VELLALAR COLLEGE FOR WOMEN (AUTONOMOUS)

ERODE – 638012

B.Sc., CHEMISTRY

CHOICE BASED CREDIT SYSTEM

*** Regulations**

***Scheme of Examination with Credits**

***Syllabus**

***Question Paper Pattern**

2019- 2020

VELLALAR COLLEGE FOR WOMEN (AUTONOMOUS),

ERODE – 638 012.

DEPARTMENT OF CHEMISTRY

B.Sc., (Chemistry)

Course contents, Scheme of examinations, Credits, Syllabus and Question paper pattern for Semesters I to IV for 2019 -20 batch.

SYLLABI

FOR

B.Sc., CHEMISTRY

Eligibility for Admission to B.Sc., Chemistry

Candidates for admission to the first year of the B.Sc., Chemistry course shall be required to have passed the Tamilnadu Higher Secondary examination or equivalent with Chemistry and Mathematics.

Duration of the course

The course shall extend over a period of three years comprising of six semesters with two semesters in one academic year. There shall not be less than 90 working days for each semester. Examination shall be conducted at the end of every semester for the respective subjects.

Course of study

The course of study for the B.Sc., Chemistry degree course shall consist of the following:

Part - 1

Tamil or Hindi shall be offered during the first four semesters with one examination at the end of each semester.

Part - II

English shall be offered during the first four semesters with one examination at the end of each semester.

Part III

Core subject - As prescribed in the scheme of examination, examination shall be conducted in the core subjects at the end of every semester.

Physics is offered as Allied I subject. Examinations are conducted at the end of the first and the second semesters. Mathematics is offered as Allied II subject. Examinations are conducted at the end of the third and the fourth semesters.

The following subjects are offered as electives.

A. (I) Analytical Chemistry/ (II) Pharmaceutical Chemistry

B. (I) Polymer Chemistry / (II) Water-quality analysis and Treatment

- Every student shall opt one elective in group A and examinations shall be conducted at the end of semester V and one elective in group B and examination shall be conducted at the end of semester VI.
- Every student shall visit industries during the course of study and submit the report of the industrial visit at the end of semester VI.

Part IV

1.(a) Students those who have not studied Tamil under part I in secondary education shall take Basic Tamil comprising of two courses (level will be at 6^{th} standard)

(b) Students those who have studied Tamil up to X std and taken a non-Tamil language under Part-I in XII std shall take Advanced Tamil comprising of two courses.

(c)For those who have not come under (a) and (b), Non major electives are offered under part IV as a Cafeteria System.

Board of studies in Chemistry offers the following Non major papers

Semester III-Water Management-An Environmental Perspective

Semester IV-Chemistry in Daily life

2. A Multiskill development paper is offered in semester IV for the major students to develop the soft skills, confidence and employability. Online examination is conducted for the first three units.

3. Skill based subject - Cafeteria system

Every student shall do a skill based subject under Cafeteria system which is spread over III, V & VI semesters. Papers offered are

- Chemistry of milk and milk products
- Textile Chemistry
- Industrial Chemistry

4. Environmental studies is offered under part IV and examination is conducted at the end of semester I.

5. Human rights and value education is offered under part IV and examination is conducted at the end of semester II.

Part V-NSS/NCC/GAMES/GREEN COUNCIL

Every student shall participate compulsorily for a period of not less than two years (4 semesters) in any one of the above programmes as extension activity.

Self learning Paper:

This board of studies in chemistry offers ‘Applied Science’ and ‘General Awareness’ as self learning papers. Every student is eligible to take up any number of self learning papers. Examination shall be conducted during April-May.

GOAL AND OBJECTIVES

The syllabus proposed for the B.Sc. Chemistry is aimed at empowering the students with the knowledge of various aspects of chemistry from the principles to the application.

The motto is to identify the newer concepts which are clearly fundamental to the learning of organic chemistry and then build them into a framework, the premise on which the science of organic chemistry rests.

Inorganic chemistry was essentially a descriptive subject in the earlier days. With the advent of modern concepts of atomic structure and electronic theory of valency, modern inorganic chemistry is more than a descriptive subject through the atomic structure and nature of the chemical bonds involved. Knowledge of the chemistry of metallic and non- metallic elements which is essential for a rational approach is also incorporated.

The syllabus includes mainly an outline of the important fundamentals of physical chemistry. Keeping in view of the widening aspects of physical chemistry many topics with recent advancements and application are added.

To orient the students towards the application of the learned subject, fundamentals of Analytical Chemistry, Pharmaceutical Chemistry, Polymer Chemistry and Water-quality analysis and treatment are prescribed as elective subjects which are value added and job oriented.

In part IV, a Multiskill development paper is offered to develop the soft skills and employability of the student in semester IV. In semesters III, V & VI Chemistry of Milk and milk products, Textile Chemistry and Industrial Chemistry are offered as skill based subjects, since this area being a region of textile industry, other small scale industries and a place where white revolution has emerged. Studying these papers motivate entrepreneurship and find more employment opportunities.

Inorganic qualitative semi micro analysis is offered in Core Chemistry Practical I to acquire the skill to analyze mixture of inorganic salts. Core Chemistry Practicals II includes Volumetric, Organic Analysis and Organic preparations to obtain the skill to perform the titration and visualizing the different organic reactions. Gravimetric Analysis and Physical Chemistry is offered as Core Chemistry Practical III to gain the analytical, evaluative and synoptic skills. Elective Practical is introduced to enhance the industrial oriented skills for a professional career.

To make the non-chemistry students to understand the importance of the water management and the importance of Chemistry in day today life, papers on Water Management-An Environmental Perspective and Chemistry in daily life is introduced as non major subjects.

To make the education process socially relevant and applying the knowledge to specific situation, a paper on Applied Science is offered as self learning.

The syllabus is framed in such a way that the students can understand the relation between facts and theories they are learning. The objective is to make them learn more and more about what is really happening and to identify the various manifestations of the same basic factors which appear unrelated. A feeling of excitement while learning chemistry and applying it to carve the future is the purpose aimed at.

Vellalar College for Women (Autonomous), Erode - 12.									
Bachelor Of Science In Chemistry									
2019 – 2020 onwards									
Course Content and Scheme of Examinations (CBCS Pattern)									
Semester I									
Part	**Study Components**	**Sub. Code**	**Title Of the Paper**	**Inst. Hrs./ Week**	**Exam. Dur. Hrs.**	**Max. Marks**			**Credits**
						CIA	**ESE**	**Total**	
I	Language I	18TAMU101/ 18HINU101	**Tamil / Hindi**	6	3	25	75	100	3
II	Language II	18ENLU101	**English I**	6	3	25	75	100	3
III	Core	18CHUC101	**Core Chemistry I**	3	3	25	75	100	4
		18CHUC102	**Core Chemistry II**	3	3	25	75	100	4
			Core Chemistry Practical I	3	–	–	–	–	–
	Allied I	18PHUA101	**Allied Physics Paper I**	4	3	20	55	75	4
			Allied Physics Practical	3	–	–	–	–	–
IV	Foundation Course	18FOCU1ES	**Environmental Studies**	2	3	–	100	100	2
	TOTAL							**575**	**20**
Semester II									
I	Language I	18TAMU202/ 18HINU202	**Tamil / Hindi**	6	3	25	75	100	3
II	Language II	18ENLU202	**English II**	6	3	25	75	100	3
III	Core	18CHUC203	**Core Chemistry III**	3	3	25	75	100	4
		18CHUC204	**Core Chemistry IV**	3	3	25	75	100	4
		18CHUCP01	**Core Chemistry Practical I**	3	3	40	60	100	3

	Allied I	18PHUA202	**Allied Physics Paper II**	4	3	20	55	75	4
		18PHUAP01	**Allied Physics Practical**	3	3	20	30	50	2
IV	Value Education	18VEDU2HR	**Value Education and Human Rights**	2	3	–	100	100	2
	TOTAL							**725**	**25**
Semester III									
I	Language I	18TAMU303	**Tamil**	6	3	25	75	100	3
II	Language II	18ENLU303	**English III**	6	3	25	75	100	3
III	Core	18CHUC305	**Core Chemistry V**	3	3	25	75	100	4
			Core Chemistry Practical - II	3	–	–	–	–	–
	Allied II	18MSUA3C3	**Mathematics for chemistry - I**	5	3	20	55	75	4
		18MSUAPC1	**SageMath & Octave**	2	3		25	25	1
IV	Skill Based Subject	18CHUS301	**Skill Based Subject – I**	3	3	25	75	100	3
	*Basic Tamil	17TMLU301		2	–	100	–	100	2
	**Advanced Tamil	17ADTU301			3	25	75		
	Non Major Elective I				3	–	100		
	TOTAL							**600**	**20**
Semester IV									
I	Language I	18TAMU404	**Tamil/Hindi**	6	3	25	75	100	3
II	Language II	18ENLU404	**English IV**	6	3	25	75	100	3
III	Core	18CHUC406	**Core Chemistry VI**	3	3	25	75	100	4

		18CHUCP02	**Core Chemistry Practical - II**	3	6	60	90	150	4
	Allied II	18MSUA4C4	**Mathematics for chemistry - II**	5	3	20	55	75	4
IV		18MSUAPC2	**R Software**	2	3		25	25	1
	Skill Based Subject	18CHUS402	**Multi Skill Development Paper**	3	1 1/2	40	#60	100	3
	*Basic Tamil	17TMLU402		2	–	100	–	100	2
	**Advanced Tamil	17ADTU402			3	25	75		
	Non Major Elective II				3	–	100		
	TOTAL							**750**	**24**
	# Online Examination								
* For Students Whose Part I in Secondary Education is Not Tamil									
** For Students Whose Part I in Higher Secondary Education is Not Tamil									

SKILL BASED SUBJECTS		
Subject - I	18CHUS301	Chemistry Of Milk And Milk Products
Subject - II	18CHUS402	Multi Skill Development Paper
NON MAJOR ELECTIVES		
Elective - I	18CHUN301	Water Management - An Environmental Perspective
Elective - II	18CHUN402	Chemistry in Daily Life
ALLIED CHEMISTRY PAPERS		
I	18CHUA101	Allied Chemistry I For B.Sc., Physics
I/III	18CHUA001/ 18CHUA303	Allied Chemistry I For B.Sc., N & D, B.Sc., Botany and B. Sc., Zoology
II	18CHUA202	Allied Chemistry II For B.Sc., Physics
II/IV	18CHUA002/ 18CHUA404	Allied Chemistry II For B.Sc., N & D, B.Sc., Botany and B. Sc., Zoology
II/IV	18CHUAP01	Allied Chemistry Practical (For All Majors having Allied Chemistry)
SELF LEARNING PAPERS		
PAPER - I	13CHUSL04	Applied Science
PAPER - II	13AUGSL05	General Awareness

MOOCs Non-ranking Compusory Credit Course will be introduced in Part V for UG from the Academic Year 2019-20 and Onwards.

