



PSGR Krishnammal College for Women



DEPARTMENT OF CHEMISTRY

CHOICE BASED CREDIT SYSTEM & OUTCOME BASED EDUCATION SYLLABUS

BACHELOR OF CHEMISTRY

2022 - 2025



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** : be 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.



DEPARTMENT OF CHEMISTRY

2022-2025

SEM	Part	Subject Code	Title of the Paper		Instruction hours/week	Contact hours	Tutorial	Duration of Examination	Examination Marks			Credits
									CA	ESE	TOTAL	
I	I	TAM2201/ HIN2201/ FRE2201	Language T/H/F Paper I	Language	6	86	4	3	50	50	100	3
	II	ENG2101/	English Paper-I	English	6	86	4	3	50	50	100	3
	IIIA	CE22C01	General Chemistry Paper -I	CC	6	86	4	3	50	50	100	5
	IIIA	CE21CP1	Chemistry Practical - I	CC	3	45	-	-	-	-	-	-
	IIIA	PS22A01/ TH22A01	IDC Allied Physics Paper - I	GE	4	56	4	3	30	45	75	4
			IDC Allied Mathematical Statistics I with R		7	101	4	3	50	50	100	5
	IIIA	PS21AP1	Allied Physics Practical	GE	3	45	-	-	-	-	-	-

	IV	NME19B1/ NME19A1/ NME12WS/ NME12AS/ NME12GS/ NME21ES/ NM22IKS	Basic Tamil / Advanced Tamil / Women Studies/ Ambedhkar Studies/ Gandhian Studies/NEN- Introduction to Entrepreneurship/Indian Knowledge System	AEC	2/2/ 2	28/26/ 26	2/4/4	-/2/-	50/ 50/ 100	50/ 50/-	100/ 100/ 100	2
II	I	TAM2202/ HIN2202/ FRE2202	Language T/H/F Paper - II	Language	6	86	4	3	50	50	100	3
	II	ENG2202	English Paper-II	English	5	86	4	3	50	50	100	3
	IIIA	CE22C02	General Chemistry Paper - II	CC	5	71	4	3	50	50	100	5
	IIIA	CE21CP1	Chemistry Practical I	CC	3	45	-	3	50	50	100	4
	IIIA	PS22A02/ TH22A02	IDC Allied Physics Paper - II IDC Allied Mathematical Statistics II with R	GE	5	71	4	3	30	45	75	4
	IIIA	PS21AP1	Allied Physics Practical	GE	3	45	-	3	25	25	50	2
	IV		Open Course - Self Study Online Courses		-	-	-	-	-	-	-	-
	IV	NME22B2/ NME22A2	Basic Tamil/Advanced Tamil**	AEC	-	-	-	-	-	-	-	-
	V	21PELS1	Professional English (Science /Management/ Humanities/Commerce)	AEC	3	45	3		50	50	100	
	IIIB	NM12GAW	Foundation Course –1 (General Awareness)		Self-study (Online)							Grade

CC – Core Courses, CA – Continuous Assessment, GE – Generic Elective, ESE - End Semester Examination, AEC – Ability Enhancing Course

QUESTION PAPER PATTERN

CORE & ALLIED PAPERS

Continuous Internal Assessment: 50 Marks

SECTION	MARKS	TOTAL
A – 4 X 2 Marks (No Choice)	08	50
B – 4 X 6 Marks (No Choice)	24	
C - 2 X 9 Marks (Internal Choice at same CLO Level)	18	

End Semester Examination: 100 Marks

SECTION	WORD LIMIT	MARKS	TOTAL
A - 5 x 2 Marks (No Choice)	One or Two Sentences	10	100
B -5 x 6 Marks (Internal Choice at same CLO Level)	300	30	
C – 5x 12Marks (Internal Choice at same CLO Level)	600-800	60	

WEIGHTAGE ASSIGNED TO VARIOUS COMPONENTS OF
CONTINUOUS INTERNAL ASSESSMENT (Semesters I - II)

