VELLALAR COLLEGE FOR WOMEN (AUTONOMOUS)

ERODE – 638 012

B.Sc., CHEMISTRY

CHOICE BASED CREDIT SYSTEM

*** Regulations**

***Scheme of Examination with Credits**

***Syllabus**

***Question Paper Pattern**

2017- 2018

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 VI for 2017 -18 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									
2017 - 2018 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	15TAMU101/ 14HINU101	**Tamil / Hindi**	6	3	25	75	100	3
II	Language II	17ENLU101	**English I**	6	3	25	75	100	3
III	Core	11CHUC101	**Core Chemistry I**	3	3	25	75	100	4
		11CHUC102	**Core Chemistry II**	3	3	25	75	100	4
			Core Chemistry Practical I	3	–	–	–	–	–
	Allied I	17PHUA101	**Allied Physics Paper I**	4	3	20	55	75	4
			Allied Physics Practical	3	–	–	–	–	–
IV	Foundation Course	09FOCU1ES	**Environmental Studies**	2	3	–	100	100	2
	TOTAL							**575**	**20**
Semester II									
I	Language I	15TAMU202/ 14HINU202	**Tamil / Hindi**	6	3	25	75	100	3
II	Language II	17ENLU202	**English II**	6	3	25	75	100	3
III	Core	11CHUC203	**Core Chemistry III**	3	3	25	75	100	4
		11CHUC204	**Core Chemistry IV**	3	3	25	75	100	4

		15CHUCP01	**Core Chemistry Practical I**	3	3	40	60	100	3
	Allied I	17PHUA202	**Allied Physics Paper II**	4	3	20	55	75	4
		17PHUAP01	**Allied Physics Practical**	3	3	20	30	50	2
IV	Value Education	14VEDU2HR	**Value Education and Human Rights**	2	3	–	100	100	2
	TOTAL							**725**	**25**
Semester III									
I	Language I	14TAMU303/ 14HINU303	**Tamil/ Hindi**	6	3	25	75	100	3
II	Language II	13ENLU303	**English III**	6	3	25	75	100	3
III	Core	11CHUC305	**Core Chemistry V**	3	3	25	75	100	4
			Core Chemistry Practical - II	3	–	–	–	–	–
	Allied II	16MSUA303	**Allied Mathematics - I**	5	3	20	55	75	4
		16MSUAP01	**Allied Practical - I Sage Math**	2	3		25	25	1
IV	Skill Based Subject	17CHUS301	**Skill Based Subject – I**	3	3	25	75	100	3
	*Basic Tamil	14TMLU301		2	–	100	–	100	2
	**Advanced Tamil	14ADTU301			3	25	75		
	Non Major Elective I				3	–	100		
	TOTAL							**600**	**20**

Semester IV									
I	Language I	14TAMU404/ 14HINU404	**Tamil/Hindi**	6	3	25	75	100	3
II	Language II	13ENLU404	**English IV**	6	3	25	75	100	3
III	Core	15CHUC406	**Core Chemistry VI**	3	3	25	75	100	4
		15CHUCP02	**Core Chemistry Practical - II**	3	6	60	90	150	4
	Allied II	16MSUA404	**Allied Mathematics - II**	5	3	20	55	75	4
IV		16MSUAP02	**Allied Practical II Otave**	2	3		25	25	1
	Skill Based Subject	17CHUS402	**Multi Skill Development Paper**	3	1 1/2	40	#60	100	3
	*Basic Tamil	14TMLU402		2	–	100	–	100	2
	**Advanced Tamil	14ADTU402			3	25	75		
	Non Major Elective I				3	–	100		
	TOTAL							**750**	**24**
	# Online Examination								
Semester V									
	Core – VII	15CHUC507	**Inorganic Chemistry**	4	3	25	75	100	4
	Core – VIII	15CHUC508	**Organic Chemistry**	4	3	25	75	100	4
	Core – IX	15CHUC509	**Electro Chemistry**	5	3	25	75	100	4
	Core Chemistry Practicals		**Core Chemistry Practicals III**	7					

	Elective	17CHUE501/ 17CHUE502	**Elective Paper– I**	4	3	25	75	100	5
			Elective Practicals	3					
IV	Skill Based Subject	17CHUS503	**Skill Based Subject – III**	3	3	25	75	100	3
	TOTAL							**500**	**20**
Semester VI									
III	Core – X	15CHUC610	**Physical Methods and Chemical Structures**	5	3	25	75	100	4
	Core – XI	15CHUC611	**Chemical Kinetics**	4	3	25	75	100	4
	Core - XII	15CHUC612	**Chemistry of Natural products**	4	3	25	75	100	4
	Core Chemistry Practicals	15CHUCP03	**Core Chemistry Practical- III**	7	6	60	90	150	5
	Elective	17CHUE603/ 17CHUE604	**Elective Paper– II**	4	3	25	75	100	5
		17CHUEP01	**Elective Practicals**	3	3	40	60	100	5
IV	Skill Based Subject	17CHUS604	**Skill Based Subject – IV**	3	3	25	75	100	3
V	Extension Activity		**NSS/NCC/ Physical Education/ YRC/ Green Society/ CCC / EDP**	-	-	-	-	100	1
	TOTAL							**850**	**31**
	GRANT TOTAL							**4000**	**140**
* For Students Whose Part I in Secondary Education is Not Tamil									
** For Students Whose Part I in Higher Secondary Education is Not Tamil									

ELECTIVE PAPERS		
Subject	**Paper Code**	**Paper Name**
Elective -I	17CHUE501	Analytical Chemistry
	17CHUE502	Pharmaceutical Chemistry
Elective - II	17CHUE603	Polymer Chemistry
	17CHUE604	Water - Quality Analysis and Treatment
SKILL BASED SUBJECTS		
Subject - I	17CHUS301	Chemistry Of Milk And Milk Products
Subject - II	17CHUS402	Multi Skill Development Paper
Subject -III	17CHUS503	Textile Chemistry
Subject -IV	17CHUS604	Industrial Chemistry
NON MAJOR ELECTIVES		
Elective - I	17CHUN301	Water Management - An Environmental Perspective
Elective - II	17CHUN402	Chemistry in Daily Life
ALLIED CHEMISTRY		
Paper - I	17CHUA101/ 17CHUA303	Allied Chemistry - I
Paper - II	17CHUA202/ 17CHUA404	Allied Chemistry - II
Allied Chemistry Practicals	15CHUAP01	Allied Chemistry Practicals
SELF-LEARNING PAPERS		
Paper - I	13CHUSL01	Applied Science
Paper - II	13AUGSL05	General Awareness

SEMESTER - I

Core Chemistry Paper I

Instructional Hrs : 45 **Sub. Code: 11CHUC101**

Max. Marks : CIA-25; ESE-75 **Credits : 4**

Objective: To motivate and enable the students to understand the basic concepts of ionic bonding, types of hybridization, polar effects, elimination reactions and addition reactions.

UNIT I **9 Hrs.**

Ionic Bonding: Ionic Crystals - NaCl Crystal Structure - *CsCl Crystal Structure* - Lattice Energy And Its Determination Using Born-Haber Cycle - Factors Affecting Crystal Lattice Energy - Properties Of Ionic Crystals (High Melting Point – Hardness - Electrical Conductivity In Molten Condition And In Solution) – Ion Polarization – Fajan's Rule - Solubility Of Ionic Compounds In Polar Solvent.

UNIT II **9 Hrs.**

Structure And Shape Of Molecules: VSEPR Theory And Geometry Of Molecules- Hybridization And Geometry Of sp, sp^2, sp^3, d sp^2, d sp^3, d^2 sp^3, sp^3 d^2, And sp^3d^3-Bonding - Shapes And Structures Of The Following Molecules - Molecules With Sigma Bonds Only – $BeCl_2$, $SnCl_2$, BF_3, CH_4, XeF_4, SiF_4, PCl_5, *IF_5, SF_6, And IF_7.*

UNIT III **9 Hrs.**

Polar Effects: Inductive Effect - Mesomeric Effect - Electromeric Effect - Hyper Conjugation And Steric Effects. **Classification Of Reagents:** Electrophiles - Nucleophiles - Free Radicals - *Types Of Reaction* - Polar Reactions Involving Carbonium Ions And Carbanions With Simple Examples.

UNIT IV **9 Hrs.**

Aliphatic Hydrocarbons: Restricted Rotation About Single Bond And Preferred Rotational Conformations. **Alkenes:** Preparation By Wittig Reaction - Mechanisms Of Beta Elimination – E_1, E_2 And Cis Elimination - Hoffmanns Rule And Saytzeff's Rule - *Addition Reactions With Hydrogen – Halogen* - Hydrogen Halide (Markownikoff's Rule) And Hydrogen Bromide (Peroxide Effect).

UNIT V **9 Hrs.**

Dienes: Stability Of Isolated And Conjugated Dienes -1,2 And 1,4 Additions - Diels –Alder Reaction - Free Radical Addition-Polymerization - *Synthetic Rubber.*

Cycloalkanes: Preparation By Dieckmann Ring Closure And By Reduction Of Aromatic Hydrocarbons – Ring Opening Reactions Of Cyclopropane With H_2 - Br_2 - HI.

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Bhal B.S., Arunbahl**, *Advanced Organic Chemistry,* S. Chand & co New Delhi 19th Edition, 2006.
2. **Puri, Sharma, Kalia,** *Principles of Inorganic Chemistry*, Milestone Publisher,Kolkata, 11th Edition, 2011.

REFERENCE BOOKS

1. **Jain M.K., Sharma S.C.,** *Modern Organic Chemistry*,Vishal Publishing Co, New Delhi, 3rd Edition, 2010.
2. **Madan R.D.,** *Satya Prakash's Modern Inorganic Chemistry*, S. Chand & co New Delhi, 3rd Revised Edition 2011.
3. **Mughergee, S.M. Singh S.P., Kapoor R.P,** *Organic Chemisty, Vol – 1,2,3*, Wiley Eastern, 1st Edition, 1990.
4. **Soni P.L. Chawla H.M,** *Text Book Of Organic Chemistry*, Sultan Chand & Sons, New Delhi, 27th Edition, 1997.
5. **Soni, P.L.,** *Inorganic Chemistry*, Sultan chand & sons. New Delhi, 20th Edition, 1997.

SEMESTER-I

Core Chemistry Paper II

Instructional Hrs : 45 **Sub. Code : 11CHUC102**

Max. Marks : CIA-25; ESE-75 **Credits : 4**

Objective: To understand the facts and principles of three branches of chemistry and their applications.

UNIT I **9 Hrs.**

Ozone And Hydrogen Peroxide: Preparation – Properties – Structure - Uses *Comparison Between The Two*. **Selenium And Tellurium:** Extraction - Properties – Uses - Oxides And Oxyacids Of Se And Te - A Comparative Study Of Sulphur – Selenium - Tellurium And Their Compounds (Hydrides, Oxides, Halides).

UNIT II **9 Hrs.**

Benzene: Resonance And Resonance Energy – Structure -Polar Effects In Electrophilic Substitution In Benzene - Mechanism Of Nitration – Sulphonation – Halogenation - *Friedel-Crafts Alkylation - Acylation* - Diazo Coupling. **Alkynes**: Acidity Of Alkynes - Formation Of Acetylides - Addition Of Water With $HgSO_4$ Catalyst - Hydroboration.

UNIT III **9 Hrs.**

Liquid Crystals: The Concept Of Mesomorphic State – Typical Liquid Crystalline Substances And Their Properties - Properties Of Liquids Like Surface Tension And Viscosity - *Structural Differences Between Solids, Liquids And Gases.* **Condensed Phases:** Coefficients Of Thermal Expansion And Compressibility Of Liquids And Solids.