DEPARTMENT OF CHEMISTRY

VISION

To excel as a centre of global reputation in chemistry in the fields of education, research and services promoting interdisciplinary learning.

MISSION

- To produce competent, competitive and professional graduates with an innovative and intellectually stimulating attitude.
- To support other academic programs by offering quality chemistry learning experiences.
- To conduct basic and applied research of national and international impact.
- To build proactive partnerships with industry and offer effective service to the society.

PROGRAMME EDUCATIONAL OBJECTIVES

- To transform and empower women graduates to meet global challenges through holistic education in terms of recent Teaching-Learning methodologies
- To groom the graduates towards excellence through building communication skills, handling leadership challenges and negotiating career path ways
- To heighten the conscious of the graduates on socio-economic concern and to evolve it as an in built mechanism to chisel as better human being.
- To produce graduates strengthened by contextual knowledge of chemistry with innovative research attitude and serve the society with appropriate consideration for sustainable development.
- To produce chemists who can nurture the needs of chemical industries and laboratories such as pharmaceutical and textile industries.

PROGRAMME OUTCOMES

The programme aids the graduates to

- emerge with competency in the subject of Chemistry and apply knowledge to cater to the needs of Society / Employer / Institution / Own Business / Enterprise
- imbibe analytical/critical/logical/innovative thinking skills in the field of Basic and Applied Science
- acquire distinct traits and ethics with high professionalism to gain a broader insight into the domain concerned, the nation and themselves
- evolve as chemists with strong fundamentals and conceptual clarity supported by specialized knowledge and high competency in scientific and analytical skills that meet current and future needs
- create, select, apply, adopt and extend appropriate knowledge, techniques, resources and modern scientific tools to a range of activities with an understanding of the associated limitations for the prospect of science and society.

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Bloom's Taxonomy Based Assessment Pattern

Components of CIA Marks (Core Papers)

Tests (I & II)	Assignment / Seminar / Subject Viva	Model Examination	Total
10	**5**	**10**	**25**

Components of CIA Marks (Allied Papers)

Tests (I & II)	Assignment / Seminar / Subject Viva	Model Examination	Total
08	**04**	**08**	**20**

CIA

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	2 x 2 = 4	30
K2 K3	B	Either / Or	2 x 5 = 10	
K2 K3	C	Open Choice (2 out of 3)	2 x 8 = 16	

Model and End Semester Examination

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	5 x 2 = 10	75
K2 K3	B	Either / Or	5 x 5 = 25	
K2 K3	C	Open Choice (5 out of 8)	5 x 8 = 40	

Components of CIA Marks (Core Practical)

Lab Work/Skill/Regularity/Viva	Record	Model Examination	Total
20	**10**	**10**	**40**

Components of CIA Marks (Allied Practical)

Lab Work/Skill/Regularity/Viva	Record	Model Examination	Total
10	**04**	**06**	**20**

CODE	COURSE TITLE
18CHUC101	**CORE CHEMISTRY - I**

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	41	4	-	4

Preamble

The course aims to provide understanding of the formation of ionic and covalent bonding with the concept of hybridization and introduces the polar effects in organic chemistry and imparts knowledge about the hydrocarbons.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1.	Recognize the formation of ionic bonding and their characteristics	K2, K3
CO2.	Apply the concept of hybridization and explore molecular geometry	K2
CO3.	Acquire knowledge of polar effects and reactive intermediates	K1,K3
CO4.	Interpret the Chemistry of Alkenes and Dienes	K2,K3
CO5.	Realize the chemistry of Cycloalkanes, Alkynes and concept of Conformations,	K2, K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1.	M	S	M	S	S
CO2.	S	M	M	S	S
CO3.	M	M	M	S	S
CO4.	M	L	M	S	S
CO5.	M	L	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(9 hrs.)**

Ionic Bonding: General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Landé equation for calculation of lattice energy. Properties of Ionic Crystals -High Melting Point – Hardness - Electrical Conductivity In Molten Condition and in solution. Polarizing power and polarizability. Fajan's rules. Solubility Of Ionic Compounds in Polar Solvent.Ionic character in covalent compounds

UNIT II **(9 hrs.)**

Covalent Bonding: VB Approach- Shapes of inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral,trigonal bipyramidal and octahedral arrangements. Concept of resonance and resonating structures in various inorganic compounds.

MO Approach- Rules for the LCAO method, bonding and antibonding MOs. MO treatment of homonuclear and heteronuclear diatomic molecules viz., H_2, O_2, N_2, CO, NO and NO^+. Comparison of VB and MO approaches.

UNIT III **(9 hrs.)**

Polar Effects: Electronic Displacements- Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Influence of polar effects on acidity and basicity of organic compounds.

Cleavage of Bonds: Homolysis and Heterolysis. Generation, Structure and reactivity of Nucleophiles and electrophiles- Carbocations -Carbanions and free radicals.

UNIT IV **(9 hrs.)**

Alkenes: Preparation By Wittig Reaction - Mechanisms Of Beta Elimination – E_1, E_2 Elimination - Hoffmann's Rule And Saytzeff's Rule - Addition Reactions With Hydrogen – Halogen - Hydrogen Halide (Markownikoff's Rule), Hydrogen Bromide (Peroxide Effect), Hydroboration and Ozonolysis.

Dienes: Stability of Isolated and Conjugated Dienes. Electrophonic Addition of HBr and Bromine. Free Radical addition. Diels –Alder Reaction.

UNIT V

(9 hrs.)

Cycloalkanes: Preparation by Dieckmann Ring Closure and by Reduction of Aromatic Hydrocarbons – Ring Opening Reactions of Cyclopropane with H_2, Br_2 and HI.

Alkynes: General methods of preparation of alkynes, properties of alkynes –acidity, hydration, hydroboration, oxidation with $KMnO_4$ and ozonolysis.

Conformations*:* Ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations.

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Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Bhal B.S. & Arun Bahl	Advanced of Organic Chemistry	S. Chand & co., New Delhi	2016, 1st Edition
2.	Puri, Sharma & Kalia	Principles of Inorganic Chemistry	Milestone Publisher	2011, 11th Edition

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Jain M.K. & Sharma S.C.	Modern Organic Chemistry	Vishal Publishing Co, New Delhi	2014, 4th Edition
2.	Madan R.D.	Modern Inorganic Chemistry	S. Chand & Co, New Delhi	2011, 3rd Revised Edition
3.	Mughergee S.M., Singh S.P. & Kapoor R.P.	Organic Chemistry (Volume I, II & III),	Newage International (P) Limited, New Delhi	Vol: I - 1990, 1st Edition Vol: II - 2014, 2nd Edition Vol: III - 2015, 2nd Edition
4.	Soni P.L. & Chawla H.M.	Text Book of Organic Chemistry	Sultan Chand & Sons, New Delhi	2010, 27th Edition
5.	Soni P.L.	Text Book of Inorganic Chemistry	Sultan chand & sons, New Delhi	2003, 20th Edition

Pedagogy

- Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

CODE	COURSE TITLE

18CHUC102	**CORE CHEMISTRY - II**

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	41	4	-	4

Preamble

The course enables the students to acquire knowledge about few inorganic elements, provides concepts on aromaticity, introduces liquid crystals and condensed phases and also imparts basic and higher level knowledge on quantum chemistry.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1.	Acquire Knowledge of Ozone, Hydrogen peroxide and Sulphur family elements.	K1, K2
CO2.	Apply the concept of aromaticity to benzenoid compounds and interpret the mechanisms of electrophilic substitution reactions.	K2
CO3.	Recognize the Liquid crystals and condensed phase.	K2, K3
CO4.	Understand the background of quantum chemistry and advanced approach to quantum mechanical model of atoms.	K2, K3
CO5.	Develop ideas on quantum mechanical approach to larger molecules.	K2, K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	L	M	S	S
CO3	M	M	M	S	S
CO4	M	M	M	S	S
CO5	M	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(9 hrs.)**

Ozone And Hydrogen Peroxide: Preparation – Properties – Structure - Uses- Comparison Between the Two. **Sulphur, Selenium and Tellurium:** A Comparative Study of Sulphur – Selenium – Tellurium. Extraction and Allotropic forms - Properties – Uses - Oxides and Oxyacids of Selenium and Tellurium

UNIT II **(9 hrs.)**

Aromaticity: Huckel's rule and its applications to Benzene Naphthalene, Anthracene, Pyridine, Pyrrole, Cyclopropenyl cation and cyclopenta dienyl anion. **Aromatic Hydrocarbons:** Resonance and Resonance energy in Benzene – Electrophilic Substitution in Benzene, Arenium mechanism - Mechanism of Nitration – Sulphonation – Halogenation - *Friedel- Crafts Alkylation - Acylation.* Reactivity and orientation of monosubstituted benzene- o,p directing and m directing effects.

UNIT III **(9 hrs.)**

Liquid Crystals: The Concept of Mesomorphic State – Types of Liquid Crystals and their Properties - Properties of Liquid state- Surface Tension And Viscosity - Structural Differences Between Solids, Liquids and Gases. **Condensed Phases:** Coefficients of Thermal Expansion and Compressibility of Liquids and Solids- Methods of Determination.

UNIT IV **(9 hrs.)**

Quantum Chemistry I: Failure of Classical Theory in Explaining Black Body Radiation - Plancks Theory of Quantization of Energy –Einstein Theory of Photoelectric Effect – Compton Effect. De Broglie Theory of Wave Particle Dualism-Heisenberg's Uncertainity Principle.

UNIT V **(9 hrs.)**

Quantum Chemistry II: An Elementary Treatment of Schordinger Wave Equation –Quantum Numbers - Concept of Orbitals - Significance Of Ψ & Ψ^2 Free Particles and Particle in a Box (One And Three Dimensional) - The Covalent Bonds – The Hydrogen Molecule - The Valence Bond Method - Hydrogen Molecule Ion - Molecular Orbital Method - Molecular Orbitals for Homonuclear - Heteronuclear Diatomic Molecules.

