CE24A03	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 Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	recollect the types of bonding, classify organic reactions, types and examples of solutions 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 bondin 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 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 solu	K3
CLO4	analyze the nature of the organic molecule based on its hybridization, electronic effect, pr 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 cry lattices	K4

Mapping with Programme Learning Outcomes

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

S-Strong; M-Medium

IDC – Allied Chemistry Paper –I (For B.Sc Physics) CE24A03 (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, polymerisationandrearrangements, 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. 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 obeyingRaoult'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 & Edition
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, 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:

1. Dr Sowmya Ramkumar

2. 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 CODE	COURSE NAME	CATEGOR	L	T	P	CREDIT
CE23CP1	**CHEMISTRY PRACTICAL - I**	PRACTICAL	**-**	**-**	**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 Learning 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	K4
CLO2	Measure the pH of different solutions	K2
CLO3	estimate the percentage amount of chlorine, carbonates, Mg, Na in bleaching powder, hard water, detergent	K3
CLO4	Prepare different buffer solutions	K1

Mapping with Programme Learning Outcomes

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

S - Strong; M-Medium

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^{3-}, $C_2O_4^{2-}$, CrO_4^{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 & Edition
1	V. V. Ramanujam	Inorganic semi micro qualitative analysis,	The National Publishing Co.	2012 & 1st Edn.
2	Jain P. C and Jain	Engineering Chemistry	Dhanpat Rai and Sons	2013 & 16th edn
3	Vogel A. I	Text Book of Practical Organic Chemistry	Prentice Hall	2011& 5th edn
4	Khosla B D, Garg Gulati A	Senior Practical Physical Chemistry	R Chand & Co	2011 Reprint

Pedagogy:

Demonstration and individual hands on practical's

Course Designers

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

COURSE CODE	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
CLO4	Analyze the functional groups and report the confirmatory test	K4

Mapping with Programme Learning Outcomes

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

S - Strong; M-Medium

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 Mohrs'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 Boo	Publishers	Year of Publication & Edition
1	N.S.Gnanapragasam, G.Ramamurthy	Organic Chemistry Manual	S.Viswanathan Print & Publishers Pvt Ltd	2011 & 3rd Edn.,
2	A.I. Vogel	A text book of quantitative inorgan analysis	Longman publishers	2011 & 12thEdn.,

Pedagogy

Demonstration and individual hands on Practicals.

Course Designers:

1. Dr.R.Revathi

2. Dr.N.Anusuya

COURSE CODE	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	S	S	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

S - Strong; M-Medium

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 Mohrs'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.N	Authors	Title of the Book	Publishers	Year Publication & Edition
1	V.Venkateswaran, R. Veeraswamy& A.R. Kulandaivelu	Basic Principles of Practical Chemistry	S.Chand& Co.	2012 Reprint
2	B. Vishwanathan, P.S. Raghavan	Practical Physical Chemistry	Viva Books	2014 Reprint

Pedagogy

Demonstration and individual hands on Practicals

Course Designers

1. Dr Sowmya Ramkumar
2. Dr S Charulatha

SEMESTER – I - FOUNDATION COURSE

INTRODUCTION TO ENTREPRENEURSHIP

SUBJECT CODE: NME23ES

CREDITS: 2

TOTAL HOURS: 30 hrs **LECTURE HOURS: 30**

Unit 1:(5 hrs)

Nature of Entrepreneurship: **(3 hrs)**

Meaning –Need for Entrepreneurship –Qualities of Successful Entrepreneurs - Myths of Entrepreneurship

Activity: Assignment, Discussion **(2 hrs)**

Unit 2: (6 hrs)

Role of Entrepreneurs **(4 hrs)**

Significance of Entrepreneurship to the nation –Environmental Factors influencing Entrepreneurship – Entrepreneurial Process andFunctions- Challenges faced by Entrepreneurs

Activity: Quiz / Role Play **(2 hrs)**

Unit 3: (6 hrs)

Formulation of Business Idea: **(4 hrs)**

Business Idea Generation - Entrepreneurial Imagination and Creativity – Role of Innovation – Opportunity Evaluation

Activity: Business Idea Pitch **(2 hrs)**

Unit 4: (6 hrs)

Business Planning: **(4 hrs)**

Need for Market Study – Securing Finance from various Sources - Significance of Business plan – Components of Business plan

Activity: Schemes available for Entrepreneurs **(2 hrs)**

Unit 5: (7 hrs) **(7 hrs)**

Project:

Interface with Successful Entrepreneurs – 4 hrs

Business Plan Presentation – 3 hrs

Reference Books

1. D.F. Kuratko and T.V. Rao, *Entrepreneurship - South Asian Perspective*, 2016, Cengage Learning India Pvt. Ltd. Delhi.
2. Arya Kumar, *Entrepreneurship: Creating and Leading an Entrepreneurial Organization*, 2012, Pearson Education India

Evaluation Pattern

INTERNAL COMPONENT

Quiz	50
Assignment	25
Project/Case Study	25
TOTAL	**100**