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.*

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Bhal B.S., Arunbahl**, *Advanced Organic Chemistry*, S. Chand & co, New Delhi, 19th Edition, 2006.
2. **Madan R.D.,** *Satya Prakash's Modern Inorganic Chemistry*, S. Chand & co New Delhi, 3rd Revised Edition 2011.
3. **Puri, B.R,. Sharma, L.R. Pathania M.S.,** *Principles Of Physical Chemistry*, Sobanlal Nagin chand & co., New Delhi, 28th Edition, 2009.

REFERENCE BOOKS

1. **Jain M.K., Sharma S.C.,** *Modern Organic Chemistry*,Vishal Publishing Co, New Delhi, 3rd Edition, 2010.
2. **Kheterpal Dr. S.C.,** *Physical Chemistry Vol. I & II*, Pradeep Publications, Jalandhar , 2011.
3. **Puri B.R., Sharma L.R.,** *Principles Of Inorganic Chemistry*, Shobanial Nagin chand & co., New Delhi., 26th Edition, 2002.
4. **Soni P.L. Chawla H.M.** *Text book of organic chemistry*, Sultan chand & sons, New Delhi, 27th Edition, 1997.
5. **Soni, P.L.,** *Inorganic Chemistry*, Sultan chand & sons, New Delhi., 20th Edition, 1997.

SEMESTER - I

Foundation Course - ENVIRONMENTAL STUDIES

Instructional Hrs. : 30 **Sub. Code : 09FOCU1ES**

Max. Marks : ESE - 100 **Credits : 2**

Objectives : To study the science of environment. It is the prime duty of the human to provide a better and clean environment for the generation to come.

UNIT - I **6 Hrs.**

The multidisciplinary nature of environmental studies - Definition - Scope and importance - Need for public awareness - Natural resources and associated problems – Forest resources - Water resources - Mineral resources - Food resources - Energy resources - Land resources - Role of an individual in conservation of natural resources - Equitable use of resources for sustainable life styles.

UNIT – II **6 Hrs.**

Concept of Ecosystem - Structure and function of an ecosystem – Producers - Consumers and Decomposers. Energy flow in the ecosystem –Food chain - Food webs and Ecological pyramids - Ecological succession.

UNIT - III **6 Hrs.**

Biodiversity and its Conservation - Introduction – definition- genetic species and ecosystem diversity. Conservation of biodiversity – In –situ and Ex-situ conservation of biodiversity.

UNIT - IV **6 Hrs.**

Environmental Pollution - Definition – causes - effects and control measures of air pollution- water pollution- soil pollution- noise pollution and thermal pollution. Disaster management – floods- earthquake- cyclone and landslides.

UNIT – V **6 Hrs.**

Social Issues and the Environment - Global warming - Ozone layer depletion- Acid rain- Nuclear accidents and Social issues - Holocaust (case studies). Consumerism and waste products- Environmental protection Act - air- water- wildlife- forest- Issues involved in enforcement of environmental legislation and Public awareness.

FIELD WORK

Visit to a local area to document environmental assets – river/ forest/ grass land/ hill/ mountain.

Visit to a local polluted site – urban/ rural/ industrial/ agricultural.

Study of common plants, insects, birds.

Study of simple ecosystems – pond, river, hill slope, etc.

REFERENCE BOOK :

1. **Professor Ranganathan, S.,** et al., "*Environmental studies",* Publication Division, Bharathiar University, Coimbatore, First Edition, 2004.

SEMESTER-II

Core Chemistry Paper III

Instructional Hrs : 45 **Sub. Code : 11CHUC203**

Max. Marks : CIA-25; ESE-75 **Credits : 4**

Objective: To acquire knowledge about the co-ordination chemistry, mechanisms of organic reactions and thermodynamic principles.

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.**

Aromaticity: Huckel's Rule - Non Benzenoid Aromatic Compounds Like Cyclopentadienyl Anion - Tropilium Cation - Fused Polynuclear Aromatic Hydrocarbons – Preparation, Properties - Uses And Structural Elucidation Of Naphthalene And *Anthracene.*

UNIT III **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 .

UNIT IV **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 E And H -C_p And C_v.

UNIT V **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.

Note: *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Bhal B.S., Arunbahl**, *Advanced Organic Chemistry*, S. Chand & co, New Delhi, 19th Edition, 2006.
2. **Bahl B.S., Tuli, G.D.,** *Essentials Of Physical Chemistry*, S. Chand & co., New Delhi, 12th Edition, 2004.
3. **Puri B.R., Sharma L.R.,** *Principles Of Inorganic Chemistry*, Shobanial Nagin chand & co., New Delhi, 26th Edition, 2002.
4. **Soni P.L. Chawla H.M.,** *Text book of organic chemistry*, Sultan chand & sons, New Delhi, 27th Edition, 1997.
5. **Soni P.L., Dharma Rao D.P.,** *Text Book Of Physical Chemistry*, S. Chand & co., New Delhi, 12th Edition, 1980.

REFERENCE BOOKS

1. **Madan, R.D.,** *Modern Inorganic Chemistry*, S. Chand & co., New Delhi, 3rd Edition, 2011.
2. **Mughergee, S.M. Singh S.P., Kapoor R.P**., *Organic Chemisty, Vol – 1,2,3*, Wiley Eastern., 27th Edition, 1997.
3. **Puri, B.R,. Sharma, L.R. Pathania M.S.,** *Principles Of Physical Chemistry*, Sobanlal Nagin chand & co., New Delhi, Revised Edition, 2009.
4. **Soni, P.L.,** *Inorganic Chemistry*, Sultan chand & sons, New Delhi, 20th Edition, 1997.
5. **Kheterpal S.C.,** *Physical Chemistry Vol. I & II*, Pradeep Publications, Jalandhar , 2011.

SEMESTER - II

Core Chemistry Paper IV

Instructional Hrs : 45 **Sub. Code : 11CHUC204**

Max. Marks : CIA-25; ESE-75 **Credits : 4**

Objective: To Enable the Students to Learn Some General Methods Of Metal Extraction Techniques In Inorganic Chemistry And To Gain Knowledge Of Active Methylene Compounds And Reactions Of Carbonyl Compounds In Organic Chemistry. A Comprehensive Information About The II Law Of Thermodynamics Is Also Aimed.

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 - Extraction - Chemical And Electrolytic Methods – Refining - Zone Refining - Van Arkel Refining - Electrolytic Refining.

UNIT II **9 Hrs.**

Alkali Metals: Comparative Study Of Physical Properties Of Alkali Metals - Electronic Structure – Density - Atomic Volume - Atomic Radius - Ionic Radius - Ionization Energy - Electro Negativity - A Comparative Study Of Reactions Of Alkali Metals With Oxygen – Hydrogen - Halogen And Water - *Differences Between Lithium And Other Alkali Metals* - Diagonal Relationship Between Lithium And Magnesium.

Malonicester And Acetoaceticester: Synthetic Applications - Tautomerism Of Acetoaceticester.

UNIT III **9 Hrs.**

Reactions Of Aldehydes And Ketones: Nucleophilic Addition Of Grignard Reagents-Aldol Condensation – Perkins – Knoevenagal – Claisen – Dieckmann - Reformatsky Reactions - Reactions With $LiAlH_4$ And $NaBH_4$ – Wolf-Kishner And MPV Reactions – *Cannizaro Reaction.*

UNIT IV **9 Hrs.**

II Law Of Thermodynamics: Entropy – Definition - Entropy Changes In Isothermal Transformations – Trouton's Rule - Entropy As A Function Of T And *V* - *Entropy As A*

Function Of T And P – Change Of Entropy With T- Entropy Changes In An Ideal Gas - Entropy Of Mixing Of Ideal Gases.

UNIT V **9 Hrs.**

Equilibrium And Spontaneity: Condition Under Constraints - Definitions Of A And G - Physical Significance Of ΔA And ΔG – Temperature And Pressure Dependence Of ΔG-*Gibbs–Helmholtz Equation*. **Chemical Equilibrium**: Concept Of Chemical Potential – Chemical Equilibrium In A Mixture Of Ideal Gases - Vant Hoff Isotherm And Isochore - III Law Of Thermodynamics – Statement And Applications – Exceptions To The III Law In The Case Of Ice And Carbon Monoxide.

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Bhal B.S., Arunbahl**, *Advanced Organic Chemistry*, S. Chand & co, New Delhi, 19th Edition, 2006.
2. **Kheterpal S.C.,** *Physical Chemistry Vol. I & II*, Pradeep Publications, Jalandhar, 2004.
3. **Madan, R.D.,** *Modern Inorganic Chemistry*, S. Chand & co., New Delhi, 3rd Edition, 2011.
4. **Puri, B.R., Sharma, L.R. Pathania M.S.,** *Principles Of Physical Chemistry*, Sobanlal Nagin chand & co., New Delhi, 28th Edition, 2009.

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1. **Puri B.R., Sharma L.R.,** *Principles Of Inorganic Chemistry*, Shobanial Nagin chand & co., New Delhi, 26th Edition, 2002.
2. **Soni, P.L.,** *Inorganic Chemistry*, Sultan chand & sons, New Delhi, 20th Edition, 1997.
3. **Bahl B.S. and. Tuli, G.D.,** *Essentials Of Physical Chemistry*, S. Chand & co., New Delhi, 12th Edition, 2004.
4. **Soni P.L., Dharma Rao D.P.,** *Text Book Of Physical Chemistry*, S.Chand & co., New Delhi, 12th Edition,1980.

SEMESTER - II

Core Chemistry Practical I

INORGANIC QUALITATIVE SEMI MICRO ANALYSIS

Instructional Hrs : 45 **Sub. Code : 15CHUCP01**

Max. Marks : CIA-40; ESE-60 **Credits : 3**

Objective: To acquire the skill to analyze mixture of inorganic salts containing an interfering anion. Analysis of a mixture containing two cations and two anions of which one will be an interferring one. Semi micro method & using the conventional scheme.

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

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

SEMESTER – II

FOUNDATION COURSE- A
VALUE EDUCATION AND HUMAN RIGHTS

Instructional Hours: 30 **Paper Code:14VEDU2HR**

Max Marks: 100 **Credits:2**

Objectives: On successful completion of the course, the students should have understood the significance of human values and the rights.

UNIT I **5hrs.**

Aim of Value Education –Concept of Human Values-Types of Values- Components of value education - Personal Development : ***Character formation towards positive personality***-National Values

UNIT II **5hrs.**

Concept and theories of Human Rights – ***Classifications of Human Rights*** – Universal Declaration of Human Rights- International Covenant on civil and political rights – International covenant on Economic, Social and Cultural Rights.

UNIT III **10hrs.**

Rights Guaranteed by Indian Constitution - Constitutional vision of freedom: Fundamental Rights – ***Fundamental duties***- Constitutional vision of Justice: Directive Principles of State policy.

UNIT IV **5hrs.**

Human Rights Issues: Gender Discrimination-***Domestic violence***-Child Labour-Bonded Labour

UNIT V **5hrs.**

Human Rights Enforcements : National Human Rights Commission – State Human Rights Commission – Human Rights Courts – Role of NGO's : Amnesty International, Asia Watch – ***Peoples Union for Liberties****(PUCL),* Peoples Union for Democratic Rights (PUDR).

Note: Bold and *Italics* denote self study topics

Books for Reference:

1. Mugammad Naqi, *Modern Value Education*, Anmol Publications Pvt Ltd,New Delhi,2007
2. Shrimali L.L, *A Search for Values in Indian Education*, Vikas Publishers, Delhi, 1974.
3. Acharya. N.K, *The Costitution of India,* Asia Law House, Hyderabad, 2011.
4. Misra R., "*Human Rights*" Sumit Enterprises, New Delhi, First Edition,2005.
5. Nirmal S.J, *"Human Rights in India*",Oxford University Press, New Delhi,2000.
6. Durgadas Basu,*Human Rights in Constitutional Law*, Prentice Hall of India,1994.
7. Bajwa G.S.,*Human Rights in India*, Anmol Publications, New Delhi,1995.