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Bhal B.S. & Arunbahl	Advanced of Organic Chemistry	S. Chand & co, New Delhi	2016, 1st Edition
2.	Madan R.D.	Modern Inorganic Chemistry	S. Chand & co, New Delhi	2011, 3rd Revised Edition
3.	Puri B.R., Sharma L.R. & Pathania M.S.	Principles of Physical Chemistry	Sobanlal Nagin chand & co., New Delhi	2016, 47th Edition

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Jain M.K. & Sharma S.C.	Modern Organic Chemistry	Vishal Publishing Co, New Delhi	2014, 4th Edition
2.	Kheterpal S.C.	Physical Chemistry Vol. I & II	Pradeep Publications, Jalandhar	2011, 2nd Edition
3.	Puri B.R. & Sharma L.R.	Principles of Inorganic Chemistry	Vishal Publishing Company, Jalandhar	2016, Revised Edition
4.	Soni P.L.& Chawla H.M.	Text Book of Organic Chemistry	Sultan Chand & Sons, New Delhi	2010, 27th Edition
5.	Soni P.L.	Text Book of Inorganic Chemistry	Sultan chand & sons, New Delhi	2003, 20th Edition

Pedagogy

- Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

CODE	COURSE TITLE
18CHUC203	**CORE CHEMISTRY - III**

Category	CIA	ESE	L	T	P	Credit
CORE	**25**	**75**	**41**	**4**	-	4

Preamble

To impart basic knowledge of coordination chemistry and a clear understanding of the gaseous laws. To enable the student to learn the basic concepts of thermodynamic transformations, apply the first law of thermodynamics and also to learn the concept of the substitution mechanisms in organic chemistry.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1.	Interpret the Key Features of Co-ordination Complexes and its applications	K1,
CO2.	Apply the concepts of gaseous law and to study their properties	K2, K3
CO3.	Realize the thermodynamic aspect of various energy transformations	K2,K3
CO4.	Analyze the potential of Thermo chemical conversions through 1^{st} law	K2, K3
CO5.	Investigate substitution mechanisms in organic conversions and the factors influencing	K2,K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	M	M	S	S
CO3	M	M	M	S	S
CO4	M	M	L	S	S
CO5	M	S	M	S	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(9 hrs.)**

Coordination Chemistry: Nomenclature of Coordination Compounds - Conductivity and Precipitation Studies - Werner's Coordination Theory - Electronic Interpretation of Coordinate Bond by Sidgwick - Pauling's Valence Bond Theory and Crystal Field Theory – Interpretation of Magnetic Properties.

UNIT II **(9 hrs.)**

Gaseous state- Postulates of Kinetic Theory of Gases- Derivation of Kinetic Gas Equation- Derivation of Boyles law, Charles law, Avagadros law, Ideal gas equation, Graham's law of diffusion and Dalton's law of partial pressure from kinetic gas equation. Maxwells distribution of molecular velocities (derivation not required), Root Mean Square, average velocity, most probable velocity (derivation not required). **Collision:** diameter, frequency, mean free path (only definition).

UNIT III **(9 hrs.)**

Thermodynamic Terms: Definitions – Heat - Work of Expansion - Work of Compression - Maximum and Minimum Quantities of Work – Reversible and Irreversible Transformations - Energy and the I Law of Thermodynamics – Properties of Energy changes in Relation to changes in Properties of the System – Isothermal and Adiabatic Changes -Thermodynamic State Function Versus Path Function – Properties of exact and inexact Differentials – Relation between ΔE and ΔH -C_p and C_v.

UNIT IV **(9 hrs.)**

Application of the First Law of Thermodynamics to Chemical Reactions: The Heat of Reaction – Conventional Values of H - The Determination of Heats of Formation Sequences of Reactions – Hess's Law- Heats of Combustion – Determination by Bomb Calorimeter - Heats of Reaction at constant volume - Dependence of the Heat of Reaction on Temperature and Kirchoff's Equations.

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UNIT V **(9 hrs.)**

Nucleophilic Substitution: Mechanism- SN^1, SN^2, SN^i Reactions - Effect of solvent –Nucleophile - Structure of Substrate and Neighbouring group participation - Elimination Versus Substitution – Benzyne Mechanism - Intermediate Complex Mechanism.

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Bhal B.S. & Arunbahl	Advanced of Organic Chemistry	S. Chand & co New Delhi	2016, 1st Edition
2.	Puri B.R.& Sharma L.R.	Principles of Inorganic Chemistry	Vishal Publishing Company, Jalandhar	2016, Revised Edition
3.	Soni P.L.& Chawla H.M.	Text Book of Organic Chemistry	Sultan Chand & Sons, New Delhi	2010, 27th Edition

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Soni P.L.& Dharma Rao D.P.	Text Book of Physical Chemistry	S. Chand & Co., New Delhi	2000, 21st Edition
2.	Madan R.D.	Modern Inorganic Chemistry	S. Chand & Co New Delhi	2011, 3rd Revised Edition
3.	Mughergee, S.M., Singh S.P. & Kapoor R.P.	Organic Chemistry (Volume I, II &III),	Newage International (P) Limited, New Delhi	Vol: I - 1990, 1st Edition Vol: II - 2014, 2nd Edition Vol: III - 2015, 2nd Edition
4.	Bahl B.S. & Tuli G.D	Essentials of Physical Chemistry	S. Chand & Co., New Delhi	2014, 27th Edition

Pedagogy

- Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

CODE	COURSE TITLE
18CHUC204	**CORE CHEMISTRY - IV**

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	41	4	-	4

Preamble

To enable the students to learn the principles of general methods of metal extraction techniques in Inorganic Chemistry and to gain knowledge of reactions of carbonyl compounds in Organic Chemistry. A comprehensive information about the II law of Thermodynamics is also aimed.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1.	Comprehend the principles and steps involved in the extraction of metals	K1,
CO2.	Compare the Physical and Chemical properties of Alkali and Alkaline Earth metals	K2,K3
CO3.	Interpret the reactions of carbonyl compounds- Aldehydes and Ketones	K2,K3
CO4.	Analyse thermodynamic processes and derive expressions for II law of Thermodynamics	K2,K3
CO5.	Apply the concepts of Chemical Equilibrium	K2,K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	M	M	S	S
CO3	L	L	M	S	S
CO4	M	M	M	S	S
CO5	M	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(9 hrs.)**

General methods of extraction of metals: Ores and Minerals – Types of ores – Methods of ore dressing - Concentration – Gravity separation – Froth Floatation – Magnetic separation – Calcination – Roasting – Smelting – Aluminothermic process – Purification of metals – Electrolysis – Refining – Zone Refining – Van Arkel Refining – Electrolytic Refining – Extraction of radioactive elements – Uranium and Thorium only.

UNIT II **(9 hrs.)**

Alkali Metals: Group discussion – Lithium extraction – Properties and uses of Li – Diagonal relationship with Magnesium. **Alkaline earth metals:** Group discussion – Extraction, Properties and Uses of Beryllium and Magnesium).

UNIT III **(9 hrs.)**

Reactions of Aldehydes and Ketones: Nucleophilic addition reactions – Aldol Condensation – Perkins – Knoevenagal – Claisen - Dieckmann – Reformatsky reactions – Reactions with $LiAlH_4$ and $NaBH_4$ – Wolf-Kishner and MPV reactions – Simple and crossed Cannizaro reaction.

UNIT IV **(9 hrs.)**

II Law of Thermodynamics: Need for the II law of Thermodynamics – Different Statements of II law – Numerical definition of Entropy – Carnot cycle – Carnot theorem – Derivation of Entropy from Carnot cycle – Entropy change in an irreversible process – Entropy change for an ideal gas with T and V as variables – P and T as variables – Entropy of mixing of Ideal gas – Gibbs Helmholtz equation.

UNIT V **(9 hrs.)**

Chemical Potential: Gibbs Duhem equation – Variation of Chemical potential with P and T – Chemical potential in a system of Ideal gases – Clapeyron-Clausius equation – **Chemical Equilibrium**: Spontaneous reactions – Standard free energy change- Conditions for equilibrium and spontaneity. Law of mass action – Relation between Kp, Kc and Kx – Vont Hoff Isotherm and Isochore – Statement of III law of Thermodynamics – Exceptions of III law. Zeroth Law-Absolute temperature.

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Bhal B.S. & Arunbahl	Advanced of Organic Chemistry	S. Chand & Co, New Delhi	2016, 1st Edition
2.	Kheterpal S.C.	Physical Chemistry Vol. I & II	Pradeep Publications, Jalandhar	2011, 2nd Edition
3..	Madan R.D.	Modern Inorganic Chemistry	S. Chand & Co, New Delhi	2011, 3rd Revised Edition
4.	Puri B.R., Sharma L.R. & Pathania M.S.	Principles of Physical Chemistry	Sobanlal Nagin chand & co., New Delhi	2016, 47th Edition

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Puri B.R., Sharma L.R.	Principles of Inorganic Chemistry	Vishal Publishing Company, Jalandhar	2016, Revised Edition
2.	Soni P.L.	Text Book of Inorganic Chemistry	Sultan chand & sons, New Delhi	2003, 20th Edition
3.	Bahl B.S. & Tuli G.D.	Essentials of Physical Chemistry	S. Chand & Co., New Delhi	2014, 27th Edition
4.	Soni P.L.& Dharma Rao D.P.	Text Book Of Physical Chemistry	S. Chand & Co., New Delhi	2000, 21st Edition

Pedagogy

- Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

CODE	COURSE TITLE
18CHUCP01	**Core Chemistry Practical I** **INORGANIC QUALITATIVE SEMI MICRO ANALYSIS**

Category	CIA	ESE	L	T	P	Credit
CORE	40	60	-	-	45	3

Preamble

The course aims to impart analytical skills by learning to analyze mixtures of inorganic substances Containing four ions and provide skills to eliminate interfering anions from mixtures.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1.	Perform systematic semi micro qualitative analysis	K1
CO2.	Interpret the nature of various inorganic anions and cations	K2 K3
CO3.	Identify and detect various anions and cations through their reactions	K2
CO4.	Eliminate interfering anions from the inorganic mixtures	K2 K3
CO5.	Identify and cations group according to their properties	K1 K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	L	S	S	S
CO3	M	M	M	S	S
CO4	M	M	M	S	S
CO5	M	L	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

Cations To Be Analysed: Lead – Copper – Iron - Zinc- Manganese – Cobalt – Nickel – Barium – Strontium - Magnesium - Ammonium.

Anions To Be Analysed: Carbonate – Sulphate – Nitrate – Chloride- Bromide –Fluoride - Oxalate - Borate - Phosphate.

