



Sri Ramakrishna College of Arts and Science

(Autonomous)
(Formerly S.N.R. Sons College)
(Affiliated to Bharathiar University)
(Re-Accredited with 'A' Grade by NAAC)
(An ISO 9001:2008 Certified Institution)

Nava India, Coimbatore - 641 006, Tamil Nadu, India.



"Scheme of Examination along with Distribution of Marks and Credits"

CBCS & OBE PATTERN

UNDER GRADUATE PROGRAMMES

BSc Degree Course

(For the students admitted during the academic year 2019 - 2020 and onwards)

Part	Study Components and Course Title	CIA	Comprehensive Exam		Comprehensive Exam Total	Total	Credit
			Online	Descriptive Theory			
Semester – I							
I	Language-I 19T01 Tamil - I / 19H01 Hindi - I / 19F01 French - I / 19M01 Malayalam - I	30	-	-	70	100	3
II	19E01 English-I	30	-	-	70	100	3
III	19CH101 CORE I - General Chemistry – I	30	20	50	70	100	4
III	19CH102 CORE II - Polymer Chemistry	30	20	50	70	100	4
III	19CH103 CORE III - Practical - I Volumetric Analysis Practical	15	-	-	35	50	2
III	19CH104 ALLIED I - Mathematics – I	30	20	50	70	100	4
IV	19VE01 Value Education #	100	-	-	-	100**	1#
IV	19CPE01 PACE - I @	-	-	-	100	100**	1@ -
IV	19CHJC1 JOC - I \$	-	-	-	-	-	1\$
Semester – II							
I	Language-II 19T02 Tamil -II / 19H02 Hindi - II / 19F02 French - II / 19M02 Malayalam – II	30	-	-	70	100	3

II	19E02 English-II	30	-	-	70	100	3
III	19CH201 CORE IV - General Chemistry –II	30	20	50	70	100	4
III	19CH202 CORE V - Analytical Chemistry (REGULAR OR SWAYAM ONLINE COURSE)	-	-	-	-	100	4
III	19CH203 CORE VI – Practical - II Inorganic Qualitative Analysis	30	-	-	70	100	3
III	19CH204 ALLIED II – Mathematics – II	30	20	50	70	100	4
IV	19ES01 Environmental Studies #	100	-	-	-	100**	1#
IV	19CPE02 PACE - II @	-	-	-	100	100**	1@
IV	19CHJC2 JOC - II \$	-	-	-	-	-	1\$
Semester – III							
III	19CH301 CORE VII - General Chemistry – III	30	20	50	70	100	4
III	19CH302 CORE VIII - Inorganic Chemistry – I	30	20	50	70	100	4
III	19CH303 CORE IX – Practical –III Organic Qualitative Analysis	30	-	-	70	100	3
III	19CH304 ALLIED III - Allied Physics for Chemistry	30	20	50	70	100	3
III	19CH305 ALLIED PRACTICAL-I Allied Physics Practical for Chemistry	15	-	-	35	50	2
III	OPEN ELECTIVE – I	30	20	50	70	100	3
III	19CH306 Skill based Subject : I Introduction to Nano Chemistry	30	20	50	70	100	3
IV	19BCT01 Basic Tamil I / 19ADT01 Advanced Tamil I #	100	-	-	-	100**	1\$
IV	19CPE03 PACE – III @	-	-	-	100	100**	1@
IV	19CHJC3 JOC – III \$	-	-	-	-	-	1\$
Semester – IV							
III	19CH401 CORE X - Inorganic Chemistry – II	30	20	50	70	100	4
III	19CH402 CORE XI - Organic Chemistry – I	30	20	50	70	100	5
III	19CH403 CORE XII - Practical - IV Applied Chemistry Practical	15	-	-	35	50	2

III	Elective – I	30	20	50	70	100	4
III	19CSC08 ALLIED IV - Computer Programming in C	30	20	50	70	100	3
III	19CS09 ALLIED PRACTICAL -II C Programming Lab	15	-	-	35	50	2
III	19CH404 Skill based Subject : 2 Textile Chemistry	30	20	50	70	100	3
IV	19BCT02 Basic Tamil II / 19ADT02 Advanced Tamil II#	100	-	-	-	100**	1\$
IV	19CPE04 PACE - IV @	-	-	-	100	100**	2@
IV	19CHJC4 JOC - IV \$	-	-	-	-	-	1\$

Semester – V

III	19CH501 CORE XIII - Organic Chemistry – II	30	20	50	70	100	5
III	19CH502 CORE XIV - Physical Chemistry – I	30	20	50	70	100	5
III	19CH503 CORE XV– Spectroscopy	30	20	50	70	100	4
III	19CH504 CORE XVI– Practical-V Gravimetric Analysis	30	-	-	70	100	3
III	OPEN ELECTIVE –II	30	20	50	70	100	3
III	19CH505 Skill based Subject : 3 Pharmaceutical Chemistry	30	20	50	70	100	3
IV	19CPE05 PACE – V @	-	-	-	100	100**	2@
IV	19CHJC5 JOC – V \$	-	-	-	-	-	1\$

Semester – VI

III	19CH601 CORE XVII - Physical Chemistry – II	30	20	50	70	100	5
III	19CH602 CORE XVIII - Self Study Course	30	20	50	70	100	3
III	19CH603 CORE XIX – Practical – VI Physical Chemistry Experiments	30	-	-	70	100	3
III	19CH604CORE XX - Project with viva-voce	80	-	-	20	100	3
III	Elective –II	30	20	50	70	100	4
III	19CH605 Skill based Subject : 4 Dye chemistry	30	20	50	70	100	3
V	Extension Activities NSS/NCC/SPORTS/YRC/SIS #	100	-	-	-	100**	1

\$ Extra credit courses for the candidates who opted other languages in Part – I and JOC.

No Comprehensive Examinations. Only Continuous Internal Assessment (CIA).

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** Marks will not be included in CGPA calculations.

List of Elective papers (Can choose any one of the paper as electives)		
Elective – I	A	19CHE01 – Introduction to Forensic Science & Technology
	B	19CHE02 - Applied Chemistry
	C	19CHE03 - Agricultural Chemistry
Elective – II	A	19CHE04 - Chemistry for Everyday Life
	B	19CHE05 - Industrial Chemistry
	C	19CHE06 - Medicinal Chemistry

List of Open Elective papers offered by the department.	
Open Elective – I	19CHI01 - Chemistry for Competitive Examinations
Open Elective – II	19CHI02 - Food and Water Chemistry


Summary							
Part	Subject	Papers	Credit	Total Credits	Papers	Marks	Total Marks
Part I	Languages	2	3	6	2	100	200
Part II	English	2	3	6	2	100	200
Part III	Core	20	74	92	20	1900	2400
	Allied	6	18		6	500	
	Open Electives	2	3	6	2	100	200
	Electives	2	4	8	2	100	200
	Skill Based	4	3	12	4	100	400
							3600
Part IV	Lang.	2	1	2\$	2	100	200**
	PACE	3	1	3@	5	100	500**
		2	2	4@			
	EVS & VE	2	1	2#	2	100	200**
	JOC	5	1	5\$	-	-	-
Part V	@ Extension	1	- 1	1	1	100	100**
	Total			140			

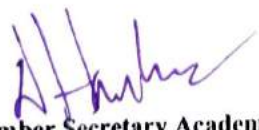
\$ - Extra credit courses

** - NOT INCLUDED IN TOTAL MARKS

Note: Total credits may vary between 140 – 145.


Syllabus Coordinator
Mr. C. Nandhakumar


BOS Chairperson
Dr. T. Sasikala


Member Secretary Academic Council
Dr. D. Hariprasad

19CH101 CORE – I: GENERAL CHEMISTRY – I**COURSE OBJECTIVES**

- To understand the basic concepts of organic chemistry.
- To know the concept of atomic structure and periodic properties
- To understand the basic chemistry and analytical techniques

Semester	I
Credit	4
Paper Type	Core
Max. Marks	CIA:30 CE :70

UNIT-I ORGANIC REACTIONS AND THEIR MECHANISM**12**

Polar effects – Inductive effect – Mesomeric effect – Electromeric effect – Reaction intermediates – carbocation – Carbanions – Carbon free radicals – Carbenes – Hyper conjugation – Classification of reagents – Electrophiles – Nucleophiles – Types of reaction mechanisms – Polar or ionic mechanism – Free radical mechanism – Mechanism of elimination reactions – Saytzeff rule, Hoffman rule.

UNIT – II STRUCTURE OF ATOM**12**

Discovery of electron – Measurement of e/m for Electrons. Determination of charge of an electron. – Positive rays. Protons – Nucleons – subatomic particles – Alpha particles. Rutherford's Atomic model – Mosley's determination of Atomic Number – Mass Number – Quantum Theory and Bohr Atom.

Wave mechanical concept of atom – de Broglie's equation. Heisenberg's Uncertainty principle. Schrodinger's Wave equation. Charge cloud concept and orbitals. Quantum Numbers-Principal, Azimuthal, Magnetic and Spin Quantum Numbers and their significance. Pauli's Exclusion principle. Energy distribution and orbitals. Distribution of electrons in orbitals. Representation of ground state electronic configuration of elements – Aufbau principle, $n+l$ rule and Hund's rule.

UNIT - III PERIODIC TABLE AND ATOMIC PROPERTIES**12**

Long form periodic table – cause of periodicity – division of elements into s, p, d and f block elements. Atomic properties: Sizes of atoms and ions - covalent radius, Van-derwaals radius and ionic radius. Ionization energy – factors determining ionization energy, variation of ionization energy in the periodic table. Electron affinity – variation of electron affinity in the periodic table. Electronegativity – Pauling's approach, Alfred and Rochow's approach, Milliken's approach, factors influencing electronegativity, applications of electronegativity.

UNIT -IV BASIC CONCEPTS OF CHEMISTRY**12**

The mole concept – atomic, molecular and molar masses. Equivalent mass – Equivalent mass of an acid, Equivalent mass of a base Equivalent mass of oxidizing and reducing agents. Concentration terms – Normality, Molarity, Molality, and Percentage solutions – weight composition, volume composition.

Principles of Volumetric analysis – Standard solution (primary and secondary standards), Titration – types (Acid, base, oxidation, reduction), equivalent point, end point, indicators – action of phenolphthalein and methyl orange, caution in volumetric titrimetry – precautions to avoid errors in titrimetric analysis, corrections for unavoidable errors.



UNIT – V QUALITATIVE ANALYSIS

12

Basic principles and applications of analytical techniques such as precipitation, vacuum distillation, steam distillation, crystallization, fractional crystallization - Evaluation of analytical data - Accuracy and precision- methods for their expression - classification of errors - detection and correction of determinate and indeterminate errors - The normal law of distribution of indeterminate errors

COURSE OUTCOMES

After successful completion of this course, the student will able to

CO1	Recognize the nomenclature of organic compounds	L3
CO2	Realize the structure of atom and importance of quantum numbers	L1
CO3	Gain knowledge the periodic properties atoms/ions	L1
CO4	Prepare the chemicals with required concentrations	L2
CO5	Expertise to know the various techniques adopted for the separation of mixtures	L1

Total Periods: 60**TEXT BOOKS**

1. B. R. Puri, L.R. Sharma and M.S. Pathania, *Principles of Physical Chemistry*, 4th ed. New Delhi: Vishal Publishing Co., 2018. (Unit-I to Unit-V)
2. Arun Bahl, B.S. Bahl and G. D. Tuli, *Essentials of Physical Chemistry*, Revised ed. New Delhi: S. Chand & Sons Publishing, 2016. (Unit-I to Unit-V).
3. B.S. Bahl and Arun Bahl, *Advanced Organic Chemistry*, 1st ed. New Delhi: S.Chand & Company Pvt, Ltd, 2016.