SEMESTER - III

Core Chemistry Paper V

Instructional Hrs : 45 **Sub. Code : 11CHUC305**

Max. Marks : CIA-25; ESE-75 **Credits : 4**

Objective : To enable the students to understand about metals , phenols, amines, phase rule and phase diagram.

UNIT I **9 Hrs.**

Chemistry Of Boron Family: Group Discussion – Electron Acceptor Behaviour And Electron Deficiency Of Boron Hydrides- Bonding Of Diboranes - Sodium Borohydride –Preparation – Properties - Structure - Uses – *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.**

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

UNIT IV **9 Hrs.**

Amines: Preparation And Reaction - Amines – Primary - Secondary - Tertiary – Their Separation - Comparision Of Their Basicity – Ring Substitution - Diazotization And *Coupling Reaction Of Aromatic Amines.*

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.

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Puri B.R., Sharma L.R.,** *Principles Of Inorganic Chemistry,* Shobanlal Nagin chand & co., New Delhi, 26th Edition, 2002.
2. **Bhal B.S., Arunbahl**, *Advanced Organic Chemistry*, S. Chand & co., New Delhi, 19th Edition, 2006.
3. **Puri, B.R., Sharma, L.R. Pathania M.S.,** *Principles Of Physical Chemistry*, Sobanlal Nagin chand & co., New Delhi, 28th Edition, 2009.

REFERENCE BOOKS

1. **Bahl B.S., and Tuli, G.D.,** *Essentials Of Physical Chemistry*, S. Chand & co., New Delhi, 12th Edition, 2004.
2. **Soni P.L.,** *Inorganic Chemistry*, Sultan chand & sons, New Delhi, 20th Edition, 1997.
3. **Madan R.D.,** *Modern Inorganic Chemistry*, S. Chand & co., New Delhi, 3rd Edition, 2011.
4. **Morrison R.T and Boyd. R.W.,** *Organic Chemistry*, Prentice-Hall of India, New Delhi, 6th Edition, 1997.
5. **Glasstone S., and Lewis D**., *Elements of Physical chemistry*, McMillan, New Delhi , 2nd Edition, 1970.
6. **Kundu N. S., Jain S.K.,** *Physical chemistry*, Chand & co., New Delhi, 1st Edition, 1984.

SEMESTER - IV

Core Chemistry Paper VI

Instructional Hrs : 45 **Sub. Code : 15CHUC406**

Max. Marks : CIA-25; ESE-75 **Credits : 4**

Objective : To enable the students to have better understanding about metals , dyes, solutions and colligative properties.

UNIT I **9 Hrs.**

Iron Group Metals: Occurance – Extraction – Uses of Iron (cast iron) – Cobalt – Nickel - Platinum Group Metals - Isolation - Properties And Uses - Their Important Alloys - Platinum Black - Spongy Platinum - *Platinised Asbestos*.

UNIT II **9 Hrs.**

Color And Constitution: Relationship Of Color Observed To Wavelength Of Light Absorbed - Terms Used In Color Chemistry – *Chromophores* – *Auxochromes* -Bathochromic Shift - Hypsochromic Shifts - Color Of A Substance - Quinonoid Theory - Molecular Orbital Approach.

UNIT III **9 Hrs.**

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 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.**

Nernst Distribution Law And *Its Application*. **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.

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Bhal B.S., Arunbahl**, *Advanced Organic Chemistry*, S. Chand & co., New Delhi, 19th Edition, 2006.,
2. **Puri B.R., Sharma L.R.,** Principles *Of Inorganic Chemistry*, Shobanial Nagin chand & co., New Delhi, 26th Edition, 2002.
4. **Puri, B.R., Sharma, L.R. Pathania M.S.,** *Elements Of Physical Chemistry*, Vishal Publshing co., Jalandhar, 4th.Edition, 2013

REFERENCE BOOKS

1. **Arora M.G.,** *Text Book Of Dyes*, Anmol Publications, New Delhi, 1st Edition, 1996**Madan R.D.,** *Modern Inorganic Chemistry*, S. Chand & co., New Delhi, 3rd Edition, 2011.
2. **Kheterpal Dr. S.C.,** *Physical Chemistry Vol. I & II,* Pradeep Publications, Jalandhar, 2011.
3. **Mughergee, S.M., Singh S.P., Kapoor R.P**., *Organic Chemisty Vol – 1,2,3*, Wiley Eastern, New Delhi, 1st Edition, 1992.
4. **Kheterpal S.C.,** Physical Chemistry, Volume I, Pradeep Publications, Jalandhar, Millennium Edition, 2004

SEMESTER - IV

Core Chemistry Practical II

VOLUMETRIC AND ORGANIC ANALYSIS

Instructional Hrs : 45 **Sub. Code : 15CHUCP02**

Max. Marks : CIA-60; ESE-90 **Credits : 4**

Objective: Development of laboratory techniques. Acquisition of observation and analyzing skills.

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.

SEMESTER - V

Core Chemistry Paper VII

INORGANIC CHEMISTRY

Instructional Hrs : 60 **Sub. Code : 15CHUC507**

Max. Marks : CIA-25; ESE-75 **Credits : 4**

Objective: To expose the students to the challenges of the subject and to unify many of the underlying principles and observed facts.

UNIT I **12 Hrs.**

Metallic bonding: Electron Sea Theory – Electrical – Optical Properties – Valence Bond Theory – Molecular Orbital Theory. **Alloys:** Substitutional And Interstitial Solid Solutions - Hume - Rothery Ratios - *Semiconductors - Intrinsic And Extrinsic - Uses*. **Metal Carbonyls:** Preparation – Properties – Uses – Structure of $Co_2(CO)_8$ – $Fe_2(CO)_9$ - $Mn_2(CO)_{10}$

UNIT II **12 Hrs.**

Artificial Radio Activity: Artificial Transmutations Of New Elements - Synthesis Of Radio Isotopes And Of Elements – Nuclear Fission And Fusion - Nuclear Reactors-Principles Of Working – Production Of Electrical Energy - *Atomic Energy Projects In India* - Safety Measures - Disposal Of Reactor Wastes Pollution - Nuclear Reactions, Mechanism And Different Types Of Stellar Energy.

UNIT III **12 Hrs.**

Nature Of Isotopes And Isobars: Detection And Isolation Of Isotopes - Various Methods - Importance Of Discovery Of Isotopes -*Uses Of Isotopes In Various Fields*– C-14 Dating - Nuclear Stability - N/P Ratio - Magic Numbers - Mass Defect - Nuclear Binding Energies - Radio Active Disintegration Series.

UNIT IV **12 Hrs.**

Acids And Bases: Definitions – Different Approaches - Protonic Acid – Base Systems – *Strengths Of Lewis Acids And Bases* – Solvolytic Reactions – Hard And Soft Acids And Bases – Acid And Base Strength Of HSAB - Applications Of HSAB Concept - Basis Of Hardness And Softness - Pi Bonding Contribution - Electro Negativities Of Hard And Soft Species - Limitations Of HSAB Concept.

UNIT V **12 Hrs.**

Solvents: Solubilities Of Compounds – Effect Of Temperature On Solubility – *Role Of Water As Solvent* – Chemical Structure And Solubility. Classification Of Solvents- General Behaviour - Properties Of Ionizing Solvents. Types Of Reactions In Solvents-Specific Non Aqueous Solvents- Protonic Solvents - Ammonia, HF – Non Protonic Solvents- SO_2, BrF_3 Molten Salt - Organic Solvents C_2H_5OH, Ether.

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Madan R.D.,** *Modern Inorganic Chemistry*, Sultan chand & sons, New Delhi, Third Revised Edition, 2011.
2. **Puri B.R., Sharma L.R.,** *Principles Of Inorganic Chemistry*, Shobanial Nagin chand & co., New Delhi, 26th Edition, 2002.
3. **Soni, P.L.,** *Inorganic Chemistry*, Sultan Chand & sons, New Delhi, 20th Edition, 1993.

REFERENCE BOOKS

1. **Cotton F.A.,** *Concepts Of Inorganic Chemistry*, John Wiley & Sons, London, 3rd Edition, 2007.
2. **Manku,** *Theortical Inorganic Chemistry*, G.S.Tata Megrow -Hill, New Delhi, 1st Edition, 1980.
3. **Shiver and Atkins,** *Inorganic Chemistry*, Oxford, New Delhi, 3rd Edition, 2002.
4. **Sundaram. S. and Srinivasan V.S.,** *Text Book Of Inorganic Chemistry- A New Approach*, Margham Publications, Chennai , 1st Edition, 1995.

SEMESTER V

Core Chemistry Paper VIII

ORGANIC CHEMISTRY

Instructional Hrs : 60 **Sub. Code : 15CHUC508**

Max. Marks : CIA-25; ESE-75 **Credits : 4**

Objective: To understand the relation between various facts, theories and mechanisms. To acquire the knowledge of the chemistry of organic compounds.

UNIT I **12 Hrs.**

Optical Activity Of Compounds With Asymmetric Carbon: Racemisation – Resolution – Asymmetric Synthesis- Configuration – D-L And R-S Nomenclature.

(With One Asymmetric Carbon) Optical Activity Of Biphenyls – Allenes - *Spiranes* And Over Crowded Molecules.

UNIT II **12 Hrs.**

Mechanism Of Molecular Rearrangement Reaction: Pinacol- Pinacolone, Beckmann – Hoffmann – Curtius – Benzidine – *Schmidt* – *Lossen* – Cope - Benzylic Acid And Claisen Rearrangements.

UNIT III **12 Hrs.**

Carbohydrates: Chemistry And Structure Of Glucose – Fructose - Sucrose And Maltose (Cyclic Structure As Well) *Starch And Cellulose* – An Elementary Account (Elucidation Of Structure Not Necessary). **Interconversion Of Sugars:** Mutarotaion –Epimerization.

UNIT IV **12 Hrs.**

Amino Acids And Proteins: Amino Acids - Classification – Preparation And Properties – Peptides And Polypeptides. **Proteins:** Classification Based On Physical Properties And Biological Functions- Primary - Secondary And Tertiary Structure - *Properties And Uses.*

UNIT V **12 Hrs.**

Heterocyclic Compounds: Preparation – Properties - Furan – Pyrrole – Thiophene - Pyridine – Comparison of basicity of Pyrrole and Pyridine - Quinoline – *Isoquinoline* - Indole - Isatin – Benzofuran .

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Bhal B.S., Arunbahl**, *Advanced Organic Chemistry,* S. Chand & co., New Delhi, 19th Edition, 2006.
2. **Soni P.L., Chawla H.M.,** *Text book of organic chemistry*, Sultan & sons, New Delhi, 27th Edition, 1997.

REFERENCE BOOKS

1. **Finar I.L., Addison-Wesly Longman,** *Organic Chemistry Volume 1,* ELBS, Londan 6th Edition - 2000
3. **Finar I.L, Addison-Wesly Longman** *Organic Chemistry Volume II*, ELBS, London, 6th Edition, 1997.
4. **Kalsi,** *Stereo Chemistry Conformation And Mechanisms***,** Wiley Eastern Ltd., New Delhi, 3rd Edition, 1995.
5. **Morrison R.T and. Boyd. R.W.,** *Organic Chemistry*, Prentice-Hall, New Delhi, 2nd Edition, 1969.
6. **Mughergee, S.M., Singh S.P., Kapoor R.P**., Organic *Chemisty, Vol – 1, 2, 3,* Wiley Eastern, New Delhi, 1st Edition, 1985.