Pedagogy

Demonstration, PPT, Experimental work

CODE	COURSE TITLE
18CHUC305	**CORE CHEMISTRY - V**

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	41	4	-	4

Preamble

The course enables the students to understand about metals, phenols, amines, phase rule and phase diagram.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1.	Acquire knowledge in Boron family and compounds of Boron	K2, K3
CO2.	Apprehend the metallurgy of Germanium and Transition metals	K1,K3
CO3.	Assist to understand the Chemistry of Phenols	K1,K2,K3
CO4.	Procure the reactions of Aliphatic and aromatic amines	K1,K2,K3
CO5.	Apply the concept of Phase rule to one and two component systems	K2, K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1.	M	L	M	S	S
CO2.	S	S	M	S	S
CO3.	M	S	M	S	S
CO4.	M	S	M	S	S
CO5.	L	M	L	M	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(9 hrs.)**

Chemistry Of Boron Family: General characteristics – Electronic configuration – Similarities in Physical properties – Similarities in Chemical properties – Formation of Oxides and Hydroxides - Formation of Trihalides - Formation of Hydrides – Comparison of B and Al – Diagonal relationship between B and Si – Position of Boron in the Periodic table – Diborane – Preparation – Properties – Structure of Diborane - Preparation – Properties – Uses of Sodium borohydride – Borazole.

UNIT II **(9 hrs.)**

Occurrence, Extraction, Properties And Uses Of Metals: Germanium – Titanium – Zirconium – Vanadium – Molybdenum - Tungsten And Their Important Compounds Such As $GeCl_4$, GeO_2, $TiCl_4$, $ZrOCl_2$, V_2O_5, Ammonium Molybdate And WO_2.

UNIT III **(9 hrs.)**

Phenols: Monohydric Phenols - Preparation And Properties – Reaction Of Monohydric Phenols With Mechanism – Alkylation – Esterification – Nitration – Sulphonation –Halogenation- Coupling With Diazonium Salts - Dihydric Phenols – Resorcinol - Preparation – Properties And Uses - Alpha And Beta Naphthols - Preparation And Properties.

UNIT IV **(9 hrs.)**

Amines: Aliphatic amines – Preparation of 1˚, 2˚, 3˚ amines – Separation of mixture of Amines – Basicities of Amines – Reactions of 1˚, 2˚, 3˚ amines – With Mineral acids – Alkylation – Acylation – Sulphonylation – Hinsberg Test – With nitrous acid – Aromatic amines – Aniline – Preparation – Basicity of Aniline – Properties - Acylation – Sulphonylation – Diazotization – Ring Substitution reactions – Bromination – Nitration – Sulphonation.

UNIT V **(9 hrs.)**

Phase Rule And Phase Equilibria: The Equilibrium Condition – Derivation Of Phase Rule – Phase Equilibria In One Component System - Phase Diagram For Sulphur And Water System - Phase Diagram For Two Component System - Construction Of The Phase Diagram - Bi-Cd, Zn-Mg, Na-K System.

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Puri B.R., Sharma L.R.	Principles of Inorganic Chemistry	Vishal Publishing Company, Jalandhar	2016, Revised Edition
2.	Bhal B.S. & Arun Bahl	Advanced Organic Chemistry	S. Chand & co., New Delhi	2016, 1st Edition
3.	Puri B.R., Sharma L.R. & Pathania M.S.	Principles of Physical Chemistry	Sobanlal Nagin chand & co., New Delhi	2016, 47th Edition

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Bahl B.S. & Tuli G.D.	Essentials of Physical Chemistry	S. Chand & Co., New Delhi	2014, 27th Edition
2.	Soni P.L.	Text Book of Inorganic Chemistry	Sultan chand & sons, New Delhi	2003, 20th Edition
3.	Madan R.D.	Modern Inorganic Chemistry	S. Chand & Co, New Delhi	2011, 3rd Revised Edition
4.	Morrison R.T and Boyd. R.W.	Organic Chemistry	Prentice-Hall of India, New Delhi	1997, 6th Edition
5.	Glasstone S. and Lewis D.	Elements of Physical chemistry	McMillan, New Delhi	1970, 2nd Edition
6.	Kundu N. S. and Jain S.K.	Physical chemistry	Chand & co., New Delhi	1984, 1st Edition

Website Sources

1. https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Supplemental_Modules (Organic_Chemistry)/Phenols/Properties_of_Phenols/Physical_Properties_of_Phenol
2. https://www.quora.com/Why-are-aliphatic-amines-more-basic-than-aromatic-amineshttps://www.researchgate.net/publication/265602607_Phase_Rule_CHAPTER-6_Phase_Rule

Pedagogy

- Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

CODE	COURSE TITLE
18CHUC406	**CORE CHEMISTRY - VI**

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	41	4	-	4

Preamble

To promulgate the better understanding of fundamental organic chemistry, dyes, iron group metals, adsorption, solutions and coligative properties.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO6.	Recognise the Purification and Estimation techniques in organic chemistry and its applications	K2
CO7.	Illuminate the perception of dye chemistry	K2,K3
CO8.	Perceive the metallurgy of iron group metals and their uses	K2,K3
CO9.	Understand the ideal, non ideal solutions and colligative properties	K2,K3
CO10.	Describe the adsorption isotherms	K1,K2

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO6.	S	S	S	S	M
CO7.	S	S	M	S	M
CO8.	M	S	M	S	M
CO9.	M	M	S	S	M
CO10.	M	S	S	S	M

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(9 hrs.)**

Purification and Estimation techniques in Organic Chemistry: Purification– Crystallization– Sublimation – Distillation – Fractional Distillation Distillation – Under Reduced Pressure – Steam Distillation – Extraction With The Solvent –Chromatography – Column Chromatography – Gas Liquid Chromatography – Tests Of Purity – Melting Point – Mixed Melting Point – Boiling Point – Detection Of Carbon, Hydrogen, Oxygen, Nitrogen, Sulphur, Halogens, Phosphorous – Estimation Of Carbon Nitrogen (Kjeldahl Method) – Halogens(Carius Method) – Sulphur, Phosphorous, Oxygen – Calculation Of Empirical Formula – Molecular Formula – Importance Of Organic Chemistry In Modern Life.

UNIT II **(9 hrs.)**

Dyes: Terms Used In Color Chemistry – *Chromophores* – *Auxochromes* -Bathochromic Shift - Hypsochromic Shifts – Relationship Of Color Observed To Wavelength Of Light Absorbed - Color Of A Substance - Quinonoid Theory - Molecular Orbital Approach – Classification Of Dyes According To Chemical Constitution**:** Azo Dyes - Methyl Orange - *Bismark Brown* - Congo Red - Triphenyl Methane Dyes-Malachite Green - Crystal Violet - Phthalein Dyes – Phenolphthalein - Xanthene Dyes-Fluorescein - Anthraquinone Dyes - Mordant Dye – Alizarin – Vat Dye – Indigo..

UNIT III **(9 hrs.)**

Iron Group metals: Iron - Occurance - Passivity Of Iron - Theories Of Passivity - Smith And Rusel Theory -Oxide Film Theory - Rusting Of Iron - Theories Of Rusting - Acid Theory -Electrochemical Theory - Production From Rusting - Commercial Forms Of Iron - Cast Iron: Manufacture From Haematite Ore -Properties And Uses - Wrought Iron: Manufacture From Cast Iron -Properties -Uses - Steel: Manufacture From Bessemer Process- Annealing - Hardening - Tempering - Uses Of Alloy Steel - Extraction - Properties And Uses Of Platinum - Important Alloys Of Platinum - Platinum Black - Spongy Platinum - *Platinised Asbestos*.

UNIT IV **(9 hrs.)**

Solutions: Ideal And Non-Ideal –Raoult's Law - Henry's Law – *Solubility Of* Partially M*iscible Liquids* – **Colligative Properties** : Relative Lowering Of Vapour Pressure - Elevation Of Boiling Point - *Depression Of Freezing Point* – Osmotic Pressure - Their Applications Nernst Distribution Law And Its Application.

UNIT V

(9 hrs.)

Adsorption: Types Of Adsorption -Adsorption Isotherms - Freundlich Adsorption Isotherm - Langmuir Adsorption Isotherm -BET Equation - (Elementary ideas only) Adsorption By Solids From Solutions - Gibbs Equation (Derivation Excluded) - Adsorption Isobars - Adsorption Isostere - Applications of Adsorption.

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Puri B.R., Sharma L.R.	Principles of Inorganic Chemistry	Vishal Publishing Company, Jalandhar	2016, Revised Edition
2.	Bhal B.S. & Arun Bahl	Advanced Organic Chemistry	S. Chand & co., New Delhi	2016, 1st Edition
3.	Puri B.R., Sharma L.R. & Pathania M.S.	Principles of Physical Chemistry	Sobanlal Nagin chand & co., New Delhi	2016, 47th Edition

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Arora M.G.,	*Text Book Of Dyes*	Anmol Publications, New Delhi	1996,1st Edition
2	Mughergee, S.M., Singh S.P., Kapoor R.P	*Organic Chemisty Vol – 1,2,3*	Wiley Eastern, New Delhi	1992,1st Edition
3	Soni P.L.	Text Book of Inorganic Chemistry	Sultan chand & sons, New Delhi	2003, 20th Edition

4	Madan R.D.	Modern Inorganic Chemistry	S. Chand & Co, New Delhi	2011, 3rd Revised Edition
5	Kheterpal Dr. S.C	*Physical Chemistry Vol. I & II*	Pradeep Publications, Jalandhar,	2011, 2nd Edition

Website Sources

1. https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Book%3A_Basic_Principles_of_Organic_Chemistry_(Roberts_and_Caserio)/28%3A_Photochemistry/28.4%3A_Color_and_Constitution

2. https://www.emedicalprep.com/study-material/chemistry/surface-chemistry/adsorption/

3. https://opentextbc.ca/chemistry/chapter/11-4-colligative-properties/

Pedagogy

- Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

SEMESTER - IV

CODE	COURSE TITLE
18CHUCP02	CORE PRACTICAL II- VOLUMETRIC AND ORGANIC ANALYSIS

Category	CIA	ESE	L	T	P	Credit
CORE	60	90	-	-	45	4

Preamble

The course aims to impart the knowledge of the principles and skill for quantitative analysis of solutions containing inorganic ions, qualitative analysis organic functional groups and preparation of organic derivatives.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Perform quantitative analysis of solutions containing inorganic substances	K1
CO2	Carryout skillfully the qualitative and quantitative analysis of solutions	K2, K3
CO3	Identify and detect various organic functional groups and special elements present in organic compounds.	K2
CO4	Analyze the aliphatic/aromatic , saturated unsaturated character of organic compounds	K3
CO5	Prepare derivatives of organic compounds	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	L	M	S	S
CO3	M	M	M	S	S
CO4	M	M	M	S	S
CO5	M	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

I VOLUMETRIC ANALYSIS:

A. Acidimetry & Alkalimetry

1. Estimation Of Sodium Carbonate

B. Permanganometry

1. Estimation Of Ferrous Sulphate
2. Estimation of Oxalic Acid
3. Estimation Of Calcium-Direct Method

C. Dichrometry

1. Estimation Of Ferrous Iron Using Internal Indicator.

D. Iodimetry

1. Estimation Of Potassium Dichromate
2. Estimation Of Copper
3. Estimation Of Arsenious Oxide

II ORGANIC ANALYSIS

Systematic Analysis Of An Organic Compound - Preliminary Testes - Detection Of Elements Present - Aromatic Or Aliphatic - Saturated Or Unsaturated - Nature Of The Functional Group - Confirmatory Tests And Preparation Of Derivatives

Compunds to be given: Aldehydes – Amines – Amides – Carbohydrates – Phenols- Acids – Esters - Nitro Compounds.