Theory

	CIA I	CIA II	Model Exam	Assignment/ Class Notes	Seminar	Quiz	Participation	Application of Knowledge, Innovation &	Attendance	Max. Marks
Core / Allied	7	7	10	4	5	4	5	5	3	50

Practical

	Model	Lab	Regularity in Record Submission	Attendance	Maximum Marks
Core / Allied	15	24	8	3	50

RUBRICS Assignment/ Seminar

Maximum - 20 Marks (converted to 4 marks)

Criteria	4 Marks	3 Marks	2 Marks	1 Mark
Focus Purpose	Clear	Shows awareness	Shows little Awareness	No awareness
Main idea	Clearly presents a main idea.	Main idea supported throughout	Vague sense	No main idea
Organization: Overall	Well planned	Good overall organization	There is a sense of organization	No sense of organization
Content	Exceptionally well presented	Well presented	Content is sound	Not good
Style: Details and Examples	Large amounts of specific examples and detailed description	Some use of examples and detailed descriptions	Little use of specific examples and details	No use of examples

CLASS PARTICIPATION

Maximum - 20 Marks (converted to 5 marks)

Criteria	5 Marks	4 Marks	3 Marks	2 Marks	1 Mark	Points scored
Level of Engagement in Class	Student proactively contributes to class by offering ideas and asks questions more than once per class.	Student proactively contributes to class by offering ideas and asks questions once per class	Student contributes to class and asks questions occasionally	Student rarely contributes to class by offering ideas and asking no questions	Student never contributes to class by offering ideas	
Listening Skills	Student listens when others talk, both in groups and in class. Student incorporates or builds off of the ideas of others.	Student listens when others talk, both in groups and in class.	Student listens when others talk in groups and in class occasionally	Student does not listen when others talk, both in groups and in class.	Student does not listen when others talk, both in groups and in class. Student often interrupts when others speak.	
Behavior	Student almost never displays disruptive behavior during class	Student rarely displays disruptive behavior during class	Student occasionally displays disruptive behavior during class	Student often displays disruptive behavior during class	Student almost always displays disruptive behavior during class	
Preparation	Student is almost always prepared for class with required class materials	Student is usually prepared for class with required class materials	Student is occasionally prepared for class with required class materials	Student is rarely prepared for class with required class materials	Student is almost never prepared for class.	
					Total	

MAPPING OF PLOs WITH CLOs

COURSE	PROGRAMME OUTCOMES					
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
COURSE- CE22C01						
CLO1	H	H	H	H	H	
CLO2	H	H	M	H	H	
CLO3	H	H	H	H	H	
CLO4	H	H	M	H	H	
COURSE - CE22A01						
CLO1	H	H	H	H	H	
CLO2	H	H	H	H	H	
CLO3	H	H	H	H	H	
CLO4	H	H	H	H	H	
COURSE - CE22A03						
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
COURSE - CE22C02						
CLO1	H	H	M	H	H	
CLO2	H	H	M	H	H	
CLO3	H	H	M	H	H	
CLO4	H	H	M	H	H	
COURSE - CE21A02						
CLO1	H	H	M	H	H	

CLO2	H	H	M	H	H	
CLO3	H	H	H	H	H	
CLO4	H	H	H	H	H	
CLO5	H	H	H	H	H	
COURSE - CE22A04						
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
COURSE - CE21CP1						
CLO1	H	H	H	H	H	
CLO2	H	H	H	H	H	
CLO3	H	H	H	H	H	
COURSE - CE21AP1						
CLO1	H	H	H	H	H	
CLO2	H	H	H	H	H	
CLO3	H	H	H	H	H	
COURSE - CE21AP2						
CLO1	H	H	H	H	H	
CLO2	H	H	H	H	H	
CLO3	H	H	H	H	H	
CLO4	H	H	H	H	H	

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CE22C01	GENERAL CHEMISTRY PAPER - I	THEORY	86	4	-	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 (CE22C01)

(86 Hrs)

Unit I

(17 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, 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

(17 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 , 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-Landé 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

(17 hrs)

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

(18 hrs)