SEMESTER - V

Core Chemistry Paper IX

ELECTRO CHEMISTRY

Instructional Hrs : 75 **Sub. Code : 15CHUC509**

Max. Marks : CIA-25; ESE-75 **Credits : 4**

Objective: To learn the principles of electrochemistry and to understand its applications. To relate electrodes and electrode potentials in producing current. To familiarize the technique of polarography.

UNIT I **12 Hrs.**

Electrical Conduction: Conduction In Metals And In Electrolytic Solutions. Measurement Of Conductivity In Electrolytic Solution - Migration Of Ions- Kohlrausch's Law - *Arrhenius Theory Of Electrolytic Dissociation* – Oswald's Dilution Law - Theory Of Strong Electrolytes - Debye And Huckel - Onsagar Theory (Elementary Account Only) Verification – Debye - Falkenhagen Effect – Wien Effect - Transport Numbers – Determination – Conductometric Titrations.

UNIT II **12 Hrs.**

Ionic Equilibria: Solubility And Solubility Product - Determination Of Solubility Product - Applications Of Solubility Product - Principle - Dissociation Of Weak Acids And Bases - Dissociation Constants - pH Scale - Common Ion Effect - *Buffer Solution* – Determination Of pH Values Of Buffer Mixtures – Henderson Equation - Hydrolysis Of Salts – Degree Of Hydrolysis.

UNIT III **12 Hrs.**

Electrochemical Cells: Electrode Potentials - Single Electrode Potential - Standard Hydrogen Electrode - Determination And Significance Of Electrode Potentials - Kinds Of Electrodes And Their Potentials - Nernst Equation – EMF - Computation And Measurement Of Cell EMF -– – *Electrochemical Series Of Cell Reaction.*

UNIT IV **12 Hrs.**

Reference Electrodes : Electrodes For Measurement Of pH - Concentration Cells With And Without Transport - Liquid Junction Potential - *Applications Of EMF Measurements* - Redox Potentials - Redox Indicators – Uses – Potentiometric Titrations.

UNIT V **12 Hrs.**

Fuel Cells: Hydrogen - Oxygen Cell And Hydrocarbon Oxygen Cell - Storage Cells –Lead Storage Cell And Nickel Cadmium Cell –Decomposition Voltage – Over Voltage -Deposition And Discharge Potential. **Polarography**: Principle- Concentration Polarization - *Dropping Mercury Electrode- $E_{1/2}$* Value.

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Kheterpal Dr. S.C.,** *Physical Chemistry Vol. I & II,* Pradeep Publications, Jalandhar, 2nd Edition, 2004.
2. **Puri B.R., Sharma L.R., Pathania M.S.,** *Principles Of Physical Chemistry,* Sobanlal Nagin chand & co., New Delhi, 19th Edition, 1987.

REFERENCE BOOKS

1. **Bahl B.S., Tuli, G.D., Arun Bahl,** *Essentials Of Physical Chemistry*, S. Chand & co., New Delhi, Revised Edition, 2009.
2. **Glasstone S., and Lewis D**., *Elements of Physical chemistry,* McMillan, New Delhi, 2nd Edition, 1970.
3. **Kapoor R.C., Aggarwal A.S.,** *Principles Of Polarography,* Sathya Bhavan, Agra, 1st Edition, 1991.
2. **Soni P.L., Dharma Rao D.P.,** *Text Book Of Physical Chemistry*, S. Chand & co., New Delhi, 12th Edition,1980.

SEMESTER - V

GROUP – A

Elective Paper I

ANALYTICAL CHEMISTRY

Instructional Hrs : 60 **Sub. Code : 17CHUE501**

Max. Marks : CIA-25; ESE-75 **Credits : 5**

Objective: To make the students to learn about basic principles of analytical chemistry and instrumentation techniques.

UNIT I **12 Hrs.**

Basic Principles And Application Of Analytical Techniques : Precipitation – Filtration - Sample Drying - Transfer Of Precipitate – Distillation - Vacuum Distillation - Fractional Distillation – *Sublimation* – Crystallization - Fractional Crystallization - Melting Point - Boiling Point - Refractive Index .

UNIT II **12 Hrs.**

Evaluation Of Analytical Data: Types And Sources Of Errors - Accuracy And Precision- Rules For Improving Accuracy - Methods For Reporting Analytical Data - **Volumetric Analysis:** Terms used - Standard solution – Standardization – Equivalence Point and End point - Types Of Titration – *Acid- base Titration* - Precipitation Titration.

UNIT III **12 Hrs.**

Gravimetric Analysis: Methods Of Obtaining The Precipitate - General Rules For Precipitation - Conditions For Precipitation – Choice Of Precipitants – Advantages Of Using Organic Precipitants – Type Of Organic Precipitation – Specific And Selective Precipitants - Sequestering Agents – Co–Precipitation - Post Precipitation – Procedures To Minimize Occlusion – Procedures To Minimize Surface Adsorption – Effect Of Digestion - Precipitation From Homogeneous Medium – *Washing Of Precipitates – Drying Of Precipitates* – Crucibles - Types - Care and Use.

UNIT IV **12 Hrs.**

Chromatographic Techniques: Principles of Chromatography - Differential Migration – Partition Coefficients - Adsorbents – Choice Of Adsorbents - Process Of Elution – Choice Of Solvents. **Adsorption Chromatography**: Partition – Column - *Paper Chromatography* -Thin

Layer Chromatography – R_f Values – Importance Of R_f Values – Factors Affecting R_f Values. **Ion Exchange Chromatography:** Principle - Ion Exchange Resins – Cation And Anion Exchanger – Experimental Techniques And Applications.

UNIT V **12 Hrs.**

Thermo Analytical Methods: Thermo Gravimetric And Differential Thermal Analysis – Principle – Instrumentation - Characteristics Of TGA And DTA Curves – Factors Affecting TGA And DTA Curves - *Thermometric Titrations* – Application Of TGA And DTA – Electro Gravimetric Analysis – Theory - Instrumentation And Application.

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Gopalan R., Subramanian P.S., and Rengarajan K.,** *Elements Of Analytical Chemistry,* S.Chand Company, New Delhi, 3st Edition, 2003.
2. **Kaur H.,** *Instrumental Methods of Chemical Analysis*, Pragati Prakashan Publications, Meerut, 11 th Edition, 2016.

REFERENCE BOOKS

1. **Mahindra Singh,** *Analytical Chemistry*, Dominate Publications, New Delhi, 1st Edition, 2003.
2. **Skoog D.A., and West D.M.,** *Fundamentals Of Analytical Chemistry,* Thomson Brooks/Cole USA, 8th Edition, 2006.
3. **Srivatsava,** *Chemical Analysis,* S.Chand Company, New Delhi, 4th Edition, 2009.
4. **Willard Dean, Merit, and Settle,** *Instrumental methods of Analysis*, CBS, New Delhi 7th Edition, 1986.
5. **Sathya Prakash, Ramdas, Diwari,** *Text Book Of Analytical Chemistry,* Students Friends & Co, 1st Edition, 1970.
6. **Gary.D.Christian,** *Analytical Chemistry*, John Wiley and Sons (ASIA) Pte Ltd Singapore, 6th Edition, 2003.

SEMESTER - V

GROUP – A

Elective Paper I

PHARMACEUTICAL CHEMISTRY

Instructional Hrs : 60 **Sub. Code : 17CHUE502**

Max. Marks : CIA-25; ESE-75 **Credits : 5**

Objective: To motivate the students to know about the chemistry of drugs which utilizes the general laws of chemistry to study drugs.

UNIT I **12 Hrs.**

Important Terminologies Used In Pharmaceutical Chemistry: Definition Of The Terms – Drug – Pharmacology - Pharmacognosy – Pharmacy- Therapeutics- Toxicology – Chemotherapy - Pharmacopoeia - B.P - I.P - U.S.P - E.P - LD_{50} – Effective dose – National Formulary. **Immunological Agents:** Active - Passive Immunity – Vaccines– Toxoids – Routes Of Drug Administration. **First Aid**: Prevention Of Bleeding - Maintain Breathing - *Everyday Injuries*.

UNIT II **12 Hrs.**

Food Poisoning: Botulism - Mushroom Poisoning – Plant Poisoning. **Causes, Symptoms And Treatment:** Anemia – Diabetes – Tuberclosis – Asthma – Jaundice – Piles – Leprosy – Epilepsy – Typhoid - Malaria And Cholera. **Indian Medicinal Plants:** Spices And Their Medicinal Uses – *Medicinal Plants In The Kitchen Garden*.

UNIT III **12 Hrs.**

Hematological Agents: Blood Coagulants – Blood Clotting Factors – Anticoagulants – Fibrinolytic Agents – Antianaemic Drugs. **Blood** – Composition And Functions – Rh Factor – RBC – WBC – Basophiles – Eosinophils – *Plasma Proteins – Functions*.

UNIT IV **12 Hrs.**

Chemotherapeutic drugs: Antibiotics – Antipyretics – Analgesics – Anaesthetics – Antiseptics And Disinfectants –Definition, Therapeutic Uses – *Distintion Between Antiseptics And Disinfectants.* **Important Drugs In Pharmaceutical Chemistry:** Aspirin – Chloramphenicol – Paracetamol – Gentamycin - Penicillin V – Erythromycin - Tetracycline – Uses And Common Side Effects.

UNIT V **12 Hrs.**

Clinical Testing : Efficacy Of Drugs – Planning Clinical Trials - Diagnostic Test For Sugar In Urine - Salts In Serum And Urine – Cholesterol In Urine – *Detection Of Diabetes* – Estimation Of Hb Concentration.

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Jayashree Ghosh,** *A Text Book Of Pharmaceutical Chemistry,* S.Chand & Co., New Delhi, 3rd Edition, 2008.

REFERENCE BOOKS

1. **Ashutosh Kar,** *Medicinal Chemistry*, New Age International, New Delhi, 1st Edition, 1992.
2. **Betleys, Raubins E.A.,** *Text Book Of Pharmacutics,* All India traveler book sellers, Delhi, 8th Edition, 1992.
3. **Satoskar R.S., Bhandarkar S.D.,** *Pharmacology And Pharmatherapeutics, Vol 1&2*, Popular prakashan, Mumbai, 11th Edition, 1989.

SEMESTER - VI

Core Chemistry Paper X

PHYSICAL METHODS & CHEMICAL STRUCTURE

Instructional Hrs : 75 **Sub. Code : 15CHUC610**

Max. Marks : CIA-25; ESE-75 **Credits : 4**

Objective: To appreciate the importance of internal structure of molecules and its impact on other properties. To utilize the variation in various properties to study the internal structure. To gain the knowledge of techniques used for structure determination.

UNIT I **12 Hrs.**

Magnetic Properties Of Molecules: Meaning Of The Terms Magnetic Susceptibility - Magnetic Moment - Diamagnetism - Para Magnetism – Ferromagnetism - *Determination Of Magnetic Susceptibility By Guoy's Method* –Application Of Magnetic Properties In Solving Structural Problems Involving Simple Ions And Co ordination compounds.

UNIT II **12 Hrs.**

Electrical Properties Of Molecules: Molar Polarization - Orientation Polarization And Distortion Polarization. **Polar And Non-Polar Molecules**: Determination Of Dipole Moments Of Polar Gases - Liquids – Solids - *Applications Of Dipole Moment In The Study Of Simple Molecules.*

UNIT III **12 Hrs.**

Spectroscopy: Absorption Spectra – Fundamental Concepts - Electromagnetic Spectrum - The Various Regions Of The Spectrum And The Relative Energies Of The Radiation In Each Region - Types Of Changes Induced By The Interaction Of Radiation With Matter - Theory Of Rotation Spectra - Molecular Rotation - Diatomic Molecule As Rigid Rotor - Intensities Of Spectral Lines - Applications Of Rotation Spectra – Bond Length - *Isotopic* S*ubstitution.*

UNIT IV **12 Hrs.**

IR Spectra : Theory - Simple Harmonic Oscillator Model-Information On Molecular Constitution From IR Spectra – Applications Of IR Spectra. **Raman Spectra**: *Theory - Comparision Of IR And Raman Spectra*.