REFERENCE BOOKS

1. B. Svehla, *Vogel's Text book of Macro and Semimicro Qualitative Analysis*, 7th ed. Newyork: Longman Inc., 1997.
2. R. D. Madan., *Modern Inorganic Chemistry*, 3rd ed. New Delhi: S. Chand & Co., 2016.
3. Sathya Praksash, G.D. Tuli, S. K. Basu, and R.D. Madan, *Advanced Inorganic Chemistry*, 19th ed. New Delhi: S. Chand & Co., 2016.
4. Dr. Wahid, U.Malik, Dr.G.D.Tuli and Dr.R.D.Madan, *Selected Topics in Inorganic chemistry*, 8th ed. New Delhi: S.Chand & Company Pvt. Ltd., 2016.



Verified by Course Coordinator
Dr. K. GNANAPRIYA



Verified by BOS Chairman
Dr.T.SASIKALA



19CH102 – CORE II – POLYMER CHEMISTRY**COURSE OBJECTIVES**

- To know about types of polymers and mechanism of polymerization.
- To have knowledge about industrial polymers.
- To have an idea about the polymer processing and recent advances in polymer science.

Semester	I
Credit	4
Paper Type	Core
Max. Marks	CIA: 30 CE: 70

UNIT-I INTRODUCTION TO POLYMERS**11**

Polymers – Natural and Synthetic polymers – Basic concepts of monomers – Functionality – Molecular weight – Degree of polymerization – Homo polymers – Co-polymers – Branched and Cross-linked polymers, Graft and Block copolymers – Rubbers – Plastics – Thermoplastics – Thermosetting plastics – Fibers (Characteristic features of each).

UNIT-II MECHANISM OF POLYMERIZATION**11**

Addition polymerization – Free radical polymerization – Ionic polymerization – Condensation polymerization – Copolymerization – Ziegler Natta polymerization – Stereochemistry of polymers.

UNIT-III INDUSTRIAL POLYMERS**11**

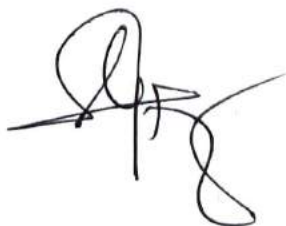
Synthesis, Properties and applications of various types of plastics and rubbers – Plastics – Polyethylene – Polyvinyl chloride – Polypropylene – Nylons – Polymethyl methacrylate, Polyethylene terephthalate – Teflon – Polystyrene – Polycarbonates – Rubbers – Natural and Synthetic rubbers – Styrene butadiene rubber – Poly butadiene – Poly isobutylene – Butyl rubber – Neoprene rubber.

UNIT-IV INTRODUCTION TO POLYMER PROCESSING**11**

Compounding – Polymer Additives – Fillers, Plasticizers, Antioxidants, Thermal stabilizers, Fire retardants and Colourants – Processing Techniques: Calendaring, Die casting, Compression moulding, Injection moulding, Blow moulding and Reinforcing – Film casting – Thermoforming, Foaming.

UNIT –V ADVANCES IN POLYMERS**11**

Biopolymers – Biodegradable polymers – High temperature and fire-resistant polymers – Conducting polymers – Polymers used as adhesive and coatings – Liquid crystalline polymers – Vulcanization of rubber – Polymer for engineering and biomedical applications.



COURSE OUTCOMES

After successful completion of this course, the student will be able to

CO1	Categorize the importance of industrial polymers and their classification.	L3
CO2	Evaluate the various mechanisms of polymerization	L3
CO3	Develop suitable synthetic route for plastics and rubbers	L3
CO4	Distinguish the polymer processing involved in synthetic methods	L2
CO5	Apply the polymers in medical and industrial field	L2


Total Periods: 55


TEXT BOOKS

1. Gowariker.V.R. Viswanathan N.V, Jayadev Sreedhar N.V, "Polymer Science", New Age International Publishers Pvt. Ltd., 2nd Edition, New Delhi, 2015. (Unit-I to Unit-V)
2. Sharma.B.K, "Polymer Chemistry", Goel Publishing House, 4th Edition, Meerut, 2015. (Unit-I to Unit-V)
3. Jain.T, Jain.J, "Engineering Chemistry", Volume-I, Dhanpat Rai Publishing Company, New Delhi, 2013. (Unit - V)

REFERENCE BOOKS

1. Billmeyer.F.W, A Text Book of Polymer Science, John Wiley & Sons, 3rd Edition, Newyork, 2007.
2. Jenkins.M, "Biomedical Polymers", University of Birmingham, Wood Head Publications, U.K, 2007.
3. Arora.M.G, Singh.M and Yadav.M.S, "Polymer Chemistry", Anmol Publications Pvt. Ltd., 2nd Revised Edition, New Delhi, 2003.
4. Bahadur.P and Sastry.N.V, "Principles of Polymer Science", Narosa Publishing House, 3rd Edition, New Delhi, 2002.


 Verified by Course Coordinator
Dr. A. AKILA


 Approved by BOS Chairman
Dr. T. SASIKALA



19CH103 CORE III PRACTICAL - I: VOLUMETRIC ANALYSIS PRACTICAL

COURSE OBJECTIVES

- To know the principles of volumetric analysis
- To acquire the skills of doing quantitative estimation by titration.

Semester	I
Credit	2
Paper Type	Core Practical
Max. Marks	CIA:15 + CE :35

QUANTITATIVE ANALYSIS

a. Acidimetry and Alkalimetry:

- Estimation of NaOH using Na_2CO_3 and decinormal HCl solution.
- Estimation of Na_2CO_3 by HCl using a standard Na_2CO_3 Solution.

b. Permanganometry:

- Estimation of oxalic acid using Mohr's salt and decinormal KMnO_4 solution.
- Estimation iron (II) sulphate using KMnO_4 and standard Mohr's Salt solution.
- Estimation of Mohr's salt using oxalic acid and decinormal KMnO_4 solution.

c. Dichrometry:

- Estimation of iron (II) using potassium dichromate and standard solution of Mohr's salt.

d. Iodometry:

- Estimation of copper using potassium dichromate solution and sodium thiosulphate solution.

e. Complexometry:

- Estimation of zinc using standard solution of EDTA.

COURSE OUTCOMES

After successful completion of this course, the student will able to

CO1	Prepare the various concentration solutions without error	L3
CO2	Carry out titrimetric procedures using standard solutions	L3
CO3	Gain knowledge of volumetric titrations and express in estimation procedures	L1

Total Periods: 30

REFERENCE BOOKS

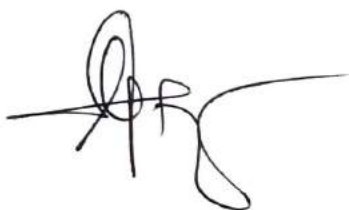
- Venkateswaran. V, Veeraswamy. R, Kulandaivelu. A.R., *Basic Principles of Practical Chemistry*, 2nd ed. New Delhi :S.Chand and Sons, 2015.
- Radha and Rekha, *Chemistry Laboratory Manual*, 1st ed. Chennai: Elshadai Publishers, 2011.



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19CH104 – ALLIED MATHEMATICS I

COURSE OBJECTIVE

- To provide the basic knowledge of Sequences and Series and Nature of roots of theory of equations.
- To provide the basic knowledge of Trigonometry and Matrices.
- To give basic knowledge about Mathematical concepts in Calculus.

Semester	I
Credit	4
Paper Type	Allied
Max. Marks	CIA -30 CE -70 TOTAL =100

UNIT-I

ALGEBRA: Statement of Binomial, Exponential and Logarithmic series – Approximation and limit expression obtained by Binomial, Exponential and Logarithmic series. Chapter 1: Section: 1.2, 1.3, 1.4 Omit summation problems. (11)

THEORY OF EQUATIONS: Nature of Roots – Relation between the coefficients and the roots of an algebraic equation - Newton's and Horner's method. Chapter 2: Section: 2.1, 2.2, 2.6, and 2.7.

UNIT-II

MATRICES: Rank of a matrix – Simultaneous linear equations - Eigen values and Eigen vectors - Cayley-Hamilton Theorem (without proof) and its applications. Chapter 3: Section: 3.2 –3.5. (11)

UNIT III

FINITE DIFFERENCES: Interpolation - Binomial method –Lagrange's interpolation. Chapter 4: Section: 4.1 –4.3. (Omit exercises) (11)

UNIT IV

TRIGONOMETRY: Expansions of $\cos n\theta$, $\sin n\theta$ and $\tan n\theta$ – Expansion of $\sin \theta$ and $\cos \theta$ in a series of ascending powers of θ - Hyperbolic functions - Relation between Hyperbolic functions - Inverse Hyperbolic functions - Real and Imaginary parts - Logarithm of complex numbers. Chapter 5: Sections 5.1, 5.3 to 5.5. (11)

UNIT V

DIFFERENTIAL CALCULUS: Curvature – Circle, radius and centre of curvature - coordinates of centre of Curvature – Evolute and involute – Radius of Curvature in polar coordinates - p-r equation of the curve. Chapter 6: Section: 6.4. (11)

TOTAL PERIODS: 55

COURSE OUTCOMES

Having successfully completed this course, the student will be able to:

CO1	Define hyperbolic and inverse hyperbolic functions.	L1
CO2	Apply the concept of Characteristic equations to find Eigen Values and Eigen Vector.	L2
CO3	Apply finite difference methods for interpolation.	L2
CO4	Gain knowledge about differential calculus.	L3
CO5	Derive the p-r equation of the curve.	L3

* Note: The Question paper consists 20% Theory and 80% Problems.

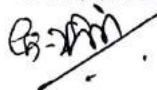
TEXT BOOKS

1. Ancillary Mathematics (Volume I) by S. Narayanan, R. Hanumantha Rao, Manickavachagam Pillai and P. Kandaswamy, S. Viswanathan (Printers & Publishers) Pvt Ltd., 2007.

REFERENCE BOOKS

1. G.C.Sharma and Madhu Jain, Algebra and Trigonometry, 1st Edition, Galgotia.
2. Dr.J.K.Goyal and G.P.Gupta, Laplace and Fourier Transforms, 16th Edition, Pragati Prakashan, Meerut, 2003.

Prepared by
Dr. D. VIVEK




Approved by
Dr. N. MUTHUMANI

19VE01 VALUE EDUCATION**COURSE OBJECTIVES**

- To orient about the society, social life, integrity in personal and public life.
- To learn the concepts of human values and respect for others.
- To provide in-depth understanding about moral awareness.
- To inculcate a sense of socially responsible citizens.

Semester	I
Credit	1
Max. Marks	CIA: 100 TOT = 100

UNIT - I VALUE EDUCATION & HUMAN EDUCATION**3**

Value Education - Definition - relevance to present day - Concept of Human Values - Self Introspection - Self Esteem

UNIT - II SOCIETY & FAMILY VALUES**3**

Structure and components of Society - Marriage and Family Values - Anger Neutralization, Adjustability - Threats to family life.

UNIT - III ETHICS & LEADERSHIP QUALITIES**3**

Ethical values: Ethics, Social Ethics, Public Policy - Leadership qualities: Integrity, Character, Courage - Personality development - Inter-culture Tolerance.

UNIT - IV SOCIAL VALUES**3**

Social Values, Faith, Service, Commitment and Decency - Fundamental Rights and Responsibilities of citizens.