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	Arun Bahl B. S. Bahl	Advanced Organic Chemistry	S. Chand Sons Company Pvt Ltd	2016
2	Jagdamba Singh	Undergraduate Organic Chemistry Vol I	PragathiPrakahasan	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.SudipMishra, 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. JoneKirubavathy

**Question Paper Pattern
End Semester Examination**

SECTION	WORD LIMIT	MARKS	TOTAL
A - 5 x 2 Marks (No Choice)	One or Two Sentences	10	100
B -5 x 6 Marks (Internal Choice at same CLO Level)	300	30	
C – 5x 12Marks (Internal Choice at same CLO Level)	600-800	60	

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CE22A01	IDC - CHEMISTRY FOR BIOLOGISTS– I (Offered to B.Sc Botany/Zoology/Biotechnology)	THEORY	56	4	-	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, amino acids and define the terms involved in analytical /environmental chemistry	K1
CLO2	Understand the concept of hybridization, classify aromatic/ non-aromatic compounds, amino acids/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 processing 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 (CE22A01)

(Offered to B.Sc Botany / Zoology/Biotechnology)

(56 hrs)

UNIT I

(11 hrs)

Bonding

Types of bonding - Covalent bond - nature, structure and hybridization of CH_4 , C_2H_4 , C_2H_2 and C_6H_6 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 BeCl_2 , H_2O , NH_3 and PCl_5 based on VSEPR theory.

UNIT II

(11 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 glass wares, 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	Highmount 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.	ArunBahl B. S. Bahl	Advanced Organic Chemistry	S. Chand Sons Company Pvt Ltd,	Reprint 2009
4.	P.C Jain & Monika Jain	Engineering chemistry	DhanpatRai 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	100
B -5 x 6 Marks (Internal Choice at same CLO Level)	300	30	
C – 5x 12Marks (Internal Choice at same CLO Level)	600-800	60	

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
CE22A03	IDC – ALLIED CHEMISTRY PAPER –I (offered to B.Sc Physics)	Theory	56	4	-	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	K ₁
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	K ₂
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	K ₃
CLO4	analyze the nature of the organic molecule based on its hybridization, electronic effect, predict the conducting behavior of materials, calculate the enthalpy, bond energy, entropy of a system, construct the phase diagram of simple eutectic system and analyze the typical crystal lattices	K ₄

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 B.Sc Physics) CE22A03

(56 Hrs)

UNIT I

(11 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

(11Hrs)

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- enthalpy - 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-Draper'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:

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	100
B -5 x 6 Marks (Internal Choice at same CLO Level)	300	30	
C – 5x 12Marks (Internal Choice at same CLO Level)	600-800	60	

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit	Category
CE22C02	GENERAL CHEMISTRY PAPER - II	Theory	71	4	-	5	Theory

Preamble

To enable the students to

- escalate the variations in atomic and physical properties of the s & p-block elements
- recognize the relationships between constitutional (structural) isomers, conformational isomers, and geometric isomers
- understand the terminology, factors, similarities and differences of nucleophilic substitution reactions and elimination reactions
- gain knowledge on the types and properties of colloids and liquid crystals
- learn the concepts of 2nd law of thermodynamics

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 s & p-block elements, isomerism of organic compounds, halides, colloids and thermodynamics	K ₁
CLO2	infer the general trends of s & p-block elements, stereochemistry of organic compounds, mechanism of organic reactions and explain the significance of colloids/thermodynamics	K ₂
CLO3	Examine the uses of s & p-block compounds, various types of stereoisomerism, reactivity of alkyl/aryl halides, types of colloids and conditions of equilibrium and spontaneity	K ₃
CLO4	Analyze the properties of s & p-block elements, the configuration and conformations of organic compounds, halides, colloids and thermodynamic functions	K ₄

Mapping with Programme Outcomes

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

H-High; M-Medium; L-Low

Unit I**(14hrs)**

s-block elements : General characteristics, physical and chemical properties and uses , Compounds of s-block elements- oxides, hydroxides, peroxides, super oxides- preparation and properties-oxo salts-carbonates-bicarbonates-nitrates-halides and poly halides. Diagonal relationships, salient features of hydrides, solvation and complexation tendencies. **P-block elements**– Comparative study (including diagonal relationship) of group 13 to 17 elements, compounds like hydrides, oxides, carbides and halides group 13 to 16. Hydrides of boron – diboranes and its structure. Basic properties of halogens, inter halogens and poly halides.