III Preparation:

Preparation involving bromination, acetylation, hydrolysis and oxidation.

Pedagogy

Demonstration ,PPT, Experimental work

CODE	COURSE TITLE
18CHUA101	ALLIED CHEMISTRY I (FOR B.Sc PHYSICS)

Category	CIA	ESE	L	T	P	Credit
ALLIED	20	55	55	5	-	4

Preamble

To enable the students to acquire knowledge about chemical bonding and geometry of various molecules, familiarize with Fertilizers and water treatment processes, understand various organic reactions and their mechanisms, have insight into the chemistry of dyes, Sulpha drugs and vitamins and understand the concepts of chemical kinetics and chromatography

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1.	Understand the nature of chemical bonding and geometry of various molecules	K1
CO2.	Recognise Inorganic fertilizers, Hardness of Water and Treatment of water for municipal Supply	K2 K3
CO3.	Interpret various organic reactions and their mechanism, stereoisomerism	K2
CO4.	Understand the chemistry of dyes, sulpha drugs, penicillin and vitamins	K2 K3
CO5.	Analyse the concepts of chemical kinetics and chromatography	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	L	M	S	S
CO3	M	M	M	S	S
CO4	M	M	M	S	S
CO5	M	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(12 hrs.)**

Chemical Bonding: Molecular Orbital Theory – Bonding - Antibonding and Non-Bonding Orbitals - Molecular Orbitals - MO Configuration Of H_2, N_2, O_2, F_2. Bond order Diamagnetism and Paramagnetism.

VSEPR Theory and Geometry of Molecules: Hybridization and Geometry of Molecules $SnCl_2$, BF_3, BrF_3, CH_4, XeF_4, SiF_4, PCl_5, IF_5, SF_6, and IF_7.

UNIT II **(12 hrs.)**

Fertilizers: Need for Fertilizers – Role of Primary and Secondary Nutrients in the Plant growth – Inorganic Fertilizers - Urea - Ammonium Nitrate - Ammonium Sulphate - Superphosphate of Lime - Triple Superphosphate.

Water: Potability of Water – Hardness of Water – Determination using EDTA -Treatment of Water for Municipal Supply – Screening – Clarification - Coagulation – Sedimentation – Sterilization and Disinfection – Aeration - Chlorination.

UNIT III **(12 hrs.)**

Organic Reactions and their Mechanism: Homolytic Fission – Heterolytic Fission –Classification of Reagents – Electrophile – Nucleophile – Free Radical – Electron Displacement Effects - Inductive Effect – Mesomeric Effect.

Stereoisomerism: Geometric Isomerism of Maleic and Fumaric Acids - Optical Isomerism – Cause of Optical Activity – Lactic Acid - Tartaric Acid – Racemisation – Resolution.

UNIT IV **(12 hrs.)**

Dye Chemistry: Chromophore – Auxochrome - Bathochromic Shift - Hypsochromic Shift - Preparation and Uses – Azodye - Methyl Orange - Mordant Dye- Alizarin - Vat Dye - Indigo.

Chemotherapy: Preparation - Uses and Mode of Action of Sulpha Drugs - Structure and uses of Penicillin – Chloramphenicol - Vitamins - Classification – Sources – Deficiency Diseases of Vitamin

A, B, C,D,E and K (Structure Not Necessary)

UNIT V **(12 hrs.)**

Kinetics: Rate – Order – Molecularity - Pseudo Unimolecular Reactions – Zero Order Reactions - Determination of Order of a Reaction - Effect of Temperature on Reaction Rate – Arrhenius Activation Energy.

Chromatography: Principle And Application of Column - Paper - Thin Layer Chromatography.

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Veeraiyan V.	Allied Chemistry Paper I & II	Highmount Publishing House	2005, 2nd Edition

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Bhal B.S. & Arunbahl	Advanced of Organic Chemistry	S. Chand & co, New Delhi	2016, 1st Edition
2.	Bahl B.S. & Tuli G.D.	Essentials of Physical Chemistry	S. Chand & co., New Delhi	2014, 27th Edition
3.	Puri B.R., Sharma L.R. & Pathania M.S.	Principles of Physical Chemistry	Sobanlal Nagin chand & co., New Delhi	2016, 47th Edition
4.	Puri B.R. & Sharma L.R.	Principles of Inorganic Chemistry	Vishal Publishing Company, Jalandhar	2016, Revised Edition
5.	Soni P.L.	Text Book of Inorganic Chemistry	Sultan chand & sons, New Delhi	2003, 20th Edition

Pedagogy

- Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

CODE	COURSE TITLE
18CHUA001/ 18CHUA303	**ALLIED CHEMISTRY I (FOR B.Sc N&D,BOTANY and ZOOLOGY)**

Category	CIA	ESE	L	T	P	Credit
ALLIED	20	55	55	5	-	4

Preamble

To enable the students to acquire knowledge about oils and fats, familiarize with organic Fertilizers, have insight the knowledge into the chemistry of dyes, sulpha drugs and vitamins and understand the concepts of chemical kinetics and chromatography

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1.	Distinguish and analyse the quality of oils and fats	K1
CO2.	Recognise Inorganic fertilizers, Hardness of Water and Treatment of water for municipal Supply.	K2, K3
CO3.	Describe the quality and types of fuels	K2
CO4.	Recognize various polymers and their applications	K2, K3
CO5.	Interpret the principles of adsorption and apply them to various processes.	K2, K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	L	M	S	S
CO3	M	M	M	S	S
CO4	M	M	M	S	S
CO5	M	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(12 hrs.)**

Oils and Fats: Difference between oils and fats-properties-Analysis of oils and fats-saponification value-ester value - acid value-iodine value-Wij's method-Reichert -Meissel value-Henher value-Elaiden test-Aniline point. Hydrogenation of oils.

UNIT II **(12 hrs.)**

Fertilizers: Need For Fertilizers – Role of Primary And Secondary Nutrients in the Plant Growth – Inorganic Fertilizers - Urea - Ammonium Nitrate - Ammonium Sulphate - Superphosphate of Lime - Triple Superphosphate.

Water: Potability of Water – Hardness of Water – Determination using EDTA. Treatment of Water for Municipal supply – Screening – Clarification - Coagulation – Sedimentation – Sterilization and Disinfection – Aeration - Chlorination.

UNIT III **(12 hrs.)**

Fuels: Characteristics of good fuel-classification-calorific value-comparison between solid, liquid and gaseous fuels. Gaseous fuels-Composition, production and uses of water gas-producer gas-semi water gas-gobar gas-LPG-CNG-Hydrogen as fuel.

UNIT IV **(12 hrs.)**

Polymers: Monomers – Polymers – Types Of Polymerization – Addition – Condensation Plastics - Thermo setting plastics – Thermo plastics – Applications - Preparation and Applications of PVC – Teflon – Polyesters – Buna –S Rubber. **Silicones:** Synthesis – Properties - Uses

UNIT V **(12 hrs.)**

Adsorption: Definition-classification-Difference between chemical and physical adsorption-Characteristics-Adsorption of gases on solids-adsorption of solutes from solutions- Applications of adsorption. Ion exchange adsorption in water softening (Zeolite process only)

Chromatography: Principle And Application of Column - Paper - Thin Layer Chromatography.

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Veeraiyan V.	Allied Chemistry Paper I & II	Highmount Publishing House	2005, 2nd Edition
2.	B.K.Sharma	Industrial Chemistry	Goel publishing House	2013, 17th Edition

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Bhal B.S. & Arunbahl	Advanced of Organic Chemistry	S. Chand & co, New Delhi	2016, 1st Edition
2.	Jain and Jain	Engineering Chemistry	Dhanpat Rai Publishing Company	2010, 15th Edition
3.	Puri B.R., Sharma L.R. & Pathania M.S.	Principles of Physical Chemistry	Sobanlal Nagin chand & co., New Delhi	2016, 47th Edition
4.	Puri B.R. & Sharma L.R.	Principles of Inorganic Chemistry	Vishal Publishing Company, Jalandhar	2016, Revised Edition
5.	Soni P.L.	Text Book of Inorganic Chemistry	Sultan chand & sons, New Delhi	2003, 20th Edition

Pedagogy

- Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

CODE	COURSE TITLE
18CHUA202	**ALLIED CHEMISTRY II (for B.Sc PHYSICS)**

Category	CIA	ESE	L	T	P	Credit
ALLIED	20	55	55	5	-	4

Preamble

To enable the students toacquire knowledge about chemical bonding and geometry of various molecules, familiarize with organic Fertilizers, understand various organic reactions and their mechanisms, have insight the knowledge into the chemistry of dyes, sulpha drugs and vitamins and understand the concepts of chemical kinetics and chromatography

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1.	Realise the principles of metallurgy with the process involved and have basic knowledge on coordination chemistry	K1
CO2.	Interpret the sunstitution reactions of benzene and know the chemistry of heterocyclics	K2 K3
CO3.	Classify and characterize Amino acids and Carbohydrates	K2

CO4.	Familiarize with various polymers and applications	K2 K3
CO5.	Recognise the principles of electrochemistry and apply them to Biological Systems	K1 K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	M	M	S	S
CO3	M	M	M	S	S
CO4	M	M	M	S	S
CO5	M	L	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(12 hrs.)**

General Methods Of Extraction Of Metals: Types Of Ores - Method Of Ore Dressing - Reduction Methods - Electrical Methods - Types Of Refining - Van Arkel - Zone Refining. **Coordination Chemistry:** Co-ordination Number - Ligands – Monodentate – Bidentate - Nomenclature Of Complexes - Theories – *Werner* – Sidgwick - Pauling.