UNIT-V SOCIAL PROBLEMS AND ROLE OF STUDENTS**3**

Social Problems: Definition - Poverty, Illiteracy, Unemployment, Exploitation, Obscenity, Immorality - Crimes and Online Crimes - Student unrest, Ragging and Peaceful Campus - Role of Students in tackling social problems

COURSE OUTCOMES

After successful completion of this course, the student will able to

CO1	Develop a sense of self-respect and respect for others	L3
CO2	Occupy one's own social space and help others live peacefully	L3
CO3	Develop scientific temper and logical reasoning and to apply in day to day life	L2

Total Periods: 15


REFERENCE BOOKS

1. Mani Jacob (Ed). 'Resource Book for Value Education', Institute for Value Education, New Delhi. 2002.
2. NCERT. "Value Education". Dharma Bharti National Institute of Peace and Value Education, Secunderabad, 2002.
3. Daniel and Selvamony. "Value Education Today "- Madras Christian College, Tambaram and ALACHE, New Delhi, 1990.
4. Ignacimuthu S. "Values for Life". Better Yourself Books, Mumbai, 1991.
5. M.M.M.Mascaronhas. Centre for Research Education Science and Training for Family Life Promotion - Family Life Education, Bangalore, 1993.



Verified by Course Coordinator
Dr. R.THIRUMOORTHY



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Dr. R.THIRUMOORTHY



PERSONALITY APTITUDE AND CAREER ENHANCEMENT (PACE – I)

Subject Code: 19CPE01

Common to all the UG streams admitted from AY 2019-20 Onwards

Semester	I
Credit	1
Paper type	Skill based
Max. Marks	Total=100 (Online:50+Verbal Oral: 50)

Instruction Hours per Semester: 40

Aim

To educate and enrich the students on setting goals, career planning and lateral thinking. Equip them on techniques of reading, learning and listening skills.

Course Objectives

To enable students to,

- Assess individual communication skills.
- Plan career
- Set Goals
- Enhance their ability to build stories and situational thinking.
- Improve their language through grammar
- Enhance techniques such as listening, non-verbal communication, verbal oral& written skills etc.

Unit I

Assessment of individual levels of communication skills, aptitude and employability skills; Psychometric test, SWOT analysis; Planning on setting goals; Understanding the stand of students, College Ethics.

Unit II

Introduction to Career planning; General Motivation; Communication Skills; Goal setting – Introduction to Soft Skills - Presentation skills - Intra-personal skills.

Unit III

Reading Skills, Learning & Studying Skills, Memory Techniques, Programmed Thinking, Lateral Thinking, Creativity, Questioning & Listening Skills.



Unit IV

Initiation, Stage Fear, Lateral Thinking; Self Introduction using an Adjective & Noun – Newspaper Assessment on Nouns; Pronouns – Passage writing by replacing noun with Pronoun; Verbs - Newspaper Assessment on Verbs; Adjectives & Adverbs; Articles - Mime the profession, Assessment for Articles; Prepositions; Past, Present and Future Tense; Situational GD & Story Telling on Tenses; Simple, Compound and Complex Sentences; Active & Passive Voice; Sentence Formation and Completion.

Unit V

Art of communication – the communication process - Word building and Role play; Exercise on English Language through symposiums and workshops.

Course Outcomes

On the successful completion of the course, the student would be able to-

- Set goals
- Learn fundamentals of English grammar
- Understand individual communication skills, aptitude and skills required for employment
- Enhance their English language.
- Listen better.
- Write better and communicate effectively.

References

- 1) A Modern Approach to Verbal and Nonverbal Reasoning by Dr. R. S. Aggarwal
- 2) A Modern A Modern Approach to Verbal by Dr. R. S. Aggarwal
- 3) A Modern Approach to Nonverbal Reasoning by Dr. R. S. Aggarwal
- 4) A Practical Course in Spoken English by J.K.Gangal
- 5) Effective English Communication for you by V.Shamala
- 6) Developing Communication Skills by Krishna Mohan &MeeraBanerji
- 7) English for Competitive Exams by Bhatnagar



Verified by
Course Coordinator

19CH201 CORE – IV: GENERAL CHEMISTRY – II**COURSE OBJECTIVES**

- To learn about the nomenclature and Isomerism of organic compounds.
- To study the properties of alkanes and cycloalkanes.
- To gain knowledge in thermodynamics and thermochemistry
- To learn almost the nomenclature of inorganic compounds

Semester	II
Credit	4
Paper type	Core
Max. Marks	CIA : 30 CE : 70 TOT=100

UNIT - I NOMENCLATURE AND ISOMERISM OF ORGANIC COMPOUNDS**12**

Introduction, systems of naming organic compounds – Rules of IUPAC system of nomenclature for cyclic compounds, complex organic compounds – substituted alkanes, alkenes and alkynes, compounds having functional groups, polyfunctional compounds. Isomerism: Structural isomerism, Geometrical isomerism in alkenes, cyclic compounds-optical isomerism- conditions of optical isomerism in lactic acid, tartaric acid-properties of enantiomers, diastereoisomers, mesocompounds

UNIT-II CHEMISTRY OF ALKANES AND CYCLOALKANES**12**

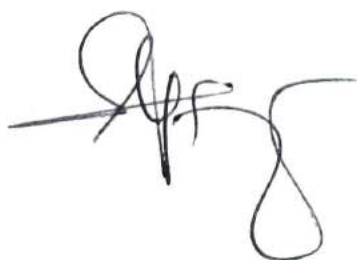
Structure – sources of alkanes – Methods of preparation – properties – Conformational study of ethane and n-butane (Newman and Fischer projection only). Cycloalkanes - Nomenclature – methods of preparation – properties. Stability of cycloalkanes - Bayer's strain theory.

UNIT-III THERMODYNAMICS**12**

Basic concepts - scope and limitations - Thermodynamic terms - intensive and extensive properties - state, equilibrium - processes-nature of heat and work - isothermal reversible and irreversible expansion works of an ideal gas - maximum work - zeroth law of thermodynamics - Internal Energy and First law of thermodynamics - Enthalpy of a system - Relation between ΔE and ΔH -Relation between C_p and C_v – Joule Thomson effect.

UNIT - IV THERMOCHEMISTRY**12**

Introduction - exothermic and endothermic reactions - Thermo chemical equations - Kirchhoff's equation - types of heat of reaction - heat of formation - standard heat of formation - standard heat of reaction - heat of combustion - heat of solution - heat of neutralization - heat of fusion - heat of vaporization - heat of sublimation and heat of transition – definition - simple problems. Hess's law of constant heat summation – applications - bond energy and strength of bond - experimental determination of heat of combustion - bomb calorimeter.



UNIT – V NOMENCLATURE OF INORGANIC COMPOUNDS**12**

Writing symbols of elements and formulae of inorganic species - inorganic nomenclature - names of compounds in general - names of ions - names of radicals - names of isopoly anions - names of heteropoly anions - names of acids - names of salts and salt like compounds - names of addition compounds - names of neutral hydrides - names of boron hydrides. Nomenclature of cations, anions, radicals, binary acids and oxy acids.

COURSE OUTCOMES

After successful completion of this course, the student will be able to

CO1	Name the nomenclature of organic compounds.	L3
CO2	Understand of alkanes and cycloalkanes	L2
CO3	Realize the fundamental of thermodynamics	L3
CO4	Know the significance of thermochemistry	L2
CO5	Name the nomenclature of inorganic compounds	L1

Total Periods: 60**TEXT BOOKS**

1. B.S. Bahl and Arun Bahl, *Advanced Organic Chemistry*, 1st ed. New Delhi: S.Chand & Company Pvt, Ltd, 2016. (Unit-I to Unit-II)
2. B. R. Puri, L.R. Sharma and M.S. Pathania, *Principles of Physical Chemistry*, 4th ed. New Delhi: Vishal Publishing Co., 2018. (Unit-III & IV)
3. Arun Bahl, B.S. Bahl and G. D. Tuli, *Essentials of Physical Chemistry*, Revised ed. New Delhi; S. Chand & Sons Publishing, 2016. (Unit-V)

REFERENCE BOOKS

1. R. D. Madan., *Modern Inorganic Chemistry*, 3rd ed. New Delhi: S. Chand & Co., 2016.
2. B.S. Bahl and Arun Bahl, *Advanced Organic Chemistry*, 1st ed. New Delhi: S.Chand & Company Pvt, Ltd, 2016.
3. Sathya Praksash, G.D. Tuli, S. K. Basu, and R.D. Madan, *Advanced Inorganic Chemistry*, 19th ed. New Delhi: S. Chand & Co., 2016.
4. Dr. Wahid, U.Malik, Dr.G.D.Tuli and Dr. R.D.Madan, *Selected Topics in Inorganic Chemistry*, 8th ed. New Delhi: S.Chand & Company Pvt. Ltd., 2016

Prepared by Course Coordinator
Ms. K.P. GREESHMA

Verified by BOS Chairman
Dr. T.SASIKALA

19CH202 CORE - V: ANALYTICAL CHEMISTRY**COURSE OBJECTIVES**

- To enable the student to learn principles of various chromatography techniques
- To enable the student to aware about the electro and thermo analytical techniques
- To learn the working principles of flame photometry and atomic absorption spectroscopy
- To study the working principles of electrogravimetry and Polarimetry

Semester	II
Credit	4
Paper type	Core
Max. Marks	CIA: 30 CE : 70 TOT =100

UNIT-I CHROMATOGRAPHIC TECHNIQUES - I**12**

Chromatographic methods - Introduction - Principle - Types - techniques - development of chromatograms- Experimental requirements and applications of column chromatography. Thin layer chromatography-theory of TLC-Techniques of TLC-development of chromatograms-Variou types of TLC-application of TLC.

UNIT-II CHROMATOGRAPHIC TECHNIQUES - II**12**

Gas chromatography - theory of gas chromatography-instrumentation-sample injection systems-split injection methods-split less injection methods-types of column-packed-adsorption column-partition & capillary column-applications of GC.

Ion exchange chromatography-types of exchangers-cation exchange resins, anion exchange resins-mechanism of ion exchange chromatography-applications of ion exchange chromatography.

UNIT-III ELECTRO AND THERMAL ANALYTICAL METHODS**12**

Coulometer- Introduction - Types - Hydrogen Oxygen coulometer, precautions - silver coulometer- Applications. Nephelometry and turbidimetry - principle, Instrumentation and applications- Turbidimetric titrations.

Thermogravimetric analysis -principle, instrumentation and applications - factors affecting TGA . Differential thermal analysis -principle, instrumentation and application - factors affecting DTA - applications.

UNIT-IV FLAME PHOTOMETRY AND ATOMIC ABSORPTION SPECTROSCOPY**12**

Flame photometry and Atomic absorption spectroscopy (AAS) - principle, Instrumentation and applications -Relationship between flame photometry and atomic absorption spectroscopy.



UNIT- V ELECTRO GRAVIMETRIC ANALYSIS AND POLARIMETRY 12

Electrogravimetry (EG) –Terms used in EG – theory - Instrumentation – Over voltage, factors influencing over voltage – Applications.

Polarimetry- plane polarized light-instrumentation-cause of optical activity, circular dichroism, optical rotatory dispersion, cotton effect-plain curves-anomalous curves. Determination of rate constant-acid catalysed mutarotation of glucose-inversion of cane sugar- relative strength of acids.