Concepts of virtual lab: flame test for s, p elements

Unit –II**(14hrs)****Stereochemistry of organic compounds**

Concepts of isomerism, types of isomerism. Optical isomerism – elements of symmetry, molecular chirality, enantiomers, stereo genic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereo genic centres, diastereomers, threo and erythrodiastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature. Geometric isomerism – determination of configuration of geometric isomers. E & Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds. Conformational isomerism – conformational analysis of ethane and n-butane: conformations of cyclohexane derivatives. Newman projection and Sawhorse formulae, Fischer and flying wedge formulae. Difference between configuration and conformation.

Unit–III**(14 Hrs)****Alkyl and Aryl Halides**

Alkyl Halides – Types of Nucleophilic Substitution (SN^1 , SN^2 and SN^i) reactions. Preparation: from alkenes and alcohols. Reactions:hydrolysis, nitrite & nitro formation, nitrile &isonitrile formation. Williamson’s ether synthesis: Elimination vs substitution.

Aryl Halides – Preparation: (Chloro, bromo and iodo-benzene) from phenol, Sandmeyer & Gattermann reactions. Reactions (Chlorobenzene): Aromatic nucleophilic substitution (replacement by –OH group) and effect of nitro substituent. Benzyne Mechanism: KNH_2/NH_3 (or

NaNH₂/NH₃). Reactivity and Relative strength of C-Halogen bond in alkyl, allyl, benzyl, vinyl and aryl halides.

UNIT IV

(14 hrs)

Colloidal State

Definition of colloids, Classification of Colloids, Solids in Liquids (SOLS): Properties-kinetic, optical and electrical; stability of colloids, protective action, Hardy-Schulze law, gold number.

Liquids in Liquids (emulsions): types of emulsions, preparation, emulsifier. Liquids in Solids (Gels): Classification, preparation and properties, inhibition, general applications of colloids

Liquid Crystals: difference between liquid crystal, solid and liquid. Classification, structure of nematic and Cholestric phases. Thermography and seven segment cell.

UNIT V

(15 hrs)

Thermodynamics –II

Second law of thermodynamics – Need for second law, different statements, entropy-definition, physical significance, entropy of an ideal gas, entropy changes in isothermal transformation, entropy changes in reversible and irreversible processes. Trouton's rule. Entropy as a function of T and V, entropy as a function of T and P. Entropy of mixing of ideal gas. General conditions of equilibrium and spontaneity- Conditions of equilibrium and spontaneity under constraints, definition of A and G, physical significance of A and G. Maxwell's relations. Temperature and pressure dependence of G, Gibbs – Helmholtz equation.

Text Books

S. No	Author	Title of the Book	Publishers	Year of Publication
1	Arun Bahl B. S. Bahl	A Text Book of Organic Chemistry	S. Chand Sons Company Pvt Ltd	2016
2	P. L. Soni	Text Book of inorganic Chemistry	Sultan Chand and Sons	2013
3	B. R. Puri, L. R. Sharma, M. S. Patania	Principles of Physical Chemistry	Vishal Publishing & Co	2017
4	D. Nasipuri	Stereochemistry of Organic Compounds	New Age International Ltd	2004

Reference Books

S. No	Author	Title of the Book	Publishers	Year of Publication
1	Arun Bahl B. S. Bahl	Advanced Organic Chemistry	S. Chand Sons Company Pvt Ltd,	2009
2	Jagdamba Singh, L. D. S. Yadhav	Advanced Organic Chemistry	Pragathi Prakahasan	2013
3	J.D Lee	Concise Inorganic Chemistry	English Language Book Society	2008
4	James E Huheey	Inorganic Chemistry	Pearson India Education Services	2015
5	R. T. Morrison and R. N. Boyd	Organic Chemistry	Pearson India Education Services	2010
6	K. S. Tewari, N. K. Vishnoi	A Textbook of Organic Chemistry	Vikas Publishing House	2017
7	P. S. Kalsi	Stereochemistry	New Age International	2000
8	B. R. Puri, L. R. Sharma, K. K. Kalia	Principles of Inorganic Chemistry	Milestone Publishers and Distributors	2011
9	R. D. Madan	Modern Inorganic Chemistry	S. Chand Sons Company Pvt Ltd	2014