UNIT V **12 Hrs.**

UV And Visible Spectra: Theory – Franck - Condon Principle – Predissociation -Determination Of Dissociation Energies Using Bridge - Spooner Method - *Applications Of UV Spectra To Simple Molecules.* **NMR Spectra :** Basic Principles - Chemical Shift - NMR Spectra Of Simple Molecules. (High Resolution Details Not Expected). **ESR Spectra:** Basic Principles -'G' Factor Lande's Splitting Factor – ESR Spectrum Of Free Radicals H**.**, CH_3.

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Kheterpal S.C.,** *Physical Chemistry Vol. I & II,* Pradeep Publications, Jalandhar , 2nd Edition, 2004.
2. **Puri B.R., Sharma L.R., Pathania M.S.,** *Principles Of Physical Chemistry,* Sobanlal Nagin chand & co., New Delhi, Revised Edition, 2009.
3. **Soni P.L., Dharma Rao D.P.,** *Text Book Of Physical Chemistry*, S.Chand & co., New Delhi, 12th Edition, 1980.

REFERENCE BOOKS

1. **Banwell C.N.,** Fundamentals *Of Molecular Spectroscopy*, Tata MC Graw Hill, New Delhi, 4th Edition, 2011.
2. **Barrow G.M.,** *Introduction To Molecular Spectroscopy*, MC Graw Hill, New York, 1st Edition, 1962.
3. **Russel S.,** *Physical Methods In Inorganic Chemistry*, Drago East west Press, 1st Edition, 1978.
4. **Sharma Y.R.,** Elementary *Organic Absorption Spectroscopy,* S. Chand & co., New Delhi, 1st Edition, 1980.

SEMESTER - VI

Core Paper - XI

CHEMICAL KINETICS

Instructional Hrs : 60 **Sub. Code : 15CHUC611**

Max. Marks : CIA-25; ESE-75 **Credits : 4**

Objective: To enable the students to acquire the knowledge regarding the principles of chemical kinetics and applying the same to solve the problems.

UNIT I **12 Hrs.**

Empirical Laws And Experimental Aspects: Rate Laws - Order - Molecularity Of Reactions - Setting Up And Solving Simple Differential Equations For First Order - Second Order - *Third Order* - Zero Order Reactions.

UNIT II **12 Hrs.**

Half - Life Period: First Order - Second Order - Zero Order- Third Order Reactions - Determination Of Order Of Reactions. **Experimental Techniques:** *Volumetry* – Manometry – Dialtometry - Polarimetry – Colorimetry - Typical Examples For Each Of The Techniques.

UNIT III **12 Hrs.**

Theoretical Aspects I : Effect Of Temperature On The Rate Constant - The Activation Energy - The Collission Theory Of Reaction Rates And Its Limitation - The Theory Of Absolute Reaction Rates - *Comparision Of The Collision Theory With The Absolute Reaction Rate Theory* - Significance Of Free Energy Of Activation - Entropy Of Activation - Lindemann Theory Of Unimolecular Reactions.

UNIT IV **12 Hrs.**

Theoretical Aspects II: Complex Thermal Reactions –Reversible-Consecutive-Parallel & Thermal Chain Reaction – Kinetics of H_2/Br_2 Reaction.

Catalysis : Positive and Negative catalysis - Auto catalysis - General Characteristics of a Catalyst- Catalytic Promoters & Inhibitors- Homogeneous & Heterogeneous Catalysis (Kinetics of reactions not needed) - *Enzyme catalysis*.

UNIT V **12 Hrs.**

Kinetics Of Photochemical Reactions: Absorption Of Light And Photochemical Processes - The Stark – Einestein Law Of Photochemical Equivalence - Photochemical Chain Reaction - H_2/Br_2 And H_2/Cl_2 Reactions - Quantum Yield Of Photochemical Reactions - Comparison Of Thermal & Photochemical Reactions - Photochemical Kinetics Of H_2/Br_2 Reaction - Photosensitized Reactions – Fluorescence *Phosphorescence* - Chemiluminescence.

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Kheterpal S.C.,** *Physical Chemistry,* Volume 1, Pradeep's Publications, 10th Edition 2012.
2. **Puri B.R, Sharma L.R., Pathania M.S.,** *Principles Of Physical Chemistry,* Sobanlal Nagin chand & co., New Delhi, 44th Edition, 2010.

REFERENCE BOOKS

1. **Aleberty R.A.,** *Physical Chemistry,* John-Wiley & sons, New York, 1st Edition, 1995.
2. **Bahl B.S., Tuli, G.D.,** *Text Book Of Physical Chemistry,* S. Chand & co., New Delhi, Revised Edition, 2009.
3. **Bajpai D.N.,** *Advanced physical chemistry,* S. Chand & co., New Delhi, 2nd Edition, 1998.
4. **Glasstone S., and Lewis D**., *Elements of Physical chemistry,* McMillan, New Delhi, 2nd Edition, 1970.
5. **Kundu, N. S. Jain, S.K.,** *Physical chemistry,* Chand & co., New Delhi, 1st Edition, 1984.
6. **Soni P.L., Dharma Rao D.P.,** *Text Book Of Physical Chemistry,* S.Chand &Co., New Delhi, 12th Edition, 1980.

SEMESTER - VI

Core Chemistry Paper XII

CHEMISTRY OF NATURAL PRODUCTS

Instructional Hrs : 60 **Sub. Code : 15CHUC612**

Max. Marks : CIA-25; ESE-75 **Credits : 4**

Objective: The syllabus is concise that encompasses important branches like chemistry of terpenoids, alkaloids, vitamins, hormones, steroids and chemotherapy. The main objective is to educate the students to gain a hold in the region of natural products chemistry.

UNIT I **12 Hrs.**

Terpenoids: Introduction – Classification – General Methods Of Isolation – Isoprene Rule - Structural Elucidation And Synthesis Of Geraniol – *Dipentene* – α Terpineol – α Pinene.

UNIT II **12 Hrs.**

Alkaloids: Introduction - Classifications – General Methods Of Determining Structures – Hoffmann's Exhaustive Methylation And Degradation - Structural Elucidation And Synthesis Of Nicotine - Coniine - *Piperine* - Papaverine.

UNIT III **12 Hrs.**

Vitamins: Definition - Classification - Sources- Deficiency Diseases Of VitaminA- Vitamin B – Vitamin C – Vitamin D – Vitamin E – Vitamin K - Importance Of Vitamin A In Vision (Rhodopsin Cycle) - Structural Elucidation And Synthesis – *Thiamine* –Ascorbic Acid.

UNIT IV **12 Hrs.**

Hormones: Introduction – Classification – Biological Functions – Structural Elucidation And Synthesis Of Adrenaline And *Thyroxine.* **Steroids:** Introduction – Chemistry And Structure Of Cholesterol (Synthesis Not Required).

UNIT V **12 Hrs.**

Chemotherapy: Introduction – Classification Of Drugs – Lethal Dose – Chemistry And Applications Of Sulpha Drugs - Anti Malarials – Life Cycle of Malarial Parasite - Analgesics - Amoebicidal Drugs And Antibiotics - Penicillin- Streptomycin – *Chloromycetin* - Tetracycline – (Structure And Uses Only).

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Agarwal O.P.,** *Chemistry Of Natural Products Vol. 1 & 2*, Goel Publications, Meerut, 18th Edition, 1995.
2. **Jayashree Ghosh**, *Fundamental concepts of Applied chemistry*, S. Chand & co., New Delhi, 1st Edition, 2006.

REFERENCE BOOKS

1. **Chatwal,** *Chemistry of natural products I,* Himalya Publishing, Mumbai, 1st Edition, 1981.
2. **Chatwal,** *Chemistry Of Natural Products II,* Himalya Publishing, Mumbai, 1st Edition, 1983.
3. **Morrison R.T and Boyd. R.W.,** *Organic Chemistry,* Prentice-Hall, New Delhi, 6th Edition, 1997.
4. **Prof. Singh P.P & Dr.Rangnekar. D.W.,** *Introduction To Synthetic Drugs*, Himalayam Publishing house, Mumbai, 1st Edition, 1980.

SEMESTER - VI

GROUP – B

Elective Paper II

POLYMER CHEMISTRY

Instructional Hrs : 60 **Sub. Code : 17CHUE603**

Max. Marks : CIA-25; ESE-75 **Credits : 5**

Objective: To learn more about polymer chemistry, the recent developments in the fields and its applications in various fields.

UNIT I **12 Hrs.**

Basic Concepts: Monomers – Polymers – Polymerization – Degree of Polymerization - Classification Of Polymers – Plastics – Elastomers - Fibres – *Adhesives* -Thermosetting Plastics and Thermoplastics – Bio degradable Polymers - Methods of Polymerization –Bulk – Solution - Suspension and Emulsion.

UNIT II **12 Hrs.**

Types Of Polymerization: Step Growth Polymerization - *Addition Polymerization* - Free Radical - Ionic - Co-Polymerisation – Randam - Alternate - Block - Graft Polymerization.

UNIT III **12 Hrs.**

Polymer Stereochemistry: Factors Influencing Stereoregulation - Uses Of Ziegler -Natta Catalysts – Nature Of These Catalysts And Mechanism Of Stereoregulation –*Tacticity Of Polymers.*

UNIT IV **12 Hrs.**

Molecular Weights Of Polymers: Number Average And Weight Average Molecular Weight – *Determination Of Molecular Weight By End Group Analysis* - Ebullioscopy – Cryoscopy - Osmotic Pressure - Vapor Pressure Osmometry - Light Scattering - Ultracentrifuge.

UNIT V **12 Hrs.**

Manufacture Of Polymers: Polyethylene – PVC - Polystyrene - Phenolic Resins – Polyurethanes - Teflon. **Polymer Processing Technique:** Calendering - Film Casting - Compression Moulding - Injection Moulding - Blow Moulding - Extrusion Moulding – Foaming – *Applications Of Polymers In Food Industry And Medical Field.*

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Gowarikar,** *Polymer Chemistry*,Wiley Eastern, New Delhi, 1st Edition, 1995.
2. **Sharma B.K**., *Polymer Chemistry*, Goel Publications , Meerut, 1st Eddition, 1999.

REFERENCE BOOKS

1. **Bhatnagar M.S**., *A Textbook Of Polymer Chemistry And Technology Of Polymers, Vol. I, II,III,* S.Chand & Co., New Delhi, 1st Edition, 2004.
2. **Billmeyer,** *Text Book Of Polymer Science*, John Wiely & Sons, 3rd Edition, 2000.
3. **Misra G.S**., *Introductory Polymer Chemistry*, Wiley Eastern, New Delhi 1st Edition, 1993.
4. **Nayak & Lenka**, *Text Book Of Polymer Science*, Kalyane Publication, New Delhi, 2nd Edition, 1994.
5. **Ravisankar N., Ilangovan K.,** *Applied Chemistry*, National Institute of Nutrition, Hyderabad, 6th Edition,1999.
6. **Dr.Subramanaiam,** *Applied Chemistry*, Scitech Publications, Chennai, 1st Edition , 1998.

