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**

2016- 2017

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 2016 -17 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 higher secondary examination conducted by the Government of Tamilnadu 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) Water-quality analysis and Treatment / (II) Pharmaceutical Chemistry

B. (I) Polymer Chemistry / (II) Analytical Chemistry

- 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) Those who have not studied Tamil up to XII std and taken a non-Tamil language under Part-I shall take Tamil comprising of two courses (level will be at 6^{th} standard)

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

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

Board of studies in Chemistry offers two courses:

Semester III-Drug harm and drug heal.

Semester IV-Chemistry in everyday 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, Polymer Chemistry, Pharmaceutical Chemistry, Chemistry of natural products and Water-quality analysis and treatment, which are value added and job centered are prescribed as elective subjects.

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.

To make the non-chemistry students to understand the importance of the medicinal value of chemicals and the importance of Chemistry in day to life, papers on Drug harm and Drug heal and Chemistry in everyday 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									
2016 - 2017 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	13ENLU101	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	10PHUA001	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	13ENLU202	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	10PHUA002	Allied Physics Paper II	4	3	20	55	75	4
		10PHUAP01	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 Paper - 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	15MSUA301	Allied Maths PaperI	7	3	25	75	100	5
IV	Skill Based Subject	11CHUS301	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	EnglishPaper - 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	08MSUA402	Allied Maths Paper II	7	3	25	75	100	5
IV	Skill Based Subject	13CHUS402	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	11CHUE501/ 11CHUE502	Elective Paper– I	4	3	25	75	100	5
			Elective Practicals	3					
IV	Skill Based Subject	14CHUS503	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	11CHUE603/ 11CHUE604	Elective Paper– II	4	3	25	75	100	5
		15CHUEP01	Elective Practicals	3	3	40	60	100	5
IV	Skill Based Subject	14CHUS604	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	11CHUE501	Water - Quality Analysis and Treatment
	11CHUE502	Pharmaceutical Chemistry
Elective - II	11CHUE603	Polymer Chemistry
	11CHUE604	Analytical Chemistry
SKILL BASED SUBJECTS		
Subject - I	11CHUS301	Chemistry Of Milk And Milk Products
Subject - II	11CHUS402	Multi Skill Development Paper
Subject -III	14CHUS503	Textile Chemistry
Subject -IV	14CHUS604	Industrial Chemistry
NON MAJOR ELECTIVES		
Elective - I	11CHUN301	Drug Harm Drug Heal
Elective - II	11CHUN402	Chemistry in Daily Life
ALLIED CHEMISTRY		
Paper - I	11CHUA001	Allied Chemistry - I
Paper - II	11CHUA002	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 –Be Cl_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, 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 - *Friedal-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-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 - 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.

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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* Patially 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 Adsoption 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

Elective Paper

GROUP – A (1)

WATER – QUALITY ANALYSIS AND TREATMENT

Instructional Hrs : 60 **Sub. Code : 11CHUE501**

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 – ICMR 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 – Lime Soda Process - 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 - Industrial Effluents – 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- Permanganate Value.

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 – V

Elective Paper

GROUP – A (II)

PHARMACEUTICAL CHEMISTRY

Instructional Hrs : 60 **Sub. Code : 11CHUE502**

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} – 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.**

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 Substitution.*

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 : Effects 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

Elective Paper

Group – B (1)

POLYMER CHEMISTRY

Instructional Hrs : 60 **Sub. Code : 11CHUE603**

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

UNIT II **12 Hrs.**

Different 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 - *Recent Advancements In Polymer Technology.*

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

Elective Paper

Group – B (II)

ANALYTICAL CHEMISTRY

Instructional Hrs : 60 **Sub. Code : 11CHUE604**

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

Objective: To make the students to learn about basic principles of analytical techniques 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 – *Filter Papers And Their Use* – Calibration And Use Of Apparatus For Titration – Units Of Weight And Concentration.

UNIT II 12 Hrs.

Evaluation Of Analytical Data: Accuracy And Precision Methods For Their Expression - Classification Of Errors - Detection And Correction Of Determinate And *Indeterminate Errors.*
Volumetric Analysis: Types Of Titration – Precipitation And Complexometric Titrations.

UNIT III 12 Hrs.

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

UNIT IV **12 Hrs.**

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 Affection R_f Values. **Gas Chromatography**: Principle - Experimental Techniques -*Instrumentation And Application Of Gas Chromatography.* **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. **Sathya Prakash, Ramdas, Diwari,** *Text Book Of Analytical Chemistry,*Students Friends & Co, 1st Edition, 1970.
2. **Vogel A.I.,** *Quantitative chemical analysis Pearson Education*, New Delhi, 6th Edition, 2003.

REFERENCE BOOKS

1. **Gopalan R., Subramanian P.S., and Rengarajan K.,** *Elements Of Analytical Chemistry,* S.Chand Company, New Delhi, 1st Edition, 1986.
2. **Mahindra Singh,** *Analytical Chemistry,* Dominate Publications, New Delhi, 1st Edition, 2003.
3. **Skoog D.A., and West D.M.,** *Fundamentals Of Analytical Chemistry,* CBS International, Sounders Golden, New Delhi, 1st Edition, 1986.
4. **Srivatsava,** *Chemical Analysis,* S.Chand Company, New Delhi, 4th Edition, 2009.
5. **Willard Dean, Merit, and Settle,** *Instrumental methods of Analysis,* CBS, New Delhi 7th Edition, 1986.