COURSE OUTCOMES

After successful completion of this course, the student will able to

CO1	Understand the basic principles of chromatography and their applications.	L1
CO2	Differentiate the types of chromatography based on separation techniques	L2
CO3	Calculate the decomposition temperature using TGA and DTA techniques.	L3
CO4	find out the surface morphologies of chemical compounds using of Atomic absorption spectroscopy and flame photometry	L2
CO5	Analyse the principles and mechanism of polarimeter	L2

Total Periods: 60

TEXT BOOKS

1. B.K. Sharma, *Instrumental Methods of Chemical Analysis*, 30th ed. Meerut: Goel Publishing House, 2015. (Unit-I to Unit-V)
2. H.Kaur, *Instrumental methods of Analysis*, 10th ed. Meerut: Pragati Prashan Education Publishers, 2014. (Unit-I to Unit-V)

REFERENCE BOOKS

1. R. Gopalan, P. S. Subramanian and K. Rengarajan, *Elements of Analytical Chemistry*, 1st ed. New Delhi: S Chand & Sons Company Pvt. Ltd., 2016.
2. D. A. Skoog, D. M. West and F. J. Holler and Stanley R Crouch, *Fundamentals of Analytical Chemistry*, 9th ed. New Delhi: Cengage Learning India Pvt.Ltd., 2014.
3. G.R.Chatwal and S.K.Anand, *Instrumental methods of chemical analysis*, 5th ed. Mumbai: Himalaya Publishing House, 2017.

Prepared by Course Coordinator
Ms. K.P. GREESHMA

Approved by BOS Chairman
Dr. T. SASIKALA

19CH203 CORE - VI PRACTICAL - II: INORGANIC QUALITATIVE ANALYSIS**COURSE OBJECTIVES**

- To know about the skills of using glassware's and apparatus used in qualitative analysis.
- To develop the analytical skills in inorganic qualitative analysis.
- To know the chemistry principles applied in qualitative analysis.

Semester	II
Credit	3
Paper type	Core Practical-II
Max. Marks	CIA: 30 CE: 70 TOT=100

SEMI - MICRO QUALITATIVE ANALYSIS

Analysis of a mixture containing two cations and two anions of which one will be an interfering ion. Semi-micro methods using the conventional scheme with Hydrogen sulphide may be adopted.

CATIONS TO BE STUDIED: Lead, Copper, Bismuth, Cadmium, Iron, Aluminum, Zinc, Manganese, Cobalt, Nickel, Barium, Calcium, Strontium, Magnesium and Ammonium.

ANIONS TO BE STUDIED: Carbonate, Sulphate, Nitrate, Chloride, Fluoride, Borate, Oxalate and Phosphate.

COURSE OUTCOMES


After successful completion of this course, the student will be able to


CO1	Handle glassware's and chemicals used in chemical analysis.	L2
CO2	Identify the presence or absence of cations and anions in the mixture of compounds, using tests based on acid – base and solubility.	L2
CO3	Understand the removal of interfering anions from the mixture of compounds.	L1
CO4	Perform experiments, analyze data and interpret results and observe scientific conduct.	L3
CO5	Work effectively in diverse teams in laboratory.	L3


Total Periods: 45

REFERENCE BOOKS

1. Venkateswaran. V, Veeraswamy. R, Kulandaivelu . A.R., *Basic Principles of Practical Chemistry*, 2nded. New Delhi:S.Chand and Sons, 2016.
2. G. Svehla and B. Sivasankari, *Vogel's Qualitative Inorganic Analysis*, 7th ed. New Delhi: Pearson India Education services.


Prepared by Course Coordinator
Dr.S.MUTHULINGAM


Approved by BOS Chairman
Dr. T.SASIKALA



19CH204 - ALLIED II - MATHEMATICS II

COURSE OBJECTIVE

- To give basic knowledge in evaluating double and triple integrals.
- To evaluate Laplace and Inverse Laplace transforms.
- To get the ability of solving Ordinary and Partial differential equations.

Semester	II
Credit	4
Paper Type	Allied
Max. Marks	CIA -30 CE -70 TOTAL =100

UNIT-I

ORDINARY DIFFERENTIAL EQUATIONS: Variable separable- Homogeneous equations - Non-Homogeneous equations - Linear equations - Bernoulli's equations - First order higher degree equations. (11)

Chapter 4: Sections 1-5.

UNIT-II

PARTIAL DIFFERENTIAL EQUATIONS: Derivation of Partial differential Equations- Eliminations of arbitrary constants / functions - Different integrals of partial differential equations - Four standard types of first order equations - Lagrange's equations. (11)

Chapter 6: Section: 1-3, 5, 6.

UNIT III

INTEGRATION: Introduction- Definite integral-Method of Integration-Integral of functions containing linear functions of x-Integral functions involving $a^2 \pm x^2$ - various form of integral of functions-Integration of rational algebraic functions-Integration by parts. (11)

Chapter 1: Section: 1-8, 12.

UNIT IV

LAPLACE TRANSFORMS: Definition - Laplace transforms of standard functions - Inverse Laplace Transforms - Applications to solve ordinary differential equations and simultaneous equations. (11)

Chapter 7 (Example problems only).

UNIT V

VECTOR ANALYSIS: Vector differentiation - Gradient of a scalar point function - Divergence and Curl - Formula connecting Divergence and Curl - Vector integration - Line integral. (11)

Chapter 8: Sections: 1.11, 1.12, 1.17 to 1.20, and 2.

TOTAL PERIODS: 55

COURSE OUTCOMES (COs)

Having successfully completed this course, the student will be able to:

CO1	Solve the ordinary differential equations.	L3
CO2	Solve the partial differential equations.	L3
CO3	Illustrate the Integration of rational algebraic functions.	L2
CO4	Apply the Laplace transform to solve the ordinary differential equations.	L3
CO5	Estimate the differential operator to find Gradient, Divergence and Curl.	L3

TEXT BOOKS

- Ancillary Mathematics (Volume II) by S. Narayanan, R. Hanumantha Rao, Manickavachagam Pillai and P. Kandaswamy, S. Viswanathan (Printers & Publishers) Pvt Ltd., 2007.

REFERENCE BOOKS

- Shanti Narayan, Differential Calculus, Shyamlal Charitable Trust, New Delhi, 2004.
- B.M. Aggarwal, Integral Calculus, 1st Edition, Satya Prakashan Publishers, New Delhi, 1992.

Prepared by
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Approved by
Dr. N. MUTHUMANI

Verified by
Academic Council-Secretary

19ES01 - ENVIRONMENTAL STUDIES

COURSE OBJECTIVES

- To recognize the major concepts of ecosystem and have in-depth understanding of environmental interactions and alternate energy resources.
- To understand the role of various environmental pollutants and its effects.
- To understand the environmental social issues and develop problem – solving skills using scientific techniques.
- To understand the Human Population growth and its variation in the environment.

Semester	II
Credit	1
Max. Marks	CIA - 100 TOT = 100

Unit I

(4)

Multidisciplinary nature of environmental studies Definition, scope and importance, Need for public awareness. Introduction to Renewable and Nonrenewable sources – Uses of alternate energy sources.

Unit II

(6)

Ecosystems - Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Food chains, food webs and ecological pyramids. Types of ecosystem - Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). Biodiversity – Levels – Patterns – Threats – Biodiversity services.

Unit III

(5)

Environmental Pollution – Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Solid waste Management : Causes, effects and control measures of urban and industrial wastes. Disaster management : floods, earthquake, cyclone and landslides.

Unit IV

(6)

Social Issues and the Environment Urban problems related to energy, Water conservation, rain water harvesting and watershed management. Environmental Issues in Coimbatore District (Noyyal River, Dye Industries and Agricultural issues). Environmental ethics: Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents. Environment Protection Act - Wildlife Protection Act, Forest Conservation Act and Issues involved in enforcement of environmental legislation.

Unit V

(5)

Human Population and the Environment - Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health, Human Rights-Women and Child Welfare, Role of Information Technology in Environment and human health.

***Activity – Documentation about Environmental Impacts/ Socio – Environmental Issues.**

Total Periods: 26

COURSE OUTCOMES

- Ability to describe the principles of ecology and major concepts in environmental sciences. L1
- Ability to interpret the key concepts in Environmental pollution that apply to air, land and water issues on a global scale and population growth. L2
- Ability to investigate the polluted environment area and document the risks and formulate a design for the environmental health. L3
- Ability to identify the Socio - Environmental issues and apply the related analysis for the protection of environment. L2
- Ability to distinguish the human rights, women and child welfare in the environment. L3

TEXT BOOK:

1. Erach Bharucha, "Textbook for Environmental Studies for Undergraduate Courses", 2nd edition, University Grants Commission, New Delhi and Bharati Vidyapeeth Institute of Environment Education and Research, Pune, University Press, 2013.

REFERENCES:

1. M P Poonia and S C Sharma. "Environmental Studies - Concepts, Impacts, Mitigation and Management", 2nd edition, Khanna Book Publishing, 2019.
2. R Rajagopalan, "Environmental Studies", 3rd edition, Oxford University Press, 2015.
3. Shashi Chawla "A Text Book of Environmental Studies", 1st edition, Tata McGraw Hill, 2012.



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19CH301 CORE –VII: GENERAL CHEMISTRY – III**COURSE OBJECTIVES**

- To learn about the concept of aromaticity and nucleophilic substitution reactions.
- To know the principles and theory of nuclear chemistry and surface chemistry.
- To have a clear idea about the concept of thermodynamics.
- To know the basic ideas of acids, bases and non-aqueous solvents.

Semester	III
Credit	4
Paper type	Core
Max. Marks	CIA: 30 CE : 70 TOT = 100

UNIT-I AROMATICITY AND NUCLEOPHILIC SUBSTITUTION REACTIONS**12**

Aromaticity - The concept of Aromaticity, Huckel's rule (Applications not needed). Aromatic, anti-aromatic, and non-aromatic compounds,

Nucleophilic substitution reactions – S_N^1 , S_N^2 and S_N^i reactions, neighbouring group participation. Aromatic electrophilic substitution in benzene, Arenium ion mechanism, Nitration, Sulphonation, Halogenation, Friedel – crafts alkylation and acylation.

UNIT-II NUCLEAR CHEMISTRY**12**

Natural radioactivity – Modes of decay – group displacement law – theories of disintegration – Rate of decay – Decay constant – Half-life period – Geiger Nuttal rule – Radioactive equilibrium – Disintegration series – Transmutation reactions – using protons, deuterons, α -particles and neutrons – Artificial radioactivity. Nuclear stability – N/P ratio – Packing fraction – Mass defect – binding energy – nuclear forces – exchange theory and nuclear fluid theory – Nuclear fission – fusion – hydrogen bomb – atomic bomb – nuclear reactor.

UNIT- III SURFACE CHEMISTRY & ADSORPTION**12**

Physical and chemical adsorption – Adsorption isotherms – Langmuir-Freundlich and B.E.T. equations (B.E.T. no derivation) – Gibbs adsorption equation – Mathematical derivation – Surface films – Determination of surface area using Langmuir and B.E.T.equations.

Colloids - Types and classification – preparation of colloids – purification – protective colloids – kinetic, optical and electrical properties – surfactants – Gels – Emulsions– Properties and applications. Zeta potential, Donnan membrane equilibrium – Dorn effect.

UNIT- IV INTRODUCTION TO SECOND LAW OF THERMODYNAMICS**12**

Introduction– spontaneous and non-spontaneous reaction – statement of second law– Entropy as a state function– Carnot's cycle– entropy changes in isothermal expansion of an ideal gas, Helmholtz and Gibbs free energies – Maxwell's relation– Criteria of spontaneity – Gibbs Helmholtz equation.

UNIT-V ACIDS, BASES AND NON-AQUEOUS SOLVENTS**12**

Concepts of Lowry and Bronsted – Lux-flood concept – The solvent system concept – The Lewis concept – Relative strength of Acids and Bases – Effect of solvent – Leveling effect –Effect of polarity and substituents – Hard and Soft acids and bases – Bonding in hard-hard and soft-soft combinations – HSAB principle and its applications – Classification of solvents – characteristic properties of a solvent – study of liquid ammonia, liquid HF and H_2SO_4 .