SEMESTER - VI

GROUP – B

Elective Paper II

WATER – QUALITY ANALYSIS AND TREATMENT

Instructional Hrs : 60 **Sub. Code : 17CHUE604**

Max. Marks : CIA-25; ESE-75 **Credits : 5**

Objective: To create an awareness on the quality of water which is used several hundred and thousand folds than any other chemical. To provide an opportunity to faculty and students to sensitize themselves with social problems and realities by exposure through field experience.

UNIT I **12 Hrs.**

Water: Physical And Chemical Properties – Emphasis On Its Solvent Properties - Sources Of Water – Precipitation, Run Off (Surface) Waters - Ground Water - Characteristics Of Water - Colour – Odour – Turbidity – Taste – pH – Acidity - Alkalinity - TDS And Hardness - *Water In Human Body* – Potability Of Water - Quality Criteria For Drinking - Industrial And Agricultural Purposes - WHO Standards

UNIT II **12 Hrs.**

Purification Of Water: Clarification Of Water – Coagulation Of Water - Sterilisation And Disinfection Of Water – Aeration – Ozonisation - *Chlorination –Boiling* - Exposure To Sunlight And Ultraviolet Light - Activated Carbon Treatment - **Water Borne Diseases**: Diseases Due To Bacteria And Viruses.

UNIT III **12 Hrs.**

Hardness Of Water : Determination Of Hardness Of Water - *EDTA Method* - Softening Of Water – Zeolite Process And Ion Exchange Process - Sea Water As A Source Of Drinking Water - Desalting By Electro Dialysis Method -Reverse Osmosis Method.

UNIT IV **12 Hrs.**

Waste Water Treatment: Sewage - Primary - Secondary And Tertiary Treatment – Treatment Of Sewage With Micro Organism – Sludge Disposal- Prevention Of Water Pollution – Control Of Water Pollution– *How To Make Best Use Of Water?*

UNIT V **12 Hrs.**

Examination Of Water And Waste Water: Collection And Labelling Of Samples - Expression Of Results – Measurement Of pH - Electrical Conductivity - Total Dissolved Solids- Free Carbon Dioxide - Acidity – *Alkalinity* – *Calcium* – *Magnesium* - Chloride And Fluoride - Measurement Of Organic Purity- Dissolved Oxygen – BOD- COD.

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Kudesia V.P.,** *Environmental Chemistry* , Pragati Prakashan, Meerut, 4th Edition, 2000.
2. **Manivasakam N.,** *Physico Chemical Examination Of Water, Sewage And Industrial Effluents,* Pragati Prakashan Publication, Merrut, 5th Edition, 2005.
3. **Sharma B.K.,** *Industrial Chemistry,* Krishna's Educational Publishers**,** 16th Edition, 2011.

REFERENCE BOOKS

1**. Kudesia V.P.,** *Water Pollution*, Pragati Prakashan, Meerut, 4th Edition, 2002.
2**. Sharma B.K.,** *Water Pollution,* Goel Publishing House, Meerut, 4th Edition, 2005

SEMESTER - VI

Core Chemistry Practical - III

GRAVIMETRIC ANALYSIS AND PHYSICAL CHEMISTRY

Practical Hrs : 105 **Sub. Code : 15CHUCP03**

Max. Marks : CIA-60; ESE-90 **Credits : 5**

Objective: To acquire the skill of analyzing the samples gravimetrically and to understand the principles of physical chemistry and also to apply them experimentally for determination of physical constants.

I GRAVIMETRIC ANALYSIS

1. Estimation Of Barium As Barium Sulphate
2. Estimation Of Barium As Barium Chromate
3. Estimation Of Lead As Lead Chromate
4. Estimation Of Calcium As Calcium Oxalate
5. Estimation Of Calcium As Calcium Carbonate

II PHYSICAL CHEMISTRY EXPERIMENTS

1. Determination Of Rate Constant Of Acid - Catalysed Hydrolysis Of An Ester (Methyl Acetate Or Ethyl Acetate).
2. Determination Of Rate Constant Of Inversion of Cane Sugar by Polarimetry
3. Determination Of K_f Molecular Weight By Rast Method-Naphthalene, Biphenyl, Biphenyl Amine As Solvents.
5. Determination Of Critical Solution Temperature Of Phenol Water System.
6. Determination Of Concentration Of An Electrolyte (NaCl / KCl/ Succinic Acid)
7. Determination Of Transition Temperature Of Sodium Acetate, Sodium Thiosulphate, And Strontium Chloride.
8. Phase Diagram-Simple Eutectic System.
9. Determination Of Cell Constant, Specific Conductance And Equivalent Conductance Of Strong Electrolyte.
10. Determination Of Dissociation Constant Of A Weak Acid (Acetic Acid)
11. Conductometric Titration, Strong Acid –Strong Base.
12. Potentiometric Titrations – Redox titrations
13. Verification of Adsorption Isotherms

SEMESTER - VI

ELECTIVE PRACTICAL

Practical Hrs : 45 **Sub. Code : 17CHUEP01**

Max. Marks : CIA-40; ESE-60 **Credits :5**

Objective: To enhance the industrial oriented skills for a professional career.

I. Estimations

(i) Estimation Of Hardness Of Water Using EDTA

(ii) Estimation Of Zinc Using EDTA

II. Colorimetric Experiments

(i) Involving Nessler's Tube

a. Estimation Of Fe^{3+} With Ammonium Thio Cyanate

b. Estimation Of Mn^{2+} In Potassium Permanganate Using Potassium Periodate.

c. Estimation Of Ni Using Dimethyl Glyoxime

(ii) Determination of OD using Colorimeter

III. Determination of pH of buffers and unknown solution.

IV. Determination of Melting point/ Boiling point of organic substances

V. Dyeing and Printing

a. Testing of Fibres

b. Dyeing Of Direct Dyes On Cotton Fibre.

c. Effect Of Temperature Of Dyeing Of Direct Dyes On Cotton Fibres.

d. Effect Of Adding Common Salt During Dyeing-Direct Dyes On Cotton Fibre.

e. Dyeing Of Reactive Dyes On Cotton Fibre.

f. Dyeing Of Direct Dyes On Viscose Rayon

g. Dyeing Of Reactive Dyes On Viscose Rayon

h. Block Printing

VI. Separation of compounds by Paper Chromatography (Group Experiments)

SYLLABI

FOR

ALLIED CHEMISTRY

B.Sc., Zoology

B.Sc., Botany

B.Sc., Physics

B.Sc ., Nutrition & Dietetics

SEMESTER - I / III

ALLIED CHEMISTRY PAPER-I

Instructional Hrs : 60 **Sub. Code : 17CHUA101/17CHUA303**

Max. Marks : CIA-20; ESE-55 **Credits : 4**

Objective: To gain the knowledge of principles of chemistry. To understand the application of chemistry in industries.

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. **Interhalogen Compounds**: ICl - BrF_3 – IF_5 – Preparation – Properties - Uses. **VSEPR Theory And Geometry Of Molecules:** Hybridization And Geometry Of Molecules ICl - BrF_3 - IF_5 – CH_4 –SF_6

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 – *Chloromycetin* - 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.*

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Dr. Veeraiyan V,** *Allied Chemistry Paper I & II*, Highmount Publishing House, Chennai, 2nd Edition, 2005.

REFERENCE BOOKS

1. **Bhal B.S., Arunbahl**, *Advanced Organic Chemistry*, S. Chand & co New Delhi 19th Edition, 2006.
2. **Bahl B.S. and Tuli, G.D.,** *Essentials Of Physical Chemistry*, S. Chand & co., New Delhi, 12th Edition, 2004.
3. **Puri B.R., Sharma L.R., Pathania M.S.,** Principles *Of Physical Chemistry*, Sobanlal Nagin chand & co., New Delhi, 28th Edition, 1987.
4. **Puri B.R., Sharma L.R.,** Principles *Of Inorganic Chemistry*, Shobanial Nagin chand & co., New Delhi, 26th Edition, 2002.
5. **Soni P.L.,** *Inorganic Chemistry*, Sultan chand & sons, New Delhi, 20th Edition, 1993.

SEMESTER - II / IV

ALLIED CHEMISTRY PAPER – II

Instructional Hrs : 60 **Sub. Code : 17CHUA202/17CHUA404**

Max. Marks : CIA-20; ESE-55 **Credits : 4**

Objective: To motivate the students of other science subjects to learn and enjoy Chemistry. To relate chemistry to careers in science that interests students. To develop problem solving skills.

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.

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Dr. Veeraiyan V,** *Allied Chemistry Paper I & II*, Highmount Publishing House, Chennai, 2005.

REFERENCE BOOKS

1. **Bhal B.S., Arunbahl**, *Advanced Organic Chemistry*, S. Chand & co New Delhi 19th Edition, 2006.
2. **Bahl B.S. and Tuli, G.D.,** *Essentials Of Physical Chemistry*, S. Chand & co.,New Delhi, 12th Edition, 2004.
3. **Jayashree Ghosh.,** *Applied Chemistry***,** Sultan chand & sons, New Delhi, 1st Edition, 2006.
4. **Puri, B.R., Sharma, L.R. Pathania M.S.,** *Principles Of Physical Chemistry*, Sobanlal Nagin chand & co., New Delhi, 28th Edition, 1987.
5. **Puri B.R., Sharma L.R.,** *Principles Of Inorganic Chemistry*, Shobanial Nagin chand & co., New Delhi, 26th Edition, 2002.
6. **Sharma .B.K,** *Industrial Chemistry*, Goel Publishing House, 16 th Edition, 2011.
7. **Soni P.L.,** *Inorganic Chemistry*, Sultan chand & sons, New Delhi, 20th Edition, 1993.
8. **Sivakumar R., Sivakumar N.,** *Engineering Chemistry*, Tata McGraw-Hill Publishing Company Limited, New Delhi, First Edition, 2008.

ALLIED CHEMISTRY PRACTICALS

Instructional Hrs : 45 **Sub. Code : 15CHUAPO1**

Max. Marks : CIA-20; ESE-30 **Credits : 2**

Objective: To Acquire The Skill Of Analysing Samples Volumetrically.

To Learn The Technique Of Analyzing Organic Compounds.

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.

SYLLABI

FOR

SKILL BASED SUBJECTS

SEMESTER - III

Skill Based Subject I

CHEMISTRY OF MILK AND MILK PRODUCTS

(CAFETERIA SYSTEM)

Instructional Hrs : 45 **Sub. Code : 17CHUS301**

Max. Marks : CIA-25; ESE-75 **Credits : 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- *Factors Influencing 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.**

Sampling 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 - *Detection Of Buffalo Milk and Cow Milk.*

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, 1st Edition, 2007.
4. **Jayashree Ghosh**, *Fundamental concepts of Applied chemistry*, S.Chand & co., New Delhi., 1st Edition, 2006.
5. M**athurM.P., Dattaroy D., Dinakar P.,** *Text book & Dairy chemistry*, Indian Council and Agricultural Research,New Delhi, 2005.