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. Shyamaladevi
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	100
B -5 x 6 Marks (Internal Choice at same CLO Level)	300	30	
C – 5x 12Marks (Internal Choice at same CLO Level)	600-800	60	

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CE22A02	IDC – CHEMISTRY FOR BIOLOGISTS - II (Offered to B.Sc Botany/Zoology)	THEORY	71	4	-	5

Preamble

To enable the students to

- learn the nomenclature, applications of coordination compounds and their significance in bioinorganic chemistry
- analyze the chemistry behind fuels, fertilizers and polymers.
- gain knowledge about the functions of various drugs and important terms in the chemistry of dyes.
- understand the basic concepts of chemical kinetics and catalysis.
- familiarize the importance of pH and Buffer

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	recall the nomenclature of coordination compounds, types of fuel gases, polymers, synthetic drugs, dyes, catalysis and buffer	K1
CLO2	compare various theories to explain the formation of coordination compounds, uses of different fuels, polymers and drugs. Recognize the theories of kinetics and significance of pH / buffer	K2
CLO3	examine the applications of chelating compounds, polymers, dyes and catalytic enzymes. Calculate the degree of hydrolysis using various methods	K3
CLO4	Appraise the importance of inorganic metal, inorganic polymers, pH and buffer in the living system. Categorize polymer, drugs based on mode of action and analyze the mechanism of catalytic action	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	H	H	M	H	H
CLO2	H	H	M	H	H
CLO3	H	H	H	H	H
CLO4	H	H	H	H	H
CLO5	H	H	H	H	H

H- High; M-Medium; L-Low

IDC – CHEMISTRY FOR BIOLOGISTS – II (CE22A02)

(Offered to B.Sc Botany/Zoology/Biotechnology)

(71 hrs)

Unit I

(15hrs)

Coordination and Bioinorganic Chemistry

Nomenclature - mononuclear complexes. Theories- Werner, Sedgwick-EAN rule, Pauling's theory - postulates and examples. Applications of coordination compounds - in qualitative and quantitative analysis. Chelation and its industrial importance with reference to EDTA in analytical chemistry. Structural features and biological functions of Chlorophyll, Haemoglobin, Rubredoxin and Ferredoxin.

Unit II

(14hrs)

Industrial Chemistry

Fuel gases - Natural gas, water gas, semi water gas, carbureted water gas, producer gas and oil gas (manufacturing details not needed) composition and uses only.

Fertilizers-Primary and secondary nutrients, need and requirements of fertilizers - preparation, properties and uses of urea, super phosphate of lime, ammonium sulphate, triple super phosphate and potassium nitrate. Pesticides - classification with examples.

Polymers – Classification -preparation and uses of PVC, Teflon & Polyethylene. Inorganic polymers - synthesis, properties and uses of silicones.

Unit III

(14hrs)

Synthetic drugs and Synthetic dyes

Synthetic drugs -Introduction, classification - based on chemical structure and therapeutic action and requirements of a drug. Sulpha drugs and mode of action. Hypnotics, sedatives, anticonvulsants, antidepressants, antipyretics, anaesthetics, antihistamines, anticoagulant, analgesics, diuretics, antimalarial, antifungal, antibacterial, ant tubercular and ant leprosy - definition, examples and side effects.

Synthetic dyes - Introduction, chromophore, auxochrome, chromogen, bathochromic, hypsochromic, hyperchromic and hypochromic shifts. Azo dyes, vat dyes, mordant dyes. Food colours- general treatment.