COURSE OUTCOMES

After successful completion of this course, the student will able to

CO1	Apply the concepts of aromaticity and nucleophilic substitution reactions	L2
CO2	Analyze the ideas of nuclear chemistry, nuclear energy and solar energy	L3
CO3	Examine the adsorption techniques and also the purification techniques of colloids	L3
CO4	Apply the concepts of thermodynamics in industrial fields	L2
CO5	Distinguish the concepts in acids, bases, non-aqueous solvents and thermodynamics	L1

Total Periods: 60**TEXT BOOKS**

1. Bahl B.S, Arun Bahl, "*Advanced Organic Chemistry*", Chand.S& Company Pvt. Ltd, 1st edition, New Delhi, 2016 (Unit – I).
2. Arnika H.J, "*Essentials of Nuclear Chemistry*", New Age International Publishers, 4th edition, New Delhi, 2018 (Unit – II).
3. Puri B. R, Sharma L.R, Pathania M.S, "*Principles of Physical Chemistry*", Vishal Publishing Co., 4th edition, New Delhi, 2018 (Unit – III to V).

REFERENCE BOOKS

1. Madan R. D, "*Modern Inorganic Chemistry*", Chand.S& Co, 3rd edition, New Delhi (2016).
2. Sathya Praksash, Tuli G.D, Basu S. K., Madan R.D., "*Advanced Inorganic Chemistry*", Chand.S & Co, 19th edition, New Delhi (2016).
3. Malik W.U, Tuli G.D, Madan R.D, "*Selected Topics in Inorganic Chemistry*", Chand.S & Company Pvt. Ltd, 8th edition, New Delhi(2016).
4. Soni P.L, Dharmarha O.P. Dash U.N, "*Textbook of Physical Chemistry*", Chand.S& Sons, Revised edition, New Delhi(2016).
5. Arun Bahl, Bahl B.S, Tuli G.D, "*Essentials of Physical Chemistry*", Chand.S& Sons Publishing, Revised edition, New Delhi(2016).



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(Dr. T. Sasikala)



Member Secretary
Academic Council
(Dr. D. Jayasheela)

19CH302 CORE – VIII: INORGANIC CHEMISTRY – I

COURSE OBJECTIVES

- To understand the basic ideas of chemical bonding.
- To know about representative elements and boron family.
- To have an idea about metallurgy and noble gases.
- To familiarize transition, inner transition elements and their properties.

Semester	III
Credit	4
Paper type	Core
Max. Marks	CIA: 30 CE :70 TOT =100

UNIT – I CHEMICAL BONDING

Chemical Bonding – Molecular orbital theory – Bonding, Anti-bonding and Non-bonding molecular orbitals – Energy order of MO's – Diamagnetism and Para magnetism – Bond order – Molecular orbital configuration of H_2 , N_2 , O_2 and F_2 – Ionic bond – Lattice energy of ionic compounds – Born-Haber cycle – its applications – Lattice energy – solubility – Polarization of ions – Fajan's rules. Covalent bond – Valence bond theory – hybridization – sp , sp^2 , sp^3 , sp^3d and sp^3d^2 hybridizations – structure of molecules – H_2O , NH_3 , SF_4 , I_3^- , SO_4^{2-} . Polarity of covalent bond – percentage of ionic character – dipole moment and molecular structure.

12

UNIT – II REPRESENTATIVE ELEMENTS

General characteristics of s-block elements – electronic configuration, size, density, ionization energy, melting point, boiling point, flame colour – General characteristics of p-block elements – Electronic configuration, size, oxidation state, ionization energy, electron affinity, electronegativity – Preparation, properties and structure of diborane, borazine, boric acid, boron nitride and interhalogen compounds (ClF , ICl_3 , ClF_3 , IF_5 and IF_7) – Electropositive character of iodine – separation of noble gases (charcoal adsorption method).

12

UNIT – III METALLURGY

Occurrence of metals based on standard electrode potential – concentration of ores – calcination, roasting and smelting – reduction using carbon and other reducing agents – electrolytic reduction – hydrometallurgy – Ellingham diagram – Refining of metals – electrolytic refining – oxidative refining – zone refining – Van Arkel method – Extractive metallurgy of Li, Ni, Ti and U – Ferrous metallurgy – manufacture of steel by open hearth process – Alloys – composition and uses of German silver, Brass, Bronze, Gunmetal, Alnico.

12

UNIT – IV NOBLE GASES

History of discovery of noble gases – separation of noble gases (from atmosphere only) – Electronic configuration and position in the periodic table – General physical properties, uses of noble gases – Compounds of noble gases – Clathrates – Compounds of Xenon – XeF_2 , XeF_4 , XeF_6 , XeO_2F_2 , $XeOF_2$, $XeOF_4$ and XeO_3 – Preparation, hybridization and geometry – Fluorides of Krypton and Radon.

12

UNIT – V TRANSITION AND INNER TRANSITION ELEMENTS

12

Transition metals – general characteristics – metallic character – oxidation states – size – density – melting and boiling points – ionization energy – colour – magnetic properties – reducing properties – catalytic properties – Non-stoichiometric compounds – complex formation – alloy formation – difference between first rows and other two rows – Lanthanides – Electronic configuration and general characteristics – occurrence of lanthanides – separation by ion exchange method – lanthanide contraction – Actinides – Electronic configuration and general characteristics – comparison with lanthanides.

COURSE OUTCOMES

After successful completion of this course, the student will be able to

CO1	Differentiate chemical bonding of different molecules.	L1
CO2	Gain knowledge about representative elements and their properties.	L1
CO3	Acquire knowledge about extraction of different metals.	L3
CO4	Know the clear idea about structure and properties of noble gases.	L1
CO5	Differentiate between transition and inner transition elements.	L1

Total Periods: 60**TEXT BOOKS**

1. Puri, Sharma, Kalia, “*Principles of Inorganic Chemistry*”, Vishal Publishing Co, 33rd edition, Jaladhar, 2017 (Unit – I to III).
2. SatyaPrakash, Tuli G.D, Basu S.K, Madan R.D, “*Advanced Inorganic Chemistry*”, Chand.S & Sons, 19th edition, New Delhi, 2016 (Unit – IV to V).


REFERENCE BOOKS

1. Cotton, Wilkinson, “*Advanced Inorganic Chemistry*”, Wiley Publishers, 6th edition, New Delhi (2015).
2. Huheey J.E, Keiter E.A, Keiter R.L, Medhi O.K, “*Inorganic Chemistry*”, Pearson Publishers, 4th edition, New Delhi (2013).
3. Agarwala S.K, KeemtiLal, “*Advanced Inorganic Chemistry*”, PragatiPrakashan Publication, 3rd edition, Meerut (1997).
4. Wahid, Malik.U, Tuli G.D, Madan R.D, “*Selected Topics in Inorganic Chemistry*”, Chand.S & Sons Company Pvt. Ltd, 8th edition, New Delhi (2016).
5. Madan R.D, “*Modern Inorganic Chemistry*”, Chand.S & Sons Company Pvt. Ltd, 3rd edition, New Delhi (2016).
6. Soni P.L, “*Text book of Inorganic Chemistry*”, Chand.S& Sons, 29th edition, New Delhi (2007).




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19CH303 CORE IX PRACTICAL –III: ORGANIC QUALITATIVE ANALYSIS

COURSE OBJECTIVES

- To develop analytical skills in organic qualitative analysis and preparations.
- To know the principles applied in preparation of organic compounds.

I. ORGANIC ANALYSIS

- Detection of special elements (N,S and Halogens)
- To distinguish between aliphatic and aromatic.
- To distinguish between saturated and unsaturated.
- Functional group identification for phenols, carboxylic acids (mono & di), aromatic primary amines, amides (mono & di), carbohydrates, aldehydes, ketones, esters and nitro compounds.
- Systematic analysis of organic compounds containing one functional group and characterization by confirmatory tests.

Semester	III
Credit	3
Paper type	Core Practical
Max. Marks	CIA: 30 CE : 70 TOT =100

II. PREPARATION OF DERIVATIVES

- Aldehydes and ketones.
- Amines and amides.
- Carbohydrates and carboxylic acids.
- Phenols, esters and nitro compounds.

COURSE OUTCOMES

After successful completion of this course, the student will able to

CO1	Identify the components present in organic compound	L3
CO2	Prove the component in organic compounds and observe in scientific aspects	L3
CO3	Work effectively in diverse teams in laboratory	L1

Total Periods: 45

REFERENCE BOOKS

- Venkateswaran V, Veeraswamy R, Kulandaivelu A.R, "Basic Principles of Practical Chemistry", Chand.S and Sons, 2nd edition, New Delhi(2015).
- Radha and Rekha, "Chemistry Laboratory Manual", Elshadai Publishers, 1st edition, Chennai (2011).
- Pandey O.P, Bajpai N and Giri S, "Practical chemistry", Nirja Publishers and Printers Pvt. Ltd, 1st edition, New Delhi (2014).

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19CH304-Allied III: Allied Physics for Chemistry

COURSE OBJECTIVE

- To understand the fundamental concepts of Physics.

Semester	III
Credit	3
Paper type	Allied
Max. Marks	100

UNIT: 1 PROPERTIES OF MATTER AND MECHANICS

Introduction – Stress and Strain – Hooke's law – Three types of elasticity – Determination of young's modulus by Uniform bending and Non-uniform bending- Surface Tension - Viscosity.
 Concept of work, power and energy - Newton's law of motion – Simple Harmonic Motion – Differential equations of S.H.M – Simple pendulum & Compound pendulum.

10

UNIT: 2 OPTICS

Light – Properties of light: Reflection of light, Refraction of light – Refractive index – Fermat's principle of least time- Interference – Newton's rings – Diffraction – Difference between interference and diffraction – Polarization – Brewster's law.

9

UNIT: 3 MAGNETIC PROPERTIES OF MATERIAL

Magnetic induction- Magnetization M- properties of dia, para and ferro magnetic materials- Anti ferro magnetism and ferri magnetism- Electron theory of magnetism- Langevin's theory of para magnetism- Weiss theory of ferromagnetism- Determination of M-H curve (horizontal model)- Energy loss due to hysteresis.

9

UNIT: 4 SOLID STATE PHYSICS

Crystallography: Introduction – Types of solids – Bravais lattices – Miller Indices – Simple cubic – Body Centered cubic – Face Centered cubic - Hexagonal close packed structures – Simple crystal structures – glass and Quasi crystals.
 Superconductivity: Introduction – Properties of Superconductors – Classifications of Superconductors – BCS theory – High temperature Superconductors – Applications.

9

UNIT: 5 SEMICONDUCTORS

Semiconductor – types of semiconductor – p-n junction – forward & reverse bias -voltage-current characteristics - Zener diode – Zener diode as voltage regulator. Transistor – Types of transistors-CE characteristics.

8

COURSE OUTCOMES

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

CO	Statement
CO1	Determine the Young's modulus
CO2	Understand the properties of light
CO3	Explain the Magnetic properties of the materials.
CO4	Differentiate crystal structure.
CO5	Differentiate the types of semiconductor.