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 : 15CHUEP01**

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

Objective: To acquire the skill of determining the physical constants.

To learn and develop the skill of various methods of dyeing.

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. Dyeing Of Direct Dyes On Cotton Fibre.

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

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

d. Dyeing Of Reactive Dyes On Cotton Fibre.

e. Dyeing Of Direct Dyes On Viscose Rayon

f. Dyeing Of Reactive Dyes On Viscose Rayon

g. 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 & Dietitics

SEMESTER - I / III

ALLIED CHEMISTRY PAPER-I

Instructional Hrs : 60 **Sub. Code : 11CHUA001**

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. **Diborane**: Prepartion – Properties – Structure - Preparation And Uses Of $NaBH_4$ – *Borazole* - Chemistry. **Interhalogen Compounds**: ICl - BrF_3 – IF_5 – Preparation – Properties- Structure.

UNIT II **12 Hrs.**

Industrial Chemistry: Synthesis, Properties And Uses Of Silicones, Fuel Gases: Natural Gas, Water Gas, Semiwater Gas, Carburetted Water Gas, Producer Gas, Oil Gas [Manufacturing Details Not Required] – Fertilizers – Urea - Ammonium Sulphate - Ammonium Nitrate - Triple Superphosphate. *Pollution Of Air - Water And Soil-Sources - Remedies*.

UNIT III **12 Hrs.**

Covalent Bond: Orbital Overlap – Hybridization - Geometry Of Organic Molecules - CH_4 - C_2H_4 - C_2H_2 - Inductive Effect - Mesomeric And Hyper Conjugation - Effect On Properties Of Compounds. **Stereoisomerism**: Optical Isomerism – Cause Of Optical Activity - Tartaric Acid – *Racemisation – Resolution* - Geometric Isomerism Of Maleic And Fumaric Acids.

UNIT - IV **12 Hrs.**

Terms In Dye Chemistry: Chromophore – Auxochrome - Bathochromic Shift - Hypsochromic Shift - Preparation And Uses – Azodye - Methyl Orange Mordant Dye- Alizarin - Vat Dye - Indigo. **Chemotheraphy**: Preparation - Uses And Mode Of Action Of Sulpha Drugs - Structure And Uses Of Penicillin - *Chloromycetin*.

UNIT V **12 Hrs.**

Kinetics: Rate – Order – Molecularity - Pseudo First Order Determination Of Order. Measurement Of Order Of Reaction - Effect Of Temperature On The Rate - Energy Of Activation. **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.
2. **Prof. Vaidyanathan K, Prof. Venkateswaran A, Prof. Ramasamy R,** *Allied Chemistry I & II*, Priya Publications, Karur, Ist 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 : 11CHUA002**

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:** Nomenclature, Theories - *Werner,* Sidgwick, Pauling - Chelation - EDTA And Its Applications.

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 – Synthesis.

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

UNIT IV **12 Hrs.**

Energetics : Definition Of I Law Of Thermodynamics - Types Of Systems – Reversible – Irreversible - Isothermal And Adiabatic Processes - Need For The Second Law - Joule-Thomson Effect – Enthalpy - Entropy - Free Energy - Significance - Carnot Cycle - *Carnot Theorem* - **Phase rule:** Phase- Component –Degrees Of Freedom - Study Of A Simple Eutectic System (Pb-Ag)

UNIT V **12 Hrs.**

Electrochemistry : Kohlrausch Law – Conductometric Titrations - Galvanic Cells - Emf - Standard Electrode Potentials - Reference Electrodes - Electrochemical Series And Its Applications - pH 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.
2. **Prof. Vaidyanathan K, Prof. Venkateswaran A, Prof. Ramasamy R,** *Allied Chemistry I & II*, Priya Publications, Karur, Ist 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.

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 : 11CHUS301**

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 - 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 : 13CHUS402**

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.*

UNIT V **9 Hrs.**

Presentation Skills: Creating Slides For Power Point – Adding Graphics To Slides – Effective Presentation. **Laboratory Techniques And First Aid** : Preparation Of Solutions – Dilution Of Acids To Various Strength – Preparation Of Reagents – 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 : 14CHUS503**

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 - 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 : 14CHUS604**

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.

Nanomaterials and Abrasives : Nanomaterials: Definition – Nanoparticles – Nano materials – Nano Science – Nanotechnology – Carbon Nanotubes – Types – Applications Of Nanomaterials.

Abrasive : Definition – Classification - Properties – *Application*

UNIT II 9 Hrs.

Non Conventional Energy Sources : Nuclear Energy – Nuclear Reactor – Power Plant – Breeder Reactor – Solar Energy – Introduction – Solar Water Heater – Solar Cell – Application – *Wind Energy*.

UNIT III 9 Hrs.