UNIT II **(12 hrs.)**

Aromatic Compounds - Electrophilic Substitution In Benzene - Mechanism Of Nitration – Halogenation - *Alkylation* - *Acylation* - Sulphonation – Isolation – Preparation - Properties And Structural Elucidation Of Naphthalene. **Heterocyclics:** Preparation And Properties Of Furan – Pyrrole - Thiophene And Pyridine.

UNIT III **(12 hrs.)**

Amino Acids: Classification - Preparation - Properties – Peptides – Dipeptide Synthesis. **Proteins:** Classification – Characteristics – Colour Reactions – Biological Functions - Structure

Carbohydrates : Classification - Glucose And *Fructose* - Preparation – Properties - Open Chain Structure - Glucose - Fructose Interconversion

UNIT IV **(12 hrs.)**

Polymers: Monomers – Polymers – Types Of Polymerization – Addition – Condensation Plastics - Thermo Setting – Thermo Plastics – Applications - Preparation And Applications Of PVC – Teflon – Polyesters – Buna –S Rubber – **Silicones:** Synthesis – Properties - Uses

UNIT V **(12 hrs.)**

Electrochemistry : Kohlrausch Law – Conductometric Titrations - Galvanic Cell - Standard Electrode Potential – Calculation Of EMF From Single Electrode Potential- Electrochemical Series And Its Applications - pH And Its Determination By Conductivity Method – EMF method (Using Hydrogen Electrode Only) - *Buffer Solutions* And Its Importance In Biological Systems.

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Veeraiyan V.	Allied Chemistry Paper I & II	Highmount Publishing House	2005, 2nd Edition

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Bhal B.S. & Arunbahl	Advanced of Organic Chemistry	S. Chand & co., New Delhi	2016, 1st Edition
2.	Bahl B.S. & Tuli G.D.	Essentials of Physical Chemistry	S. Chand & co., New Delhi	2014, 27th Edition
3.	Jayashree Ghosh	Applied Chemistry	Sultan chand & sons, New Delhi	2006, 1st Edition
4.	Puri B.R., Sharma L.R. & Pathania M.S.	Principles of Physical Chemistry	Sobanlal Nagin chand & co., New Delhi	2016, 47th Edition
5.	Sharma B.K.	Industrial Chemistry	Goel Publishing House	2011, 16th Edition
6.	Soni P.L.	Text Book of Inorganic Chemistry	Sultan chand & sons, New Delhi	2003, 20th Edition
7.	Sivakumar R. & Sivakumar N.	Engineering Chemistry I & II	Tata McGraw-Hill Publishing Company Limited, New Delhi	2013, 3rd Edition

Pedagogy

- Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

CODE	COURSE TITLE
18CHUA002/ 18CHUA404	**ALLIED CHEMISTRY II (FOR B.Sc N&D,BOTANY and ZOOLOGY**

Category	CIA	ESE	L	T	P	Credit
ALLIED	20	55	55	5	-	4

Preamble

To enable the students to acquire knowledge about the concepts of Coordination and Bio inorganic chemistry, sources of carbohydrates and vitamins, chemistry of amino acids, proteins and drugs and understand the chemistry of PCPs.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level

CO1.	Realize the concepts of chemistry of coordination compounds and Bio inorganic chemistry	K1
CO2.	Classify and identify the sources of carbohydrates and vitamins	K2 K3
CO3.	Interpret the properties of amino acids and proteins and acquire skills in first aid.	K2
CO4.	Familiarize the nature of various therapeutic drugs	K2 K3
CO5.	Categorize the chemistry of different cosmetics and soaps	K1 K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	M	M	S	S
CO3	M	M	M	S	S
CO4	M	M	M	S	S
CO5	M	L	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(12 hrs.)**

Coordination Chemistry: Co-ordination Number - Ligands – Monodentate – Bidentate - Nomenclature Of Complexes - Theories – Werner – Sidgwick - Pauling. Analytical applications. Haemoglobin and Chlorophyll.

Bio inorganic Chemistry: Role of alkali and alkaline earth metal ions in biological systems-biological functions and toxicity of elements like Cr, Mn, Co, Ni, Cu, As, Se, Cd, Hg, Pb, Fe, Zn and Mo.

UNIT II **(12 hrs.)**

Carbohydrates : Classification - Glucose And Fructose - Preparation – Properties - Open Chain Structure - Glucose - Fructose. Interconversions-Glucose to Fructose and vice versa.

Vitamins: Classification-sources and deficiency diseases of Vitamin A, B, C, D, E and K

UNIT III **(12 hrs.)**

Amino Acids: Classification - Preparation - Properties – Peptides – Dipeptide Synthesis.

Proteins: Classification – Characteristics – Colour Reactions – Biological Functions.

First Aid: First aid box-First aid for accidents-cuts, abrasions and Bruises-Bleeding-Fractures-Burns-Fainting-Poisonous bites.

UNIT IV **(12 hrs.)**

Chemotherapy: Biological classification-Sulpha drugs-Preparation of Sulphanamide-Sulphapyridine Mode of Action -Therapeutic uses-Antibiotics- Definition- Structure and uses of Penicillin G – Chloramphenicol - Paracetamol preparation and therapeutic uses-Antimalarial-Life cycle of malarial parasites-uses of Chloroquine as antimalarial.

UNIT V **(12 hrs.)**

Chemistry of Cosmetics: Skin Care - Hair Care - Deodorants and Antiperspirants - Colour Cosmetics – Mascara - Eyeshadow and Eyebrow Pencils - Sun screen lotions. Shampoo- Perfumes.

Soaps: Preparation -Properties-Cleansing action-Advantages-Disadvantages-Difference between soaps and detergents.

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Veeraiyan V.	Allied Chemistry Paper I & II	Highmount Publishing House	2005, 2nd Edition
2.	B.K.Sharma	Industrial Chemistry	Goel publishing House	2013, 17th Edition

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Bhal B.S. & Arunbahl	Advanced of Organic Chemistry	S. Chand & co., New Delhi	2016, 1st Edition
2.	Bahl B.S. & Tuli G.D.	Essentials of Physical Chemistry	S. Chand & co., New Delhi	2014, 27th Edition
3.	Jayashree Ghosh	Applied Chemistry	Sultan chand & sons, New Delhi	2006, 1st Edition

4.	Puri B.R., Sharma L.R. & Pathania M.S.	Principles of Physical Chemistry	Sobanlal Nagin chand & co., New Delhi	2016, 47th Edition
5.	Jain and Jain	Engineering Chemistry	Dhanpat Rai Publishing Company	2010, 15th Edition
6.	Soni P.L.	Text Book of Inorganic Chemistry	Sultan chand & sons, New Delhi	2003, 20th Edition
7.	Sivakumar R. & Sivakumar N.	Engineering Chemistry I & II	Tata McGraw-Hill Publishing Company Limited, New Delhi	2013, 3rd Edition

Pedagogy

- Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

CODE	COURSE TITLE
18CHUAPO1	**ALLIED CHEMISTRY PRACTICALS**

Category	CIA	ESE	L	T	P	Credit
CORE	20	30	-	-	45	2

Preamble

The course aims to impart the principles and procedure for quantitative analysis to the students of other science disciplines and the qualitative analysis organic functional groups

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1.	Perform quantitative analysis of solutions containing	K1

	inorganic substances	
CO2.	Carryout skillfully the qualitative and quantitative analysis of solutions	K2 K3
CO3.	Identify and detect various organic functional groups.	K2
CO4.	Identify the special elements present in organic compounds	K3
CO5.	Analyze the aliphatic/aromatic , saturated unsaturated character of organic compounds	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	L	M	S	S
CO3	M	M	M	S	S
CO4	M	M	M	S	S
CO5	M	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

I VOLUMETRIC ANALYSIS

1. Estimation Of Sodium Hydroxide Using Standard Sodium Carbonate
2. Estimation Of Hydrochloric Acid-Standard Oxalic Acid
3. Estimation Of Oxalic Acid –Standard Sulphuric Acid
4. Estimation Of Ferrous Sulphate-Standard Mohr's Salt Solution.
5. Estimation Of Oxalic Acid –Standard Ferrous Sulphate
6. Estimation Of Potassium Permanganate.

II ORGANIC ANALYSIS

1. Detection Of Elements (N, S And Halogens)
2. To Distinguish Between Aliphatic And Aromatic, Saturated And Unsaturated Compounds.

3. Functional Group Tests For Mono Hydric Phenol, Acids (Mono And Di), Aromatic Primary Amine, Amide, Diamide And Glucose. Systematic Analysis Of Organic Compounds Containing One Functional Group And Characterization By Confirmatory Tests.

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Pedagogy

Demonstration, PPT, Experimental work

SYLLABI

FOR

SKILL BASED SUBJECTS

SEMESTER - III

CODE	COURSE TITLE
18CHUS301	Skill Based Subject I CHEMISTRY OF MILK AND MILK PRODUCTS (CAFETERIA SYSTEM)

Category	CIA	ESE	L	T	P	Credit
Skill Based Subject	25	75	-	-	45	3

Objective: To acquire a comprehensive knowledge on milk and milk products required for practical and systematic quality control programme in dairy plants.

UNIT I **9 Hrs.**

Importance Of Dairy Industry: Milk – Definition – Composition Of Milk – Water In Milk – Dry Matters – Milk Fat – Milk Protein – Whey Protein – Milk Sugars – Mineral Matters - Minor Constituents – Cholesterol- Pigment- Enzymes- Vitamins- *FactorsInfluencing The Gross Composition Of Milk* – Variation To Species Of Animal – Breed – Stage Of Lactation - Seasonal Variations - Interval Between Milking - Effect Of Feed Upon Milk.

UNIT II **9 Hrs.**

Physical Properties Of Milk: Colour - Flavor And Aroma – Acidity – Natural & Developed – Specific Gravity – Recknagel Effect – Viscosity And Conductivity. Physio- Chemical Change Taking Place In Milk Due To Processing Parameters Like –Boiling- Pasteurization – *Sterilization And Homogenization* - Fermentation Of Milk - Souring.

UNIT III **9 Hrs.**

Milk Products: Cream – Definition – Composition – Chemistry - Creaming Process Butter – Composition – Process Of Manufacture - Ghee – Major Constituents – Common Adulterants Added To Ghee – Rancidity –Paneer and Cheese – Classification – Composition- *Ice Cream* – *Composition of Ice Cream* – Role Of Stabilizers And Emulsifiers- .