TEXT BOOK:

Total Periods: 45

1. R.Murugesan& D.S Mathur, "Properties of matter" – S.Chand& Company Ltd ,2014.(Unit-I)
2. D.S. Mathur , "Mechanics", S.Chand& PVT Ltd., 2015.(Unit-I)
3. Dr.N.SubrahmanyamBrijlal&Dr.M.N.Avadhanulu, " A Text Book Of Optics", S.Chand& PVT Ltd., 2015. (Unit-II)
4. R.Murugesan, "Electricity and Magnetism", Sultan Chand & Sons, 2003. (Unit-III)
5. S.L.Gupta,V.Kumar, "Solid State Physics", K.Nath& Co, Meeraut,2013. (Unit-IV)
6. V.K.Mehta and Rohit Mehta, " Principle of Electronics",S.Chand& Company Ltd, 2015. (Unit-V)

REFERENCE BOOKS:

1. Fundamentals of Optics- Jenkins and White Tata Mc Graw- Hill Pub. Co. Ltd. Delhi,2006
2. Brijlal and Subramaniam, "Properties of Matter",S.Chand& Company,2003.
3. Dr. M.Arumugam, "Material Science", Anuradha Agencies,2000.

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Dr Poonguzhali S

Approved by

Member Secretary,
Academic Council

19CH305- ALLIED PRACTICAL-I: Allied Physics Practical for Chemistry

COURSE OBJECTIVE:

- To learn the basic Experiment of Physics.

Semester	III
Credit	2
Paper type	Allied Practical
Max. Marks	50

All the Experiments:

- Young's modulus – Uniform Bending – Pin and Microscope method
- Young's modulus – Non-Uniform Bending – Pin and Microscope method
- Surface tension of a liquid – Drop weight method
- Spectrometer – Refractive index of solid prism
- Spectrometer – Wavelength of Mercury Spectrum - Grating
- Newton's Rings – Radius of Curvature
- Compound pendulum – Determination of 'g' and 'k'
- Characteristics of PN junction diode

COURSE OUTCOME:

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

CO	Statement
CO1	Recognize the physical properties of matter by interpreting the results of experiments
CO2	Determine the gravitational force and radius of gyration using Compound pendulum
CO3	Demonstrate team work skills/ ability to collaborate by working in groups on a laboratory experiments

Total Periods : 30

Prepared by

Mr Gowrisankar G

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Dr Poonguzhali S

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Member Secretary,

Academic Council

19CHI01 OPEN ELECTIVE – I: CHEMISTRY FOR COMPETITIVE EXAMINATIONS**COURSE OBJECTIVES**

- To make non-chemistry students to get exposed to day to day chemistry related materials and science
- To learn the simple chemistry terms and reactions
- To understand the nature of materials and know about their applications in various field

Semester	III
Credit	3
Paper type	Open Elective
Max. Marks	CIA: 30 CE : 70 TOT =100

UNIT-I FERTILIZERS

9

Fertilizers-natural, synthetic, mixed, NPK fertilizers. Comparison between synthetic and natural fertilizers
- Excessive use of fertilizers and its impact on the environment – Bio-fertilizers.

UNIT-II NUTRIENTS AND PESTICIDES

9

Plant nutrients - micro and macronutrients and their role – Pesticides- Classifications- herbicides, insecticides, fungicides-repellents – fumigants, defoliants.

UNIT-III ELEMENTS IN PERIODIC TABLE

9

Classification of elements: metals, non-metals and metalloids - Position of elements in modern periodic table – Properties and uses of element in various fields. Types and naming of compounds: Acid, Base and Salt.

UNIT-IV FOOD SCIENCE

9

Food additives- Artificial sweeteners, Food laws, Food colours - permitted and non-permitted-Toxicology. Food adulteration - Common adulterants used in different foods - analysis of detection and prevention. Soft drinks–Merits and Demerits

UNIT-V ARTICLES USED IN DAILY LIFE

9

Polymers-Thermoplastics and thermosetting plastics- Use of PET, HDPE, PVC, PVA, PU-Recycling of plastics-Biodegradable plastics. Environmental hazards of plastics – Glass- composition, types and uses- Cement- composition and setting of cement.

COURSE OUTCOMES

After successful completion of this course, the student will able to

CO1	Know about the importance of chemistry in fertilizers	L1
CO2	Understand the usage of various pesticides in agricultural field	L1
CO3	Identify of elements in periodic table and its uses	L3
CO4	Recognize the awareness of additives in food industries	L2
CO5	Know about the usage of articles in our daily life	L1

Total Periods: 45

TEXT BOOKS

1. Sivashankar B. "Food Processing and Preservatives", PHI Learning Pvt. Ltd, 1st edition, New Delhi, 2016 (Unit-IV).
2. Madan R.D, "Modern Inorganic Chemistry", Chand.S and Co., Third Revised Edition, 2011 (Unit-III).
3. Jain T, Jain J, "Engineering Chemistry", Dhanpat Rai Publications, 16th edition, New Delhi, 2016 (Unit -I, II & V).

REFERENCE BOOKS

1. Ayodhyasingh, "Industrial Chemistry", Campus Books International, 1st edition, New Delhi (2012).
2. Chatwal G.R, "Pharmaceutical Chemistry-Inorganic-Vol-I", Himalaya Publishing House, 4th edition, Mumbai (2019).
3. Sharma B.K, "Industrial Chemistry", Krishnaprakash Media Pvt. Ltd, 13th edition, Meerut (2001).
4. Vermain O.P and Narula A.C, "Applied Chemistry-Theory and Practices", New age international Publishers, 2nd edition, New Delhi (2017).



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**19CH306 – SKILL BASED SUBJECT: I
INTRODUCTION TO NANO CHEMISTRY**

COURSE OBJECTIVES

- To introduce the basics of nanochemistry and technology.
- To learn the instrumental and synthetic techniques used in characterization of nano materials.
- To understand the preparation and properties of nanomaterials.
- To get an idea about carbon nanotubes and their applications.

Semester	III
Credit	3
Paper type	Skill based
Max. Marks	CIA : 30 CE : 70 TOT =100

UNIT - I**Basics of Nano Chemistry**

9

Introduction – definition – length scales – importance of Nano scale and its technology – self-assembly of materials – self-assembly of molecules – porous solids, nanowires, Nano machines and quantum dots.

UNIT - II**Nano Particles**

9

Introduction – types of nanoparticles – preparation, properties and uses of gold, silicon, silver, zinc oxide, iron oxide, alumina and titania nanoparticles. Biosynthesis of Nanoparticles – Natural and artificial production.

UNIT - III**Synthetic Techniques**

9

Techniques to synthesize nanoparticles – top down and bottom up approaches – common growth methods – characterization of nanoparticles – biosynthesis of nanoparticles - applications and toxic effects of nanomaterials.

UNIT - IV**Nano Materials**

9

Carbon based Nanostructures Carbon Nanotubes(CNT), Graphene, Fullerenes, history and types, Carbon clusters, Single wall tubes, Multiwall tubes, Macroscopic Nanotube materials, Preparation and Physical properties (Mechanical Properties, Thermal Properties, Electronic Properties, magnetic and superconducting properties), Applications of Carbon Nanotubes. Preparation, properties and applications of nanorods, nanofibre and nanoclay.

UNIT - V**Instrumental Techniques**

9

Electron microscopes – scanning electron microscopes (SEM) – transmission electron microscopes (TEM) – scanning probe microscopy – atomic force microscopy (AFM) – scanning tunneling electron microscope (STEM) – basic principles only.

COURSE OUTCOMES

After successful completion of this course, the student will able to

CO1	Apply the basics of nanochemistry and the concept of nanoparticles	L1
CO2	Apply the synthetic and instrumental techniques in nanotechnology	L1
CO3	Apply the properties of carbon based nanostructures in drug therapy and other biosystems.	L2
CO4	Determine the nanomaterials and synthesize new nanoparticles using common growth approaches	L3
CO5	Characterize techniques of nanomaterials	L1

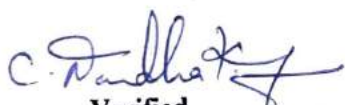
Total Periods: 45


TEXT BOOKS

1. Pradeep T, "*Nano the essentials*", Tata McGraw Hill Pvt. Ltd, 6th edition, New Delhi, 2011 (Unit-I to V).

REFERENCE BOOKS

1. Patrick Salomon, "*A Handbook on Nano Chemistry*", Dominant Publishers and Distributors, 10th edition, New Delhi (2009).
2. Shanmugam S, "*Nano Technology*", MJP Publishers, Chennai (2010).


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19CH401 CORE – X: INORGANIC CHEMISTRY – II**COURSE OBJECTIVES**

- To understand the basics of coordination chemistry and theories of co-ordination compounds.
- To familiarize organometallic compounds.
- To understand the basic concepts of bioinorganic chemistry.
- To have an idea about industrially important inorganic materials.

Semester	IV
Credit	4
Paper type	Core
Max. Marks	CIA : 30 CE : 70 TOT =100

UNIT-I BASICS OF COORDINATION CHEMISTRY**12**

Introduction – Double salts and Coordination compounds – Nomenclature – Werner's theory – Electronic interpretation of co-ordination compounds – Effective Atomic Number (EAN) – Shapes of d orbitals – Types of ligands – Chelates. Stereo chemistry of coordination compounds with coordination numbers 2 to 6. Isomerism – Stability of complex ions – stability constant. Factors affecting the stability of complexes. Application of complex formation in qualitative and quantitative analysis.

UNIT- II THEORIES OF COORDINATION COMPOUNDS**12**

Theories of bonding in transition metal complexes – Valence bond theory – Application to some complexes – Hybridization in tetrahedral – square planar and octahedral complexes – explanation of magnetic properties based on VBT – Limitations of VBT – Crystal field theory – Crystal field splitting in octahedral – tetrahedral and square planar geometries – Factors affecting the magnitude of crystal field splitting – Crystal field stabilization energy (CFSE) – Explanation of colour, spectral and magnetic properties – Spectrochemical series.

UNIT- III ORGANOMETALLIC COMPOUNDS**12**

Definition – classification based on the nature of metal-carbon bond. Metal carbonyls – 18 electron rule – Mononuclear and polynuclear carbonyls (give examples of Fe, Co, Ni) – Bonding in metal carbonyls – Preparation of carbonyls of Fe and Ni – Ferrocene – Preparation, properties and structure – Bonding in ferrocene (only qualitative treatment) – Applications of Organometallic compounds – Wilkinson catalyst (mechanism not expected).

UNIT- IV BIO-INORGANIC CHEMISTRY**12**

Metal ions in biological system – trace and bulk metal ions – Haemoglobin and Myoglobin (elementary idea of structure and oxygen binding mechanism). Sodium – potassium pump – biochemistry of Mg, Ca, Zn, Co. Toxicity of metal ion (Pb, Hg, As), Cis-platin as anticancer drug.

UNIT- V INDUSTRIALLY IMPORTANT INORGANIC MATERIALS**12**

Inorganic Polymers – Synthesis, structure and applications of silicones, Phosphazenes – S-N compounds, S-P compounds – Silicates, Zeolites – Role of selenium in Xerography – Composition, properties and uses of beryl, asbestos, talc, mica and ultramarines.

COURSE OUTCOMES

After successful completion of this course, the student will be able to

CO1	Differentiate the terms and definitions in coordination compounds.	L2
CO2	Understand crystal field splitting and its applications.	L2
CO3	Classify the organometallic compounds and its applications	L3
CO4	Apply mechanism of bioinorganic chemistry in pharma industries.	L3
CO5	Analyze the basic concepts in industrially important inorganic materials.	L3

Total Periods: 60

TEXT BOOKS

1. Puri, Sharma and Kalia, "*Principles of Inorganic Chemistry*", Vishal Publishing Co, 33rd edition, Jalandhar, 2017 (Unit – I to V).
2. Satya Prakash, Tuli G.D, Basu S.K and Madan R.D, "*Advanced Inorganic Chemistry*", Chand.S& Sons, 18th edition, New Delhi, 2016 (Unit – I to V).
3. Madan R.D, "*Modern Inorganic Chemistry*", Chand.S& Sons Company Pvt Ltd, 3rd edition, New Delhi, 2016 (Unit – I to V).