Corrosion And Its Control : Corrosion – Introduction – 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 : Introduction – *Classification* – Characteristics – Manufacture – Properties And Uses Of Silica – Alumina – Magnesite Refractories.

UNIT V **9 Hrs.**

Surface Chemistry : Definition – Classification Of Adsorption – Characteristics – Factors Influencing Adsorption Of Solutes From Solutions – Adsorption Isotherms – Freundlich's Adsorption Isotherm – Langmuir's Adsorption Isotherm (Derivation Is Not Required) – *Application Of Adsorption.*

Note : *Italics* denotes Topics for Self Study

REFERENCE BOOKS

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

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

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

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

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

SYLLABI

FOR

NON MAJOR ELECTIVE

SEMESTER - lll

Non Major Elective - I

DRUG HARM DRUG HEAL

Instructional Hrs : 30 **Sub. Code : 11CHUN301**

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

Objectives: To facilitate the students to study about the causes, symptoms, prevention and treatment methods of some common diseases. On completion of the course the students should have an exposure to the above basic concepts.

UNIT I **6 Hrs.**

Nature And Sources Of Drugs: Various Sources Of Drugs – Pharmacologically Active Principles In Plants – Study Of Drugs – Important Terms In Pharmaceutical Chemistry Like Pharmacy - Medicinal Chemistry – Bacteria – Virus – Mutation- Fungi - Chemotherapy - Vaccine. **Important Rules Of First Aid:** Cuts – *Abrasions* – Bleeding – Fractures – Burns - Fainting – First Aid Box.

UNIT II **6 Hrs.**

Vitamins : Classification – Sources - Deficiency Diseases - Therapeutic Uses - A_1, A_2, B_1, B_2, B_{12}, C, D, K And D. **Storage Of Pharmaceutical Substances**: Temperature Effect - Humidity Effect - Effect Of Gases - Effect Of Light - *Containers* – Encapsulation – Gelatin Capsules – Drug Delivery.

UNIT III **6 Hrs.**

Diseases : Diabetes - Types And Control - Hypoglycemic Drugs – Insulin - Uses - Adverse Effect - Cancer – Common Causes - *Spread And Treatment* - Acquired Immuno Deficiency Syndrome (AIDS) – Introduction - General Symptoms - Prevention - Treatment.

UNIT IV **6 Hrs.**

Biological Role Of Metals: Sodium – Potassium – Calcium – Iodine. **Important Drugs In Pharmaceutical Chemistry :** Aspirin – Chloramphenicol – Crocin – *Ibuprofen* – Garamycin – Erythrosine – Tetracycline – Ranitidine – Mebendazole – Chloroquine - Streptomycin – Uses - Common Side Effects.

UNIT – V **6 Hrs.**

Digestion Of Nutrients : Introduction - Absorption Of Nutrients – Active Mechanism - Passive Mechanism – *Digestion And Absorption Of Carbohydrates* - Gastric And Intestinal Digestion Of Proteins - Digestion - Absorption Of Fats – Direct Absorption Of Fatty Acids.

Note : *Italics* denotes Topics for Self Study

TEXT BOOKS

1. **Jayashree Ghosh,** *A Text Book Of Pharmaceutical Chemistry,* S.Chand & Co., New Delhi, 1st Edition,1990.

REFERENCE BOOKS

1. **Ashutosh Kar,** *Medicinal Chemistry*, New Age International, 1st Edition,1992.
2**. Betleys**, *Text Book Of Pharmacutics*, E.A. Raubins, All India traveler book sellers, Delhi. 8th Edition, 1992.
3. **Chatwal**, *Pharmaceutical Chemistry,* Himalaya Publishing House, Mumbai, 1st Edition, 1990.
4. **Satoskar R.S. & Bhandarkar S.D .,** *Pharmacology And Pharmatherapeutics Vol 1&2,* Popular prakashan, Mumbai, 11th Edition, 1989.

SEMESTER – IV

Non Major Elective II

CHEMISTRY IN EVERYDAY LIFE

Instructional Hrs : 30 **Sub. Code : 11CHUN402**

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

UNIT I **6 Hrs.**

Chemistry In Earth Sciences:

1. What Does 43 And 53 Grade Cement Mean?
2. How Does Carbon Change Into Diamond?
3. What Causes Cooling When Glucose Is Dissolved In Water?
4. How Does Potassium Cyanide Cause Sudden Death?
5. Why Can't Ornaments Be Made With Pure Gold?
   What Is The Purity (In Percentage) Of 22 Carat And 18 Carat Gold?
6. *Why Do Salt And Sugar Readily Dissolve In Water And Not In Oil?*
7. Do Normal Hand Soaps Actually Kill Germs? We Are Always Encouraged To Wash Our Hands After A Visit To The Toilet, But Does This Really Make Much Difference?
8. Why Is Zeolite Used In The Purification Of Water ?

UNIT II **6 Hrs.**

Chemistry In Life Sciences:

9. A)Does Cold Water Extinguish Fire Faster Than Hot Water? (B) Why Does Boiled Water Lose Taste?
10. Like Ordinary