UNIT IV **9 Hrs.**

Non Fermented Milk Products: Condensed Milk - Composition – Methods Of condensing - Milk Powder – Definition – Process Of Drying Milk - Spray Drying – *Drum Drying* - Types Of Dry Milk – Uses Of Dry Milk – Defects Of Dry Milk – Marketing Of Dry Milk - Dairy Detergents – Definition – Classification – Sanitizers – Chloramin T – Sodium Hypochlorite.

UNIT V **9 Hrs.**

Testing Of Milk: Significance Of Lactose In Milk And Milk Products - Determination Of Lactose Content In Milk – Polarimetry Method - Chloramines - Determination Of Moisture And Total Solid Content Of Milk – Gravimetric Method Determination Of Fat And SNF Of Milk - Detection Of Added Water In Milk –Adulterations in milk and their impact on human health.

Note :*Italics* denotes Topics for Self Study

REFERENCE BOOKS

1. **Bagavathi Sundari K.,** *Applied Chemistry,* MJP Publishers, Chennai, 1st Edition, 2006.
2. **Clarence Henry Eckles D.S., Willes Barnes com PSMA,** *Milk and Milk Products* , Tata MC Graw-Hill, New Delhi, 1st Edition, 2005.
3. **Ghatak P.K., & Bandyophyay A.K.,** *Practical Dairy Chemistry,* Kalyani Publishers, New Delhi, 1st Edition, 2007.
4. **JayashreeGhosh**, *Fundamental Concepts of Applied Chemistry*, S.Chand& Co., New Delhi., 1st Edition, 2006.
5. M**athur M.P., Dattaroy D., Dinakar P.,** *Text book & Dairy Chemistry*, Indian Council and Agricultural Research, New Delhi, Revised Edition, 2005.

SEMESTER - IV

CODE	COURSE TITLE
18CHUS402	Skill Based Subject II MULTISKILL DEVELOPMENT PAPER (CAFETERIA SYSTEM)

Category	CIA	ESE	L	T	P	Credit
Skill Based Subject	40	60	-	-	45	3

Objective: To equip the students with knowledge on all topics as desirable from the point of view of brilliant success in the competitive examinations. To familiarize the students with various types of tests that are employed by the diverse examining bodies. To facilitate the students to communicate with confidence. To enhance their employability. To inculcate soft skills and to keep pace with the modern trend. To learn laboratory techniques with all precautions.

UNIT I **9 Hrs.**

Communication: Question tag – Gerund and Infinitives – Spotting the errors – Vocabulary – Synonyms – Antonyms - Prepositions – Articles – One word substitution – Sentence completion.

UNIT II **9 Hrs.**

Numerical Aptitude : Problems on numbers - Problems on Ages – Percentage - Profit and loss - Ratio & Proportion - Time & Work - Time & Distance - *Simple Interest* - Compound Interest.

UNIT III **9 Hrs.**

Critical Reasoning : Logical Inference Questions and Syllogism.

Analytical Reasoning : Arrangement problems – Family / Blood Relation Qualms – Sense of Directions – Age Doubts.

Verbal Reasoning : Verbal Analogy (Letter series and number series only) – Coding and Decoding.

UNIT IV **9 Hrs.**

MS Word: Creating A New Document – Working With Margins, Pages And Line Spacing – Page Numbering – Printing Documents – Biodata Preparation. **MS Excel:** Creating New Excel Work Book – Entering Data Into The Worksheets – Creating Charts – Bar Diagram – *Pie Chart.* **Presentation Skills:** Creating Slides For Power Point – Adding Graphics To Slides – Effective Presentation.

UNIT V **9 Hrs.**

Laboratory Techniques: Concentration Terms -Normal Solution – Molar Solution – Molal Solution – Percentage Solution – Weight Composition – Volume Composition – Preparation Of Standard Solution - Dilution Of Solution To Various Strength – Dilution Of Sulphuric, Nitric and Hydrochloric Acids. Precaution in Chemistry Laboratory - Accidents -First Aid Measures.

Note : Unit I, Unit II &Unit III evaluation will be through online examination-ESE
***Italics* denotes Topics for Self Study**

REFERENCE BOOKS:

1. **Agarwal R.S.**, A Modern Approach to Verbal Reasoning (Fully Solved), S.Chand Company Limited, New Delhi, Revised Edition 2012. (Unit – III)

2. **Aggarwal**, **R.S.,** *Quantitative Aptitude*, S.Chand Company Limited, New Delhi, 7th Edition, 2010. (Unit - II)

3. **Alkondan M.,** *"Qualitative Analysis"*, Nallamuthu Gounder Mahalingam College Students Co-operative Stores Ltd., Pollachi, 1st Edition, 1966.

4. **Balagurusamy E., *"Programming is Ansi C"*** Tata McGraw – Hill Publishing Company Limited, New Delhi, 3rd Edition, 2004.

5. **Edgar Thorpe**, *Test of Reasoning for Competitive Examinations*, Tata McGraw-Hill Publishing Company Limited, New Delhi, 4th Edition, 2008. (Unit – III)

6. **Hari Mohan Prasad & Uma Rani Sinha,** *Objective English for Competitive Exminations*, Tata McGraw Hill Education Pvt.Ltd, New Delhi, 4th Edition, 2010, (Unit – I).

7. **Jain T.S.Upkar's** *SBI Clerical Cadre Recruitment Examination*. Agar Upkar Prakashan, Agra, 1st Edition,2005.

8. **Karthikeyan T.**, PC *"Software For Office Automation",* Sultan Chand & Company, New Delhi, 1st Edition 2002.

9. **Muir G.D.,** *"Hazards In The Chemical Laboratory"* ,The Chemical Society,London, 17th Edition, 1977.

10. **Raman K. V.** "*Computers in Chemistry* ", Tata McGraw – Hill Publishing Company Limited, New Delhi,1st Edition, 2004.

11. **Venkateswaran V., Veeraswamy R., Kulandaivelu A.R.,** *"Basic Principles Of Practical Chemistry"*, Sultan Chand & Sons, New Delhi,1st Edition, 1995.

SYLLABI

FOR

NON MAJOR ELECTIVE

SEMESTER - III

CODE	COURSE TITLE
18CHUN301	Non Major Elective - I WATER MANAGEMENT-AN ENVIRONMENTAL PERSPECTIVE

Category	CIA	ESE	L	T	P	Credit
Non Major Elective	-	100	-	-	30	2

Objectives: To facilitate the students to have basic knowledge about the need to protect and nurture the precious bounty of freshwater, its socio-economic importance and conservation of water resources.

UNIT I **6 Hrs.**

Water: Sources Of Water - Chemistry Of Water - Hardness Of Water - Water In Human Body - Quality Of Natural Water - Potability Of Water - *Water Cycle* - National Water Policy.

UNIT II **6 Hrs.**

Socio- Economical Importance of Water: Demand And Consumption Of Water – Agriculture – Industry – Household – Recreation - Water Scarcity - Major Causes Of Water Quality Degradation - *Water Borne Diseases*.

UNIT III **6 Hrs.**

Purification of Water: Clarification – Coagulation – Sterilization - Physical Methods -*Boiling* - *Exposure To Sunlight & UV Light* - Irradiation With Ultrasound - Chemical Methods - Aeration- Ozonisation – Chlorination - Softening By Zeolite Process - Sea Water As A Source Of Water.

UNIT IV **6 Hrs.**

Sewage Treatment: *Purpose Of Sewage Treatment* – Composition - Properties [Physical and Chemical] – 1° Treatment - 2° Treatment - 3° Treatment - Sludge Disposal.

UNIT – V **6 Hrs.**

Conservation of water Resources: Need Of Water Harvesting Technologies - Recharging Of Ground Water - Rain Water Harvesting - Recycling Of Water - Artificial Rain - *How To Make Best Use Of Water*.

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Jat B.C, Sujan Singh,** *Water Management Through Traditional Technologies*, Pointer Publishers, Jaipur, Ist Edition, 2010.
2. **Sharma B.K.,** *Industrial Chemistry,* Krishna's Educational Publishers**,** Delhi, 16th Edition, 2011.
3. **Sharma B.K,** *Water Pollution*, Krishna Prakashan Media (P) Ltd., Meerut, Vth Edition, 2012.

REFERENCE BOOKS

1. **Ahluwalia V.K,** *Environmental Chemistry*, Ane Books Pvt. Ltd., New Delhi, 2nd Edition, 2013.
2. **Chandark K. Sharma,** *Introduction To Environmental Studies*, Vrinda Publications (P) Ltd., New Delhi, Ist Edition, 2010.
3. **De A.K,** *Environmental Chemistry*, New Age International (P) Ltd Publishers, Delhi, VIth Edition, 2006.
4. **Dr. Punnia B.C, Arun Kumar Jain, Ashok Kumar Jain,** *Environmental Engineering-2 Waste Water Engineering (Including Air Pollution),* Laxmi Publications (P) Ltd., New Delhi, IInd Edition,1988.
5. **Raghunath H.M,** *Ground Water*, New Age International Publishers, New Delhi, 3rd Edition, 2007.
6. **Santhosh Kumar Garg,** *Water Supply Engineering*, Khanna Publishers, New Delhi, 21st Edition, 2012.
7. **Santra S.C,** *Environmental Science*, New Central Book Agency (P) Ltd., Kolkata, II Nd Edition, 2013.
8. **Stanley E. Manahan**, *Water Chemistry Green Science & Technology Of Nature´s Most Renewable Resource,* CRC Press, New York, 1st Indian Reprint, 2015.

SEMESTER - IV

CODE	COURSE TITLE
18CHUN402	Non Major Elective - II CHEMISTRY IN DAILY LIFE

Category	CIA	ESE	L	T	P	Credit
Non Major Elective	-	100	-	-	30	2

Objective: To understand the importance of chemistry in various fields of life

UNIT I

Chemicals Of Life: Chemistry And Nutrition - Chemistry And Diet – Proteins - Nucleic Acids – Carbohydrates – Lipids – Vitamins - Minerals And Hormones - Chemistry In Plant Growth.

UNIT II

Chemistry In Housing And Household Products: Portland Cement - Paints And Coatings - Varnishes And Polishes - Glass - Cleaners - Household Pesticides - Stain Removers - Fire Extinguishers- Composition And Uses

UNIT III

Chemistry Of Textiles And Clothing: Types Of Fibres - Natural Fibres - Man Made Fibres - Production Of Yarns – Clothing - Textile Dyeing And Printing.