REFERENCE BOOKS

1. Cotton and Wilkinson, "*Advanced Inorganic Chemistry*", Wiley Publishers, 6th edition, New Delhi (2015).
2. Huheey J.E, Keiter E.A, Keiter R.L and Medhi O.K, "*Inorganic Chemistry*", Pearson Publishers, 4th edition, New Delhi (2013).
3. Agarwala S.K and KeemtiLal, "*Advanced Inorganic Chemistry*", PragatiPrakashan Publication, 3rd edition, Meerut (1997).
4. Wahid, Malik U, Tuli G.D and Madan R.D, "*Selected Topics in Inorganic Chemistry*", Chand.S& Sons Company Pvt Ltd, 8th edition, New Delhi (2016).
5. Soni P.L, "*Text book of Inorganic Chemistry*", Chand.S& Sons, 29th edition, New Delhi (2007).


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19CH402 CORE – XI: ORGANIC CHEMISTRY – I**COURSE OBJECTIVES**

- To understand the stereochemistry of organic compounds, conformation, geometric and optical isomerism.
- To learn and understand the chemistry of phenols and amine compounds.
- To learn and practice the molecular rearrangements and the reaction mechanisms.

Semester	IV
Credit	5
Paper type	Core
Max. Marks	CIA: 30 CE: 70 TOT =100

UNIT – I ISOMERISM AND STEREOCHEMISTRY**14**

Definition – Classification – Optical and Geometrical isomerism – Optical isomerism – Optical activity – Optical and Specific rotations – conditions for optical activity – asymmetric center – Chirality – achiral molecules – meaning of (+) and (–) and D and L notations.

Elements of symmetry – Projection formulae – Fischer, and Newman projection formulae – Notation of optical isomers – Cahn- Ingold - Prelog rules – R - S notations for optical isomers with one and two asymmetric Carbon atoms – erythro and threo representations – Racemization – chiral synthesis – Walden inversion – Optical isomerism in cyclic compounds – Optical isomerism in nature.

UNIT – II CONFORMATIONAL ANALYSIS**13**

Conformational Analysis – introduction of terms – conformers – dihedral angle, torsional strain, conformational analysis of ethylene glycol and chlorohydrin including energy diagrams – conformers of cyclohexane (chair, boat and skew boat forms) – axial and equatorial bonds – ring flipping showing axial equatorial interconversions – conformers of mono and disubstituted cyclohexanes – 1:2 and 1:3 interactions.

UNIT – III PHENOLS**13**

Monohydric phenols – cresols – preparation & properties – mechanism – alkylation, esterification, Nitration, Sulphonation, Halogenation – coupling with diazonium salts – Kolbe - Schmidt, Reimer - Tiemann reactions.

Dihydric phenols – Resorcinol, catechol and Quinol – preparation & properties. Trihydric phenols – Pyrogallol and phloroglucinol – preparation, Houben - Hoesch reaction.

UNIT – IV AMINES**13**

Amines – Nomenclature – Preparation and properties of aliphatic and aromatic primary, secondary and tertiary amines – Separation (Hoffman method and Hinsberg method) and comparison of their basicity – Ring substitution, diazotization and coupling reaction of aromatic amines – Diazomethane and diazoacetic ester – Preparation, structure and their synthetic applications.

UNIT– V MOLECULAR REARRANGEMENTS**13**

Classification – Mechanism of Pinacol - Pinacolone, Beckmann, Claisen, Cope, Hoffmann, Curtius, Lossen, Schmidt and Benzil - Benzilic acid Rearrangements.

COURSE OUTCOMES

After successful completion of this course, the student will be able to

CO1	Establish the stereochemistry of organic compounds.	L2
CO2	Elucidate the structure of some simple compounds	L3
CO3	Synthesize the organic compounds like phenols and its derivatives.	L3
CO4	Prepare amine compounds and its derivatives.	L3
CO5	Identify the suitable reagents and derive the mechanisms of some important organic reactions.	L2

Total Periods: 66

TEXT BOOKS

1. Bahl B.S and ArunBahl, "*Advanced Organic Chemistry*", Chand.S& Company Pvt Ltd, 1st edition, New Delhi, 2016 (Unit- III to Unit- V).
2. Kalsi P.S, "*Stereochemistry, Conformation and Mechanism*", New Age International Publishers, 9th edition, New Delhi, 2017 (Unit- I & Unit- II).

REFERENCE BOOKS

1. Mukherji S.M, Singh S.P, Kapoor R.P and Dass R, "*Organic Chemistry*", Vol- 1, New Age International Pvt. Ltd, 2nd edition, New Delhi (2015).
2. Bhupinder Mehta and Manju Mehta, "*Organic Chemistry*", Ashok K.Ghosh, PHI learning Pvt Ltd, 2nd edition, New Delhi (2015).
3. Robert Thornton Morrison and Robert Neilson Boyd, "*Organic Chemistry*", Dorling Kindersley Pvt. Ltd, 6th edition, New Delhi (2005).
4. Jain M.K and Sharma S.C, "*Modern Organic chemistry*", Vishal Publishing Co, 4th edition, Jalandhar (2016).

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19CH403 CORE XII PRACTICAL – IV: APPLIED CHEMISTRY PRACTICAL**COURSE OBJECTIVES**

- To have an idea about water quality parameters and the amount of elements present in tablets.
- To understand the method involved in the preparation of home care products.

Semester	IV
Credit	2
Paper type	Core Practical
Max. Marks	CIA: 15 CE: 35 TOT = 50

VOLUMETRIC ANALYSIS & PREPARATIONS

- Estimation of Hardness of water using EDTA.
- Estimation of dissolved oxygen in water (Winkler's method).
- Estimation of alkalinity in water sample.
- Estimation of Calcium in limestone by EDTA method.
- Estimation of available chlorine in bleaching powder.
- Estimation of Iron in Iron tablet.
- Estimation of Calcium in Calcium Tablet.
- Isolation of Casein.
- Preparation of Detergent Powder.
- Preparation of White Phenyl.

COURSE OUTCOMES

After the successful completion of the course the student will be able to


CO1	Analyze the water quality parameters using volumetric experiments.	L3
CO2	Estimate the amount of Iron and Calcium in tablets.	L2
CO3	Prepare the home care products.	L3

Total Periods: 30

REFERENCE BOOKS

- Venkateswaran V, Veeraswamy R and Kulandaivelu A.R, "Basic Principles of Practical Chemistry", Chand.S& Sons Company Pvt Ltd, 2nd edition, New Delhi (2015).
- Pandey O.P, Bajpai N and Giri S, "Practical Chemistry", Nirja Publishers and Printers Pvt Ltd, 1st edition, New Delhi (2016).


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19CHE01 ELECTIVE – I: INTRODUCTION TO FORENSIC SCIENCE & TECHNOLOGY**COURSE OBJECTIVES**

- To give the students the importance of forensic chemistry and an exposure to find, analyze and find a suitable method to detect the crime.

Semester	IV
Credit	4
Paper type	Elective
Max. Marks	CIA : 30 CE : 70 TOT = 100

UNIT – I FOOD ADULTRATION**12**

Contamination of wheat, rice, dhal, milk, butter, etc. With clay, sand, stone, water and toxic chemicals (example: Kasser dhal with mentanil yellow). Food poisons: natural poisons (alkaloids, nephrotoxins), pesticides (DDT, BHC, Follidol), Chemical poisons (KCN). First aid and Antidotes for poisoned persons. Heavy metal (Hg, Pb, Cd) Contamination of Sea food. Use of neutron activation analysis in detecting poisoning (example: As in human hair).

UNIT – II TRANSPORTAION**12**

Drunk and driving : breathe analyzer for ethanol. Incendiary and timed bomb sin road and railway tracks. Defusing live bombs.

Hit and go traffic accidents : paint analysis by AAS. Soil of toxic and corrosive chemicals (example: concentrated acids) from tankers.

UNIT – III CRIME DETECTION**12**

Accidental explosions during manufacture of matches and fire – works (as in Sivakasi). Human bombs, possible explosives (gelatin sticks, RDX). Metal detector devices and other security measures for VVIP. Composition of bullets and detection of powder burns.

Scene of crime : finger prints and their matching using computer records. Smell tracks and police dogs. Analysis of blood and other body fluids in rape cases. Typing of blood. DNA finger printing for tissue identification in dismembered bodies. Blood stains on clothing. Cranial analysis (head and teeth).

UNIT – IV FORGERY AND COUNTERFEITING**12**

Detecting forgery in bank cheques / drafts and educational records (mark lists, certificates) using UV light. Alloy analysis using AAS to detect counterfeit coins. Checking silver line water mark in currency notes.

Jewellery : detection of gold purity in 22 carat ornaments, detecting gold plated jewels, authenticity of diamonds (natural, synthetic, glassy).

UNIT – V MEDICAL ASPECTS**12**

AIDS : Cause and prevention. Misuse of scheduled drugs. Burns and their treatment by plastic surgery. Metabolite analysis using mass spectrum – Gas chromatography. Detecting steroid consumption among athletes and race horses.

COURSE OUTCOMES

After successful completion of this course, the student will able to

CO1	Analyze the basic concepts in food adulteration methods.	L3
CO2	Understand basic concepts in transportation rules and regulation.	L1
CO3	Analyze the blood and other body fluids for crime cases.	L3
CO4	Identify the methods for detection of purity of gold and other ornaments.	L2
CO5	Understand the effect of steroid consumption in our body.	L1

Total Periods: 60

TEXT BOOKS

1. Jason H. Byrd, Patricia Norris, Nancy Bradley-Siemens, "*Veterinary Forensic Medicine and Forensic Sciences*", CRC Press, 1st edition, USA, 2020 (Unit – I to V).

REFERENCE BOOKS

1. Ernest R. Rogers and Adam W. Stern, "*Veterinary Forensics-Investigation, Evidence Collection and Expert Testimony*", CRC Press, 1st edition, USA (2020).



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19CHE02 ELECTIVE – I: APPLIED CHEMISTRY**COURSE OBJECTIVES**

- To understand the characteristics & methods of treatment of water.
- To classify various petroleum processing techniques.
- To apply the mechanism and properties of lubricants.
- To distinguish between refractories and abrasives.
- To create awareness about corrosion and its prevention methods.

Semester	IV
Credit	4
Paper type	Elective
Max. Marks	CIA : 30 CE : 70 TOT : 100

UNIT – I WATER TECHNOLOGY**12**

Introduction – Characteristics – Hardness – Estimation of hardness by EDTA method – Alkalinity and its estimation – Demineralization process – Desalination by reverse osmosis – Domestic water treatment – Screening – Sedimentation – Coagulation – Aeration and sand filtration – Disinfection methods – Chlorination – Ozonation and UV treatment.

UNIT – II FUELS**12**

Fuels – Classification – Calorific value – Gross and net calorific value – Petroleum processing and fractions – Cracking – Catalytic cracking (Method only) – Synthetic petrol – Bergius process and Fischer Tropsch process – Knocking – Octane number and Cetane number – Gaseous fuels – Water gas, Producer gas – CNG and LPG.

UNIT – III LUBRICANTS**12**

Lubricants – Functions – Mechanism – Classification – Liquid lubricants – Properties (viscosity index, fire and flash point, cloud and pour point, oiliness) – Semi-solid lubricants – Greases – Solid lubricants – Graphite and Molybdenum disulphide.