Unit IV**(14hrs)****Chemical Kinetics and Catalysis**

Chemical Kinetics - Definition - order and molecularity - rate of reaction—expression for first, second and third order reactions (derivation not required only equation). Effect of temperature on reaction rate – Arrhenius equation – concept of activation energy -collision theory (elementary treatment only) - failures of collision theory.

Catalysis - types, mechanism of catalytic action - homogeneous, heterogeneous and enzyme catalysis, industrial applications of enzymes.

Unit V**(14hrs)****Importance of pH and Buffer**

pH, pH scale, buffer solutions - types - buffer mixture of weak acid and its salt - buffer mixture of weak base and its salt. Importance of pH and buffer in the living system.

Hydrolysis of salts – types (strong acid vs strong base, weak acid vs strong base, strong acid vs weak base, weak acid vs weak base)- hydrolysis constant (K_h) - relation between K_h , K_a and K_w - degree of hydrolysis and determination - indirect method, electrical conductance method (Bredig's method), freezing point depression and from distribution law.

Text Books:

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1.	Dr. V.Veeraian	Text book of Allied Chemistry	2 nd Edn, High mount Publishing house, triplicane, Chennai.	Reprint 2005
2.	B.S.Bahl, ArunBahl and G.D.Tuli	Essentials of Physical Chemistry	S Chand & Company Ltd, New Delhi.	Reprint 2000
3.	B.K.Sharma	Industrial Chemistry	GOEL Publishing House	Reprint 2000

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	100
B -5 x 6 Marks (Internal Choice at same CLO Level)	300	30	
C – 5x 12Marks (Internal Choice at same CLO Level)	600-800	60	

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
CE22A04	IDC – ALLIED CHEMISTRY PAPER –II (For B.Sc Physics)	Theory	71	4	-	4

Preamble

To enable the students to

- understand the concepts of aromaticity, isomerisms and nuclear chemistry
- understand the concepts of electrochemistry
- gain knowledge about the basics of surface chemistry
- know the basics of fuels, polymers and water treatment methods

Course Outcomes

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

CLO Number	CO Statement	Knowledge Level
CLO1	recall the fundamental subatomic particles, criteria for aromaticity, terms in electrochemistry, mole concept, chemistry of fuels, polymers	K ₁
CLO2	relate the stability of a nucleus, property of different structural and stereo isomers, theories of electrochemistry on conductance measurements, importance of pH and buffers in the living systems, ions responsible for temporary and permanent hardness of water	K ₂
CLO3	apply the laws of nuclear chemistry in calculating nuclear binding energy, element of symmetry for predicting the isomers, principles of chromatographic techniques, relate the structure of polymers on its application	K ₃
CLO4	analyse the modes of radioactive decay, conformational analysis of cyclic and acyclic systems, to solve problems related to conductance, categorize the solution based on its pH, techniques for softening of hard water	K ₄

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 –II (For B.Sc Physics) CE22A04 (71 Hrs)

UNIT I

(14 Hrs)

Nuclear Chemistry

Fundamental particles of nucleus, isobars, isotones and isomers, differences between chemical reactions and nuclear reaction, fusion and fission, mass defect, derivation of $1\text{amu} = 931\text{ MeV}$ - nuclear binding energy and calculation - packing fraction, n/p ratio, magic numbers - radioactive series- $4n+1$, $4n+2$, $4n+3$, group displacement law- modes of radioactive decay- half-life period- applications of radio isotopes- carbon dating and rock dating.

UNIT II

(14 Hrs)

Organic Chemistry

Aromatic compounds- aromaticity, Huckel's rule, aromatic electrophilic substitution, mechanism of nitration, sulphonation, halogenation, Friedel-Craft's alkylation and acylation.

Isomerisms- optical isomerism, elements of symmetry, polarized light and optical activity, isomerism of lactic acid and tartaric acid, racemisation and resolution, Geometrical isomerism- cis-trans isomerism, keto-enol tautomerism, conformational analysis of ethane, n-butane and cyclohexane.

UNIT III

(14 Hrs)

Electrochemistry

Electronic and electrolytic conductors, Arrhenius theory of electrolytic dissociation. Conductance- specific & equivalent conductance and their determination, variation of conductance with dilution, Ostwald's dilution law. Kohlrausch's law & application - determination of degree of dissociation of weak electrolytes, conductometric titrations.