UNIT IV

Chemistry In Medicine And Healthcare: Chemistry And Medical Diagnosis - Drugs -Pain Relieving Drugs – Antacids – Antibiotics – Hormones - Birth Control Pills -Stimulants And Depressants - Drugs Affecting The Central Nervous System – Narcotics -Tranquilizers - Finding Out Blood Group.

UNIT V

Chemical Composition Of Cosmetics: Skin Care - Hair Care - Deodorants And Antiperspirants - Colour Cosmetics – Mascara - Eyeshadow And Eyebrow Pencils - Sun Protection - Nail Cosmetics - Mouth Cosmetics - Perfumes And Fragrances.

Text Book

1. *Chemistry in Everyday Life*, 3rd Edition Kirpal Singh PHI Learning Private Ltd, Delhi.

Reference Books

1. Bernard P. Corbman. *Textiles, Fibre To Fabric*, Mc.Grow Hill, New York, 6th Edition, 1983.

2**. Mishra S.P.**, *A Text Book Of Science & Technology*, New Age International, New Delhi, 1st Edition 2008.

3. **Sharma .B.K,** *Industrial Chemistry*, Goel Publishing House, 16 th Edition, 2011.

4. **E. P. G. Gohl, L. D. Vilensky,** *Textile Science an Explanation of Fibre Properties*, 2nd Edition, 2005.

5. **Kanwar Varinder Pal Singh,** *Introduction of Textiles*, I st Edition, 2009.

6. **E.G.Thomson,** *Modern Cosmetics*, Universal Publishing Corporation, 1stEdition, 1985.

SCHEME OF VALUATION FOR PRACTICALS

18CHUCP01- CORE CHEMISTRY PRACTICAL – I

INOGANIC SEMIMICRO QUALITATIVE ANALYSIS

Time : 3 Hours **Total Marks : 60**

Record : 10 marks ; Experiment : 50 marks

A) Four Ions Correct With Correct Procedure - 50

3 Ions Correct With Correct Procedure - 40

2 Ions Correct With Correct Procedure - 30

1 Ion Correct With Correct Procedure - 15

B) Spotting Of An Ion - 5

C) Precipitation In The Correct Group - 5

D) Correct Detection Of Cations, Without Eliminating The Interfering Ion Should Be Treated As Spotting.

E) At Least One Confirmatory Test For Each Ion Is Expected. If No Confirmatory Test Is Reported Deduct 3 Marks.

F) The Candidate May Be Asked To Leave A Small Portion Of The Given Mixture So That The Examiners May Confirm The Presence Of An Ion If Any Discrepancy Arise.

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CORE CHEMISTRY PRACTICAL – II

VOLUMETRIC ANALYSIS AND ORGANIC ANALYSIS

Time : 6 Hours **Sub.Code: 18CHUCP02**

Total Marks : 150

SCHEME OF VALUATION

EXTERNAL : 90 **INTERNAL : 60**

Record : 10; Experiment : 80 **Class Performance : 15**

Test : 15

Model : 15

Record : 15

VOLUMETRIC ANALYSIS

Maximum Marks : 35

Procedure : 5

Result / Value : 30

Error up to 2%	30
Error up to 2 to 3 %	25
Error up to 3 to 4 %	20
Error up to 4 to 5 %	15
Error > 5%	10

a. Proportionate Deduction Of Marks Must Be Made For Errors Between The Limits Given Above.
b. Examiners Should Calculated The Result Of The Each Candidate With The Data.
c. If Two Titre Values Are Reported, The Result Must Be Calculate For Both The Values And The One Favorable To The Candidate Should Be Accepted.
d. If Two Titre Values Differ By More Than 0.2ml Deduct 3 Marks.
e. For Each Independent Arithmetic Error Deduct 1.5 Marks.
f. For Incomplete Or Wrong Calculation Deduct 20% Of Marks Eligible For The Result As Calculated By The Examiner.

g. For No Calculation Deduct 30% Of Marks Eligible For The Results.
h. If A Candidate Is Not Able To Complete The Experiment Due To Accident, Award 4 Marks.

ORGANIC ANALYSIS

Maximum Marks : 30

Elements	3 x 2	=	6
Aliphatic /Aromatic	2 x 2	=	4
Saturated/Unsaturated	2 x 2	=	4
Preliminary & Functional group			6
Confirmatory test			6
Derivative			4

Substance to be given for organic analysis

Benzoic Acid, Phthalic Acid, Aniline, Benzamide, Urea, Benzaldehyde, Phenol, Glucose, Ethyl Benzoate, Nitrobenzene.

PREPARATION

Maximum Marks : 15

Crude sample / Yield : 10

Recrystallized Sample : 5

Organic preparation involving bromination, acetylation, hydrolysis and oxidation may be given.

18CHUAP01 ALLIED CHEMISTRY PRACTICAL

Time : 3 Hours **Total Marks : 30**

Record : 06 marks ; Experiment : 24 marks

ESTIMATION -VOLUMETRIC ANALYSIS

Maximum Marks : 12

Error up to 2%	12
Error up to 2 to 3 %	10
Error up to 3 to 4 %	8
Error above 4%	5

a. Proportionate Deduction Of Marks Must Be Made For Errors Between The Limits Given Above.
b. The Examiners Must Calculate The Results Of Each Candidate With The Data Given By The Candidate.
c. If Two Titre Values Are Given The Results Must Be Calculated For Both The Values And The One Favourable Is Taken.
d. If Two Titre Value Differ By More Than 0.2ml Deduct 2 Marks.
e. For Each Independent Arithmetic Error Deduct 1mark.
f. For Incomplete Or Wrong Calculation Deduct 20% Of Marks Eligible For The Result As Calculated By The Examiner.
g. For No Calculation Deduct 25% Of Marks Eligible For The Results.

ORGANIC ANALYSIS

Maximum marks : 12

Aliphatic /Aromatic - 2
Saturated/Unsaturated - 2
Special Elements - 2 (Nitrogen – 1 mark ; Other elements : 1 mark)
Preliminary &
Functional group - 3
Confirmatory Tests - 3

OUTCOME BASED EDUCATION (OBE)

UG - QUESTION PAPER PATTERN FOR CORE / ALLIED / ELECTIVE

Applicable to UG of All Branches from the Academic Year 2018-19 and Onwards

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Time: Three Hours **Maximum: 75 Marks**

Section A- (5 × 2 = 10 Marks)

Answer ALL Questions: Each question carries 2 Marks

(Please use the following Bloom's Taxonomy Action Verbs for framing the Questions (K1) Choose / Define / Find / How / Label / List / Match / Name / Omit / Recall / Relate / Select / Show / Spell / What / When / Where / Which / Who / Why / Journalise)

1)
2)
3)
4)
5)

Section B- (5 × 5 = 25 Marks)

Answer ALL Questions: Each question carries 5 Marks

(Please use the following Bloom's Taxonomy Action Verbs for framing the Questions (K1 & K2) : Choose / Define / Find / How / Label / List / Match / Name / Omit / Recall / Relate / Select / Show / Spell / What / When / Where / Which / Who / Why / Journalise / Classify / Compare / Contrast / Demonstrate / Explain / Extend / Illustrate / Infer / Interpret / Outline / Relate / Rephrase / Show / Summarize / Translate)

6. (a) (OR) (b)
7. (a) (OR) (b)
8. (a) (OR) (b)
9. (a) (OR) (b)
10. (a) (OR) (b)

Section C - (5 x 8 = 40 Marks)

Answer five out of eight questions. All Questions: Each question carries 8 Marks

(Please use the following Bloom's Taxonomy Action Verbs for framing the Questions (K2 & K3) : Classify / Compare / Contrast / Demonstrate / Explain / Extend / Illustrate / Infer / Interpret / Outline / Relate / Rephrase / Show / Summarize / Translate / Apply / Build / Choose / Construct / Develop / Experiment with / Identify / Interview / Make use of / Model / Organize / Plan / Select / Solve / Utilize / Journalise / Prepare)

11.
12.
13.
14.
15.
16.
17.
18.

DEPARTMENT OF CHEMISTRY

B.Sc., Chemistry

Question Paper Pattern for SBS/Non Major/Self learning papers

SKILL BASED SUBJECTS

Five Questions out of Eight **(5 x 15 = 75 marks)**

SELF LEARNING AND NON MAJOR ELECTIVE PAPERS

Five Questions out of **Eight** **(5 x 20 = 100 marks)**

SCIENCE CLUB

SAS-Serious About Science

(OFFERED UNDER PART V)

Preamble

The Club aims to promote interest in learning science based on constructive activities and independent enquiry by providing inquisitive scientific attitude and genuine interest in science

OBJECTIVES

- To provide proper incentive and inspiration for the pursuit of scientific knowledge in vigorous way by broadening their scientific outlook.
- To provide opportunities for bringing school close to the society and to acquaint the people with the services and contribution of the science in their life.
- To develop among the student the spirit and attitude of healthy competition for the individual and social cause.
- To help the students in imbibing the habit of self- reliance, self-dependence and love for manual work.
- To provide opportunity for the development of the constructive, explorative and inventive faculties of the students.
- To make the students understand the values of time and to help them in the proper utilization to their leisure hours.
- To create interest in latest inventions and discoveries of science in various fields and to get acquainted with the life history and contributions of great scientists.
- To develop students, interest and participation in the practical application of the knowledge related to different branches of sciences.

- To create interest in scientific facts and events related to one's surroundings.
- To develop training in scientific method of problem solving.

ACTIVITIES PROPOSED

1. Organizing lectures, debates, seminars, symposia etc.
2. Holding science exhibition and fair
3. Celebrating birth days of eminent scientist
4. Participating in science fairs
5. Conducting visual programmes of scientific interest
6. Arranging visit to places of scientific interest
7. Preparing charts, posters, models etc
8. Developing College garden
9. Displaying science news
10. Improvising and preparing hand-made apparatus
11. General reading of scientific literature
12. Rendering services in health and sanitation
13. Visiting other science clubs
14. conducting essay competition on scientific problems
15. Managing a first aid squad
16. Participating in scientific hobbies-Preparation of soaps, ink ,candle matches, toys, bleaching powder, nail polish, chalk etc.
17. Helping the community by way of demonstration on health and hygiene, improvement of agriculture, eradication of superstitious belief etc.
18. Celebrating science days
19. Maintaining a bulletin board
20. Publishing science magazine
21. Preparing still/Working models on science topics
22. Conducting science related projects
23. Conducting science quiz competitions
24. Organizing creativity works on science