UNIT – IV REFRACTORIES AND ABRASIVES**12**

Refractories – Classification – Acidic, basic and neutral refractories – Properties (refractoriness, refractoriness under load, dimensional stability, porosity and thermal spalling) – Abrasives – Natural and synthetic abrasives – Quartz, corundum, emery, garnet, diamond, silicon carbide and boron carbide.

UNIT – V CORROSION AND SURFACE COATINGS**12**

Corrosion – Dry corrosion and Wet corrosion – Mechanism – Galvanic corrosion – Corrosion control – Sacrificial anode method – Corrosion inhibitors – Protective coatings – Preliminary treatment – Paints – Constituents and functions – Varnishes – Constituents, characteristics of good varnish, types and uses – basic concept of lacquers and enamels.

COURSE OUTCOMES

After successful completion of this course, the student will able to

CO1	Analyze the water quality parameters.	L2
CO2	Apply the concepts related to chemistry in industries.	L2
CO3	Identify the types and functions of lubricants based on its properties.	L3
CO4	Classify various refractories based on their mechanical properties.	L2
CO5	Differentiate the different types of corrosion and its prevention.	L1

Total Periods: 60

TEXT BOOKS

1. Jain T, Jain J, "*Engineering Chemistry*", Dhanpat Rai & Sons, 16th Edition, New Delhi, 2016 (Unit – I to V).

REFERENCE BOOKS

1. Agarwal O.P, "*Engineering Chemistry*", Khanna Publishers, 1st Edition, New Delhi (1993).
2. Uppal M.M, "*Engineering Chemistry*", Khanna Publishers, 1st Edition, New Delhi (1994).
3. Vermain O.P, Narula A.C, "*Applied Chemistry – Theory and Practices*", New age international Publishers, 2nd Edition, New Delhi (2017).



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19CHE03 ELECTIVE – I: AGRICULTURAL CHEMISTRY**COURSE OBJECTIVES**

- To enable the students to study about the classification and properties of soil.
- To make the students to learn about fertilizers and manures.
- The major objective of this is to provide a thorough background in pesticides, insecticides, fungicides and herbicides.

Semester	IV
Credit	4
Paper type	Elective
Max. Marks	CIA: 30 CE: 70 TOT =100

UNIT – I SOILS**12**

Classification, composition and properties of soils – soil water, soil temperature, soil minerals, soil acidity and soil testing.

UNIT – II FERTILIZERS**12**

Effect of Nitrogen, potassium and phosphorous on plant growth – commercial method of preparation of urea, triple superphosphate. Complex fertilizers and mixed fertilizers – their manufacture and composition. Secondary nutrients – micronutrients – their function in plants.

UNIT – III MANURES**12**

Bulky organic manures – Farm yard manure – handling and storage – oil cakes – blood meal – fish manures and green manures.

UNIT – IV PESTICIDES AND INSECTICIDES**12**

Pesticides: classification of Insecticides, fungicides, herbicides as organic and inorganic – general methods of application and toxicity. Safety measures when using pesticides.

Insecticides: Plant products – Nicotine, pyrethrin – Inorganic pesticides – borates. Organic pesticides – DDT and BHC.

UNIT – V FUNGICIDES AND HERBICIDES**12**

Fungicides: Sulphur compounds, Copper compounds, Bordeaux mixture.

Herbicides: Acaricides – Rodenticides. Attractants – Repellants. Preservation of seeds.

COURSE OUTCOMES

After the successful completion of the course the student will be able to

CO1	Enumerate how to overcome the deficiency of soil by application of fertilizers and manures.	L2
CO2	Develop an idea about the purification of water.	L2
CO3	Analyze the classification and applications of pesticides, insecticides, fungicides and herbicides.	L3

Total Periods: 60

TEXT BOOKS

1. Hegde H.P, "*Text Book of Agrochemistry*", Discovery Publishing House Pvt Ltd, 1st edition, New Delhi, 2009 (Unit – I & II).
2. Tan K.H, "*Principles of Soil Chemistry*", CRC Press, 4th edition, 2010 (Unit – III to V).

REFERENCE BOOKS

1. Yallamanda Reddy T and Sankara Reddy G.H, "*Principles of Agronomy*", Kalyani Publications, 1st edition.



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19CSC08 - Computer Programming in C
(Common to Physics & Chemistry)

OBJECTIVES

- To enable students to learn about the basic features of C Programming Language
- To learn the various decision making and looping statements
- To learn how to program using arrays and functions
- To learn about structures and pointers
- To learn file management and preprocessor in C

Semester	IV
Credit	3
Paper Type	Allied
Max. Marks	CIA: 30 CE: 70 TOTAL: 100

UNIT - I

(09)

Overview of C: History – Importance —Sample programs- Structure of a C Program – Programming Style **Constants, Variables and Data Types:** Character set - C Tokens – Constants, Variables and Data Types. **Operators and Expressions:** Operator and Expressions

UNIT II

(09)

Decision making and Branching: Decision Making with IF – Simple IF – The IF...ELSE Statement – Nesting of IF...ELSE Statements – ELSE IF Ladder – Switch Statement - ? Statement – GOTO Statement. **Decision Making and looping:** While Statement – DO Statement – FOR Statement

UNIT - III

(09)

Arrays: Declaring and Initializing Arrays – Declaring and Initializing One Dimensional Array – Declaring and Initializing of Two Dimensional Arrays – Multidimensional Arrays.

User Defined functions: Elements of User Defined Function – Definition of Function – Return Values and Types – Function Call and Declaration - Category of Functions – Recursion

UNIT - IV

(09)

Structures and Unions: Definition of Structure – Declaring Structure Variable – Accessing Structure Member – Structure within Structure – Structures and Function – Union.

Pointers: Understanding Pointers – Accessing the Address of the Variable – Declaring and initializing pointer variable – Accessing Pointer Variable.

UNIT - V

(09)

File Management: Defining and Opening the File – Closing a File – I/O Operation on File - Command Line Arguments.

TOTAL PERIODS: 45**COURSE OUTCOMES**

Upon successful completion of the course students will be able to

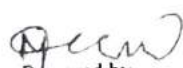
- Explain the basics of programs and programming
- Select appropriate data types and control structures for solving a given problem.
- Illustrate the representation of arrays, strings and usage of string operations.
- Create functions and use structures in programming
- Knowledge of pointers and dynamic memory allocation.
- Explain the basics of file handling mechanism.

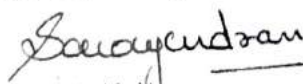
TEXT BOOK:


1. E.Balagurusamy "Programming in ANSI C", 4th Ed., Tata McGraw - Hill Publications, 2013.
Unit I :CH 1,2,3, UNIT II : CH 5,6 UNIT III :CH 7,8,9 UNIT IV :CH 10,11 UNIT V : CH 12

REFERENCE BOOKS :

1. Yashavant Kanetkar, "Let us C", 15th Ed., BPB Publications. 2017
2. Gottfried, "Programming with C", 2nd Ed., TMH Publications 2014


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19CS09 C - Programming Lab

Course Objectives

- Understand the basics of computers using c
- Understand the numerical differentiation and integration
- Understand matrix operations

List of practicals

1. Finding largest of three numbers
2. Calculation of pH of the solution
3. Conversion of Fahrenheit to Centigrade and vice versa
4. Sum of the squares of 1 to 10 numbers
5. Calculation of RMS, Average and Most Probable velocity
6. Calculation of energy of Electromagnetic radiation
7. Calculation of number of vibrational modes of linear and non-linear molecules
8. Calculation of Half-life period
9. Sorting of first ten elements in the periodic table
10. Printing name of the elements and their atomic numbers in "C" format.

Semester	IV
Credit	2
Paper Type	ALLIED
Max. Marks	CIA-15 CE- 35 TOTAL= 50

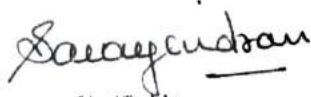
TOTAL PERIODS: 30

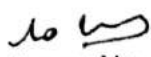
COURSE OUTCOMES

Upon successful completion of the course students will be able to

- Develop programming using basic concepts
- Implement concepts in chemistry
- Perform mathematical calculations using programming


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19CH404 SKILL BASED SUBJECT – 2: TEXTILE CHEMISTRY**COURSE OBJECTIVES**

- To provide a thorough background in the textile chemistry field.
- To understand structure, production and uses of viscose fiber.
- To understand the basic cleaning process involved in the fiber and chemical treatments.
- To understand the classification of yarn & types of weaves.
- To understand the types of warp and weft knitting.

Semester	IV
Credit	3
Paper type	Skill based
Max. Marks	CIA: 30 CE : 70 TOT = 100

UNIT – I FIBRES

9

Natural Textile Fibers – Definition, Classification of Natural Textile Fibers – Vegetable fibers – Animal fibers Properties, Uses and Features of Cotton, Wool, Silk and Jute fibers – Genetically Modified Cotton – its merits and demerits.

UNIT – II VISCOSE & RAYON

9

Viscose Fibre – Chemical structure, chemistry of regenerated cellulose – Production of Viscose Fiber – a simple flow chart, wet spinning of viscose filaments – Properties and uses of Viscose Fibre – Rayon – Different types of rayon and their sources – Acetate rayon – manufacture – properties – applications.

UNIT-III REMOVAL & BLEACHING

9

Impurities in raw cotton and grey cloth, wool and silk – general principles of the removal – Scouring – bleaching – Desizing – Souring – Kierboiling – Chemicking – Chemical and machinery use Degumming and Bleaching of silk Scouring and Bleaching of wool.

UNIT-IV YARN

9

Yarn – Definition and classification of yarn, Simple Yarn – Cable, Ply and double Fancy yarn – Slub, flake, Spiral, knot or spot yarn, Count and twist – Optimum twist. Woven Definition and Introduction. Woven – Parts and functions of a loom. Basic weaves – plain, twill and satin and their variations, Fancy weaves – pile, double cloth, swivel, lappet, leno, dobby and jacquard.

UNIT-V KNITTING

9

Knitting – Definition and classification of weft knitting – plain – Rib – Purl – Single jersey – Double jersey, Terry Interlock Warp knitting – Tricot – Raschel – Simplex and Milanese. Parts and functions of Flat & Circular knitting machine. Non-Woven – Definition and its Techniques – felting, fusing, bonding, lamination, netting and braiding.

COURSE OUTCOMES

After the successful completion of the course the student will be able to

CO1	Classify the different types of textile fibers.	L1
CO2	Manufacture and classify the viscose fibers and rayon's.	L2
CO3	Remove various types of impurities in natural fibers.	L3
CO4	Identify the different types of yarn available and their uses in various fields.	L3
CO5	Identify the weaving techniques of knitting & non woven fabrics.	L3


Total Periods: 45


TEXT BOOKS

1. Gupta et al, "*Textbook of Clothing and Textiles and Laundry*", Kalyani Publishers, 5th edition, New Delhi, 2006 (Unit – I & II).
2. Mishra S.P, "*A Textbook of Fibre Science and Technology*", New Age International Publishers, New Delhi, Reprint 2018 (Unit – III).
3. Gokarneshan N, "*Fabric Structure and Design*", New Age International Publishers, New Delhi, Reprint 2018 (Unit – IV & V).

REFERENCE BOOKS

1. Aspland J.R, "*Textile Dyeing and Colouration*", Clemson University, AA7CC, Copyright, USA (1997).
2. Corbman B.P, "*Fibre to Fabric*", International Students Edition McGraw Hill Book Co, ISBN:0070131376, Singapore (2000).
3. Smith J.L, "*Textile processing*", Abhishek Publications, Chandigarh (2003).
4. Gokarneshan U, "*Fabric Structure and Design*", New age International Publishers (2004).


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