Faraday's law of electrolysis, Galvanic cells: EMF and its origin, standard electrode potentials, electrochemical series and its applications, formation of standard cells, cell reaction and calculation of EMFs, ΔG and spontaneity of a reaction.

UNIT IV

(14 Hrs)

Solution- mole concept, mole fraction, molality, molarity, normality. Primary and secondary standards- preparation of standard solutions, principle of volumetric analysis (with simple problems), acid-base of redox titration.

Ionic product of water- pH, pK_a , pK_b - definition, determination of pH by indicator method. **Buffer solutions-** types, buffer action, pH of buffer solutions, importance of pH and buffers in the living systems.

Surface chemistry- emulsions, gels- preparation, properties and applications,
Chromatography – basic principles of column, paper and thin layer chromatography.

UNIT V

(15 Hrs)

Industrial Chemistry

Fuels- classification- gaseous fuels like water gas, producer gas, liquefied petroleum gas, gobar gas, compressed natural gas

Polymers- classifications, preparation and uses of PVC, Teflon & Polyethylene, bakelite, synthesis, properties and uses of silicones.

Hardness of water- temporary and permanent hardness, disadvantages of hard water - softening of hard water - Zeolite process, demineralization process and reverse osmosis - purification of water for domestic use: use of chlorine, ozone and UV light.

Text Books

S. No	Authors	Title of the Book	Publishers	Year of Publication
1.	H.J.Arn timer	Essentials of Nuclear Chemistry	New Age International Pvt., Ltd., Publishers	2011 4 th Edn
2.	Dr. Veeraiyan V	Text book of Allied Chemistry	Highmount Publishing House, Chennai-14	Reprint 2006
3.	B.R.Puri, L.R.Sharma, L.S.Pathania	Principles of Physical chemistry	Vishal Publishing Co, Jalandhar, New Delhi	Reprint 2013

Pedagogy

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

Question Paper Pattern End Semester Examination

SECTION	WORD LIMIT	MARKS	TOTAL
A - 5 x 2 Marks (No Choice)	One or Two Sentences	10	100
B -5 x 6 Marks (Internal Choice at same CLO Level)	300	30	
C – 5x 12Marks (Internal Choice at same CLO Level)	600-800	60	

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CE21CP1	CHEMISTRY PRACTICAL - I	THEORY	86	4	-	5

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	K ₁ , K ₂
CLO2	estimate the percentage amount of chlorine, carbonates, Mg, Na in bleaching powder, hard water, detergent	K ₄
CLO3	estimate the percentage amount of chlorine, carbonates, Mg, Na in bleaching powder, hard water, detergent	K ₄

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

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
CE21AP1	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	K ₁
CLO2	perform the volumetric analysis and estimate the quantity present.	K ₂ , K ₃
CLO3	identify and analyse organic compounds	K ₃

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 (CE21AP1)

(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 Practicals.

Course Designers:

Dr.R.Revathi

Dr.N.Anusuya

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CE21AP2	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	K ₁
CLO2	perform the volumetric analysis and estimate the quantity present.	K ₂ , K ₃
CLO3	Calculate the hardness of water samples	K ₄
CLO4	recall the various terms in conductometric and potentiometric experiments	K ₁

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 (CE21AP2) (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 Practicals

Course Designers

1. Dr.Sowmya Ramkumar
2. Dr.S.Charulatha

SEMESTER – I - FOUNDATION COURSE

**INTRODUCTION TO ENTREPRENEURSHIP
SUBJECT CODE: NME21ES**

CREDITS: 2

TOTAL HOURS: 30

LECTURE HOURS: 26

TUTORIAL HOURS: 4

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 and Functions- 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

Internal Pattern

CIA I and II –50 Marks (2 hrs) each- 100 marks - Converted into 60 Marks

Activity (Quiz-5, Assignment-5, Schemes for Entrepreneurs - 5, Idea Pitch -5) - 20 Marks