SEMESTER – IV

Skill Based Subject II

MULTISKILL DEVELOPMENT PAPER

Instructional Hrs : 45 **Sub Code : 17CHUS402**

Max. Marks : CIA – 40; ESE – 60 **Credits : 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 –. Laboratory Accidents And *First Aid*

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) **–**Revised Edition, S.Chand Company Limited, New Delhi, 2012. (Unit – III)
2. **Aggarwal**, **R.S.,** *Quantitative Aptitude*, S.Chand 2010. (Unit - II)
3. **Alkondan M.,** *"Qualitative Analysis"*, Nallamuthu Gounder Mahalingam College Students Co-operative Stores Ltd., Pollachi, 1966.
4. **Balagurusamy E., *"Programming is Ansi C"*** Tata McGraw – Hill Publishing Company Limited New Delhi – 3rd Edition
5. **Edgar Thorpe**, *Test of Reasoning for Competitive Examinations –4th edition*, Tata McGraw-Hill Publishing Company Limited, New Delhi. (Unit – III)
6. **Hari Mohan Prasad & Uma Rani Sinha. 2011.** Objective English for Competitive Exminations. New Delhi: Tata McGraw Hill Education Private Ltd. (Unit – I)
7. **Jain T.S.Upkar's** *SBI Clerical Cadre Recruitment Examination*. Agar Upkar Prakashan
8. **Karthikeyan T.**, PC *"Software For Office Automation",* 1st Edition 2002.
9. **Muir G.G.,** *"Hazards In The Chemical Laboratory"*,The Chemical Society, 1977.
10. **Raman K. V.** "*Computers in Chemistry* ", Tata McGraw – Hill Publishing Company Limited New Delhi
11. **Venkateswaran V., Veeraswamy R., Kulandaivelu A.R.,** *"Basic Principles Of Practical Chemistry"*, Sultan Chand & Sons, 1995.

SEMESTER-V

Skill Based Subject III

TEXTILE CHEMISTRY

(CAFETERIA SYSTEM)

Instructional Hrs : 45 **Sub. Code : 17CHUS503**

Max. Marks : CIA-25; ESE-75 **Credits : 3**

Objective: To gain knowledge about various fibres and their importance in textile field.
To broaden one's horizon and to enhance the career opportunity in Textile Industries.

UNIT I **9 Hrs.**

General Classification Of Fibres: Natural Cellulosic Fibre – Cotton - Jute - Natural Protein Fibre – Wool – Silk - Man Made Fibres – Rayon - Nylon - Polyester - *Bark Fibres – Linen - Hemp.*

UNIT II **9 Hrs.**

Development Of Various Textile Fibres: Cotton - Development Of Cotton Fibre In The Seed – Grading – Commercial Classification – Modification Of Cotton - **Silk :** Production Of Raw Silk – Properties - Uses. **Wool :** Wool Production – Sorting - *Properties - Uses.*

UNIT III **9 Hrs.**

Processing Of Fibres: General Sequence Of Processing Of Fibres - Desizing - Singeing - Scouring - Bleaching - Fabric Care. **Identification And Application Of Fibre :** Types Of Tests – Feeling Test – Burning Test- Staining Test - Chemical Test - *Application Of Different Fibers In Textile Industry*.

UNIT IV **9 Hrs.**

Dyeing Of Fibres: Theory Of Dyeing – Dyeing With Mordant Dyes – Chrome Mordant Method - Dyeing Of Cotton Using Direct Dye - Reactive Dye – Natural Dyes - Dyeing Of Silk - With Acid Dyes – Basic Dyes – *Dyeing Of Wool With Indigo.*

UNIT V **9 Hrs.**

Printing: Theory Of Printing - Preparation Of Printing Paste - Materials Used And Their Function - **Styles Of Printing** - Block Printing – Stencil Printing - Screen Printing - Roller Printing – *Transfer Printing* – Printing Of Polyester With Disperse Dyes.

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

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

REFERENCE BOOKS

1. **Bernard P. Corbman**. "*Textiles, Fibre To Fabric"* – Mc.Grow Hill, New York 6th Edition. 1983.
2. **Gohl E. P. G, L. D. Vilensky,** *Textile Science an Explanation of Fibre Properties*, 2nd Edition, 2005.
3. **Kanwar Varinder Pal Singh,** *Introduction of Textiles*, I st Edition, 2009.
4. **NIIR Board, "***A Complete Technology Book On Textile Processing* "–
5. **Prayag R.S, "***Dyeing Of Wool,Silk and Man Made Fifres"* Mrs.L.R.Prayag Publication, 2nd Edition 1994.
6. **Prayag R.S, "***Bleaching, Mercering and Dyeing of Cotton Materials"* Mrs.L.R.Prayag Publication, 3rd Edition 1996.
7. **Ravl Jewel,** *Textile Testing*, 2009.

SEMESTER – VI

Skill Based Subject IV

INDUSTRIAL CHEMISTRY

(CAFETERIA SYSTEM)

Instructional Hrs : 45 **Sub. Code : 17CHUS604**

Max. Marks : CIA-25; ESE-75 **Credits : 3**

Objective: To broaden one's horizon and to enhance the career opportunity in industries.

UNIT I **9 Hrs.**

Nanoscience and Nanotechnology: Nanomaterials – Methods Of Synthesis Of Nanomaterials – Chemical Vapour Deposition – Electro Deposition – Hydrothermal –Solvothermal – Sol-Gel Synthesis - Applications Of Nanomaterials In Medicine – Energy Storage - Carbon Nanotubes – Types - Applications

UNIT II **9 Hrs.**

Solar Energy : Introduction – Solar Water Heater – Solar Cell – Application. **Green Chemistry:** Principles – Green Synthesis In Water – Diels Alder Reaction – Claisen Rearrangement – Aldol Condensation – Knoevenagel Reaction.

UNIT III **9 Hrs.**

Corrosion And Its Control : Cause Of Corrosion – Types – Chemical – Electrochemical – Galvanic Corrosion – Crevice – Pitting – Mechanism Of Dry Corrosion – Wet Corrosion – Factors Influencing Corrosion – Preventions And *Control Measures.*

UNIT IV **9 Hrs.**

Refractories : *Classification* – Characteristics – Manufacture – Properties And Uses Of Silica – Alumina – Magnesite. **Cement:** Raw Materials – Manufacture – Wet Process – Dry Process – Setting Of Cement - Properties – Testing Of Cement

UNIT V **9 Hrs.**

Soil Chemistry: Soil - Definition – Classification – Soil Fertility – Macro Nutrients – Micro Nutrients – Organic Manures – *Methods of Composting* – Farm Yard Manure – Green Manure - Soil

Microorganism – Bacteria – Fixation Of Atmospheric Nitrogen – Nitrogen Cycle – C–N Ratio Effects – Carbon Cycle.

Note : *Italics* denotes Topics for Self Study

REFERENCE BOOKS

1 . **Ahluwalia V.K.,** *Green Chemistry A Text Book*, Narosa Publishers, 2013

2. **Bagavathi Sundari K.,** *Applied Chemistry*, MJP Publishers, Chennai, 1st Edition, 2006.

3. **Dara S.S.,** *A Textbook of Engineering Chemistry*, S.Chand & Company Ltd., Ist Edition, 2009.

4. **Durga Nath Dhar,** *Applied Chemistry II,* Vayu Education of India, 1 st Edition, 2009.

5. **Jain P.C., Monika Jain.,** *Engineering Chemistry,* Dhanpat Rai Publishing Company Pvt.Ltd., 15th Edition, 2010

6. **Jayashree Ghosh**, *Fundamental concepts of Applied chemistry,* S.Chand & Co., New Delhi., 1st Edition, 2006.

7. **Krishnamurthy N, Vallinayagam. P., Madhavan .D.**, *Engineering Chemistry,* PHI Learning Private Limited, 2 nd Edition, 2008.

8. **Prof.Lakshmanan,** *Agricultural Chemistry*, Vikas Publishing Houses, New Delhi.

9. **Ravi Krishna A,** *Engineering Chemistry* – I, Sri Krishna Publications, 9 th Edition, 2008.

10. **Shah M.A., Tokeer Ahmad,** *Principles Of Nanoscience and Nanotechnology*, Narosha Publishers, 2013.

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

12. **Sivakumar R., Sivakumar. N,** *Engineering Chemistry*, Tata Mc. Graw. Hill Publishing Company Limited, 2008.

13. **Viswanathan B.,** *Nanomaterials,* Narosha Publishers, 2014.

SYLLABI

FOR

NON MAJOR ELECTIVE

SEMESTER - lll

Non Major Elective - I

WATER MANAGEMENT-AN ENVIRONMENTAL PERSPECTIVE

Instructional Hrs : 30 **Sub. Code : 17CHUN301**

Max. Marks : ESE-100 **Credits : 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 – 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**,** 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

Non Major Elective II

CHEMISTRY IN DAILY LIFE

Instructional Hrs : 30 **Sub. Code : 17CHUN402**

Max. Marks : ESE-100 **Credits : 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 – Varieties And Uses - Cleaners - Household Pesticides - Stain Removers - Fire Extinguishers.

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 -Tranquilisers - Finding Out Blood Group.

UNIT V

Chemistry 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 SinghPHI 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.

SYLLABI

FOR

SELF LEARNING PAPER

Self Learning Paper

APPLIED SCIENCE

Max. Marks: ESE – 100 **Sub.Code: 13CHUSL04**

Credits : 5

Objective: To make the education process socially relevant and applying the knowledge to specific situation.

UNIT I

Conventional Fuel: Petroleum - Mining – Refining – Cracking - Knocking - Octane Number - Diesel - Power Alcohol - Nonconventional Fuels - Solar Energy – Solar Cells – Solar Heater – Advantages - Fuel Cells - Kinds Of Fuel Cells - Hydrogen Oxygen Fuel Cell - Advantages Of Fuel Cells.

UNIT II

Paint : Classification – Distempers – Constituent Of Paints- Manufacture Of Paints – Setting Of The Paint - Requirements Of A Good Paint- Significance Of PVC – Emulsion Paint – Luminescent Paint - Fire Retardant Paint – Varnishes - **Corrosion:** Causes – Classification – Factors Influencing Corrosion –Corrosion Control.

UNIT III

Glass: Properties – Manufacture – Shaping - Forming Of Glass - Varieties Of Glass - And Its Uses - Special Glasses. **Ceramics:** Divisions – Properties - Manufacturing Process.

UNIT IV

Cements: Portland Cement- White Cement - Acid Resisting Cement - Coloured Cements – Raw Materials - Manufacture – Mixing Of Additives To Cement – Setting Of Cement - Properties Of Cement - ISI Specifications- Uses.

UNIT V

Adhesives: Introduction – Classification - Adhesive Action - Development Of Adhesive Strength – Chemical Factors Influencing Adhesive Action - Advantages And Disadvantages. **Abrasives:** Definition – Abrasive Power – Classification - Bonded Girding Wheels – Abrasive Paper – Abrasive Cloth - Soft Abrasives.

TEXT BOOK

1. **Sharma B.K**., *Industrial Chemistry,* Goel Publishing House, Meerut 14th Edition, 2004.

REFERENCE BOOKS

1. **Bagavathi Sundari K**, *Applied chemistry.*
2. **Balaram pani**, *A Text Book Of Engineering Chemistry,* Galgotia Publications, New Delhi, 1st Edition, 2001.
3. **Dr.Karunanithi M., Dr. Ramchandran,Venkatraman H, Dr. Ayyaswami N.,** *Applied Chemistry – Four Authors*, Anuradha Agencies, Kumbakonam, 1st Edition, 1993.
4. **Kothari D.P, Singal, Rakesh Ranjan K.C.,** *Renewable Energy Sources And Emerging Technologies,* Prentice-Hall of India, New Delhi, 1st Edition, 2008.
5. **Mohan K.M .,** *Engineering Chemistry,* Pradeepa Publication, Coimbatore, 4th Edition, 1993.

Self – Learning paper – Group – V (Optional)

Subject Title – General Awareness – (Online Examination)

Subject Code (13AUGSL05)

CONTENTS*

***Reference**

BOOK TITLE : GENERAL AWARNESS

Year of publication : January 2010

Published by : Vellalar College for Women (Autonomous)

(For Private Circulation Only)

DEPARTMENT OF CHEMISTRY

B.Sc., Chemistry

Question Paper Pattern (For students admitted during 2017-2018)

CORE AND ELECTIVE PAPERS

Duration : 3.00 Hrs. **Marks :75**

Section A	**(10 x 1 = 10 marks)**
Multiple Choice Questions – 10 (Two from each unit)	(Q.No1 – 10)
Section B	
Answer all the Questions (Either or Pattern)	**(5 x 5 = 25 marks)**
One Question from each unit	(Q. No 11-15)
Section C	**(5 x 8 = 40 marks)**
Answer five out of eight Questions	
At least One Question from each unit	(Q. No 16 - 23)

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)**

DEPARTMENT OF CHEMISTRY

B.Sc. Chemistry

Question Paper Pattern

ALLIED CHEMISTRY PAPERS I & II

Duration : 3.00 Hrs. **Marks :55**

Section A **(10 x 1 = 10 marks)**

Multiple Choice Questions – 10 (Two from each unit) (Q.No1 – 10)

Section B

Answer all the Questions (Either or Pattern) **(5 x 3 = 15 marks)**

One Question from each unit (Q. No 11-15)

Section C **(5 x 6 = 30 marks)**

Answer five out of eight Questions

At least One Question from each unit (Q. No 16 - 23)

VELLALAR COLLEGE FOR WOMEN (AUTONOMOUS), ERODE

B.Sc Degree Practical Examination – MARCH/APRIL

FROM 2017- 2018 ONWARDS

BRANCH IV – CHEMISTRY

GENERAL GUIDELINES TO EXAMINERS IN CHEMISTRY

All matters concerned with practical examination have to be treated as strictly confidential.

Both the examiners are jointly responsible in conducting practical examinations. Preparing, conducting and valuing are to be done is accordance with the general and specific instructions issued.

Preparation for Examination

Questions papers and valuation scheme for various batches of practical examinations as per the time-table have to be collected from the Principal/chief superintendent of examinations. Preparation of solutions and packing of substances are to be done as per the requirement of the questions and the number of candidates registered in the batch on the previous day/session in advance after receiving the concerned question paper cover. Prepared solutions and substances should be kept under safe custody. Values by weights and volumes, names of substances etc are to be preserved confidentially by the examiners. Volume of solution given to the skilled assistant should be different from those distributed to the candidates.

Conduct of Examination

Seats for candidates are to be marked by number serially and the required apparatus/instruments to be provided at the places. Candidates have to be admitted into the Laboratory in time after verifying their Hall Tickets and Identity Cards. Seats have to be allotted to the candidates in batch by lot system.

Common questions in qualitative, volumetric and gravimetric analysis and organic preparation should be dictated to the candidates immediately after they have occupied their respective seats. Questions in Physical chemistry experiments may be written or affixed on the main answer book before hand and allotted by lots.

The examiners shall dictate to the candidates an outline of the procedure to be adopted for volumetric/gravimetric analysis and for organic within 10 minutes.

Examiners should supervise the candidates while carrying out the experiments. If a candidate fails to carry out the experiment according to the question/procedure given, the fact may be entered on the answer book and marks to be reduced in proportion to the gravity of failure/mistake done in carrying out the experiment.

Mere reporting of result alone at the end of the practical examination session should not be taken as indication for having carried out the experiment properly.

Values of weights and volumes have to be attested by the examiners as and when reported to them by the candidates before completing the final calculations.

Submission of Record Note Books

Every candidate should submit a certified bonafied record of practical experiment at the time of her first appearance for the practical examination. In case of arrear/improvement candidates, whose note books were already submitted and valued, a statement to the effect that they have already submitted the records at a previous examination should be obtained from them in the following proforma and the consolidated statement can be sent to the controller of Examinations at the closure of the practical examinations.

Proforma

I have already submitted my record note book for valuation at my first appearance as noted below:

Subject

Date	Reg. No	Name	Dt. of First appearance	Signature of the candidate

Signature of the Examiners

Record note book should be signed by both the examiners and punched.

Valuation on Answer Scripts

Examiners are to refer to the schemes of valuation given for common and individual experiments for awarding marks. In the case of qualitative experiments each test performed/expected to be performed, observations made thereto and inferences drawn have to be scrupulously taken into consideration for awarding marks. In quantitative experiments mistakes committed have to be indicated and marks reduced as suggested in the scheme of valuation. The final marks awarded should be indicated both inside and on the cover page of the answer books. Skilled values, calculated results, check lists etc. shall be kept in the sealed cover along with the relevant answer scripts and the sealed covers be handed over to the Principal/Chief Superintendent of examinations.

CORE CHEMISTRY PRACTICAL – I

INOGANIC SEMIMICRO QUALITATIVE ANALYSIS

Time : 3 Hours **Sub.Code: 15CHUCP01**

Total Marks : 100

SCHEME OF VALUATION

EXTERNAL : 60 **INTERNAL : 40**

Record : 10; Experiment : 50 **Class Performance : 10**

Test : 10

Model : 10

Record : 10

Maximum marks: 50

Analysis: 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.

Anions to be given

Sulphate, Chloride, Bromide, Fluoride, Borate, Nitrate, Carbonate, Oxalate, Phosphate.

Cations to be given

Lead, Copper, Manganese, Ferrous, Cobalt, Nickel, Zinc, Barium, Strontium, Magnesium and Ammonium.

CORE CHEMISTRY PRACTICAL – II

VOLUMETRIC ANALYSIS AND ORGANIC ANALYSIS

Time : 6 Hours **Sub.Code: 15CHUCP02**

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.

CORE CHEMISTRY PRACTICAL – III

GRAVIMETRIC ANALYSIS AND PHYSICAL CHEMISTRY

Time : 6 Hours **Sub. Code: 15CHUCP03**

Total Marks : 150

SCHEME OF VALUATION

EXTERNAL : 90 **INTERNAL : 60**

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

Test : 15

Model : 15

Record : 15

GRAVIMETRIC ANALYSIS

Maximum Marks : 40

Procedure : 5

Result / Value : 35

Error up to 2%	35
Error up to 2 to 3 %	30
Error up to 3 to 4 %	25
Error up to 4 to 5 %	20
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 Obtained By The Candidate.
c. For Each Independent Arithmetic Error Deduct 2 Marks.
d. For Incomplete Or Wrong Calculation Deduct 20% Of Marks Eligible For The Result As Calculated By The Examiner.
e. For No Calculation Deduct 30% Of Marks Eligible For The Result
f. If There Is A Difference Between The Two Results, The Examiners Should Consider The One Favorable To The Candidate.

g. If A Candidate Is Unable To Complete The Experiment Due To Accident, Award 5 Marks Only.

PHYSICAL CHEMISTRY EXPERIMENTS

Maximum Marks: 40

For carrying out the experiment: 20

Value : 20

Questions

1. Determine the hydrolysis constant of ethyl acetate using the given acid solution as catalyst at room temperature.
2. Find out the molecular weight of the given organic solute a by rast method. You are supplied with a suitable solvent and a solute with molecular weight.
3. Determine the critical solution temperature of phenol water system. Construct the phase diagram and mark various regions in it.
4. Determine the strength of the given electrolyte solutions of strengths between 0.1% and 1.0% (minimum 5 dilutions).
5. Determine the transition temperature of the given salt hydrate.
6. Construct the phase diagram of the given eutectic system a and b and find out the eutectic composition and eutectic temperature.
7. Determine the equivalent conductance of the given 0.1 n acetic and at room temperature. You are provided with exactly 0.1n kc1 solution whose specific conductance is 0.01412 ohm^{-1} cm^{-1}.
8. Calculate the dissociation constant of the given 0.1 n acetic acid by measuring the equivalent conductance of it. You are provided with an exactly 0.1 n kci solution of specific conductance 0.01412 ohm^{-1} cm^{-1} equivalent conductance of acetic acid at infinite dilution is 391 ohm^{-1} cm^{-1}.
9. Find the strength of the given hydrochloric acid solution conductometrically. You are given 0.1n naoh solution.
10. Determine the concentration of given solution using potentiometric titrations.
11. Verify the adsorption isotherm
12. Determine the rate constant of inversion of cane sugar by polarimetry.

SCHEME OF VALUATION FOR PHYSICAL CHEMISTRY

Total : 40marks

Distribution of marks for experiment :

For carrying out the experiment : 20 marks

Value : 20 marks

Evaluation Pattern For Values: 20 marks

1&12. Kinetics Experiments

Theoretical and candidates value differs a factor of 10 -20 marks

Above a factor of 10 - reduce 5 marks for each factor

2. Rast Method - Determination of Molecular weight

Up to 10% - 20 marks

10-20% - 10 marks

> 20% - 5 marks

3. Critical Solution Temperature of Water Phenol – 68.0^{0}C

Plot of % phenol Vs temp - 10 marks

Error upto $\pm 1^0$ - 10 marks

Error upto $\pm 2^0$ - 5marks

4. Unknown Concentration – Phenol Water System

Candidate may be instructed to use solutions of strength 1% and below. Un known solution must be below 0.8%

Construction of % Electrolyte Vs. Temp. Plot - 10 marks

Determination of % of electrolyte - 10 marks

Value difference up to 0.1 - 10 marks

Value difference up to 0.2 - 5 marks

5. Transition Temperature

Construction of Graph - 10 marks

Transition temp Error upto $\pm$ 2^0C - 10 marks

$\pm 3^0$C - 5 marks

6. Phase Diagram – Eutectic

Construction of Phase diagram - 10 marks

Eutectic temperature - 5 marks

Error upto $\pm 1^0$ - 5 marks

Error upto $\pm 2^0$ - 4 marks

Error upto $\pm 3^0$ - 3 marks

Error > 3^0 - No marks

Eutectic composition - 5 marks

Error upto $^{\pm}$1% - 5 marks

Error upto $^{\pm}$2% - 4 marks

Error upto $^{\pm}$3 % - 3 marks

Error > 3 % - No marks

Electrochemistry Experiments

7. Equivalent Conductance Of Acetic Acid

Calculation of specific conductance - 10 marks

Calculation of equivalent conductance - 10 marks

Error upto 10% - 10 marks

Error above 10% - Reduce 2 marks for each %

8. Dissociation Constant

Calculation of equivalent conductance - 10 marks

Calculation of dissociation constant - 10 marks

Error upto 10% - 10 marks

Error above 10% - Reduce 2 marks for each %

9&10 Conductometric Titration & Potentiometric titration

Error upto 5% - 20 marks

Error upto 5-10% - Reduce 2 marks for each %

Error upto 10-15% - Reduce 2 marks for each %

Error above 15% - 10 marks

11. Adsorption Isotherm

Plot of Adsorption Isotherm - 10 marks

Verification - 10 marks

ELECTIVE PRACTICAL

Time : 3 Hours **Sub.Code: 15CHUEP01**

Total Marks : 100

SCHEME OF VALUATION

EXTERNAL : 60 **INTERNAL : 40**

Record : 10; Experiment : 50 **Class Performance : 10**

Test : 10

Model : 10

Record : 10

ESTIMATION

Maximum Marks : 30

Error up to 10%	30
Error up to 10 to 12 %	25
Error up to 12 to 15 %	20
Error above 15%	10

DYEING

Maximum Marks : 15

Preparation		**Dyeing**	
Quantity	: 10	Appearance and Finishing	: 15
Quality	: 5		

DETERMINATION OF PHYSICAL CONSTANT

Maximum Marks : 5

Melting Point / Boiling Point

± 1º C - 5 marks ± 2 º C - 4 marks

± 3 º C - 3 marks > 3 º C - No marks

ALLIED CHEMISTRY PRACTICAL

Time : 3 Hours **Sub. Code: 15CHUAP01**

Total Marks : 50

SCHEME OF VALUATION

EXTERNAL : 30 **INTERNAL : 20**

Record : 06; Experiment : 24 **Class Performance : 04**

Test : 06

Model : 06

Record : 04

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

Substances to be given for organic analysis

Aniline, Phenol, Benzoic acid, Urea, Glucose, Phthalic acid.