Project (Business Plan Presentation) - 20 Marks

Total - 100 Marks

Question paper pattern for CIA

Section-A (Paragraph answers-4 out of 6) 4x5 = 20marks

Section-B (Essay type-2 out of 3) 2x15=30marks

Total =50 marks

Portions:

CIA-1 – Unit-1 and 2

CIA-II- Unit- 3 and 4

COURSE NUMBER 21PEPS1	COURSE NAME I BSc Physics, Chemistry, Mathematics SEMESTER – II PROFESSIONAL ENGLISH FOR PHYSICAL SCIENCES	Category	L	T	P	Credit
			40	5		2

Objectives

1. To develop the language skills of students by offering adequate practice in professional contexts.
2. To enhance the lexical, grammatical and socio-linguistic and communicative competence of first year physical sciences students
3. To focus on developing students' knowledge of domain specific registers and the required language skills.
4. To develop strategic competence that will help in efficient communication
5. To sharpen students' critical thinking skills and make students culturally aware of the target situation.

Course Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recognise their own ability to improve their own competence in using the language	K1
CLO2	Use language for speaking with confidence in an intelligible and acceptable manner	K2
CLO3	Read independently unfamiliar texts with comprehension and understand the importance of reading for life	K3
CLO4	Understand the importance of writing in academic life	K3
CLO5	Write simple sentences without committing error of spelling or grammar	K3

(Outcomes based on guidelines in UGC LOCF – Generic Elective)

Syllabus

UNIT 1: COMMUNICATION

8 hours

Listening: Listening to audio text and answering question
Listening to Instructions

Speaking: Pair work and small group work.

Reading: Comprehension passages –Differentiate between facts and opinion

Writing: Developing a story with pictures.

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 2: DESCRIPTION

8 hours

Listening: Listening to process description.-Drawing a flow chart.

Speaking: Role play (formal context)

Reading: Skimming/Scanning- Reading passages on products, equipment and gadgets.

Writing: Process Description –Compare and Contrast Paragraph-Sentence Definition and
Extended definition- Free Writing.

Vocabulary: Register specific -Incorporated into the LSRW tasks.

UNIT 3: NEGOTIATION STRATEGIES

8 hours

Listening: Listening to interviews of specialists / Inventors in fields (Subject specific)

Speaking: Brainstorming. (Mind mapping).

Small group discussions (Subject- Specific)

Reading: Longer Reading text.

Writing: Essay writing (250 words)

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 4: PRESENTATION SKILLS

8 hours

Listening: Listening to lectures.

Speaking: Short talks.

Reading: Reading Comprehension passages

Writing: Writing Recommendations
Interpreting Visuals inputs

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 5: CRITICAL THINKING SKILLS

8 hours

Listening: Listening comprehension- Listening for information.

Speaking: Making presentations (with PPT- practice).

Reading: Comprehension passages –Note making.

Comprehension: Motivational article on Professional Competence, Professional Ethics and Life Skills)

Writing: Problem and Solution essay– Creative writing –Summary writing

Vocabulary: Register specific - Incorporated into the LSRW tasks

Textbook

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	Tamil Nadu State Council for Higher Education (TANSCH)	English for Physical Sciences Semester 1	--	--

Reference Books

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	Sreedharan, Josh	The Four Skills for Communication	Foundation books	2016
2	Pillai, G Radhakrishna, K Rajeevan, P Bhaskaran Nair	Spoken English for you	Emerald	1998
3	Pillai, G radhakrishna, K Rajeevan, P Bhaskaran Nair	Written English for you	Emerald	1998

Evaluation pattern: Internal 50 marks
ESE 50 marks

NOTE 1:

Internals 5 tests x 10 marks each=50 marks

Test 1: Listening

Test 2: Speaking

Test 3: Reading

Test 4: Listening

Test 5: Speaking

ESE: Only Reading, Writing and Vocabulary components from all 5 units

Question Paper pattern for ESE

Section A: $5 \times 2 = 10$ marks

Section B: $4/6 \times 5 = 20$ marks

Section C: $2/3 \times 10 = 20$ marks

Total = 50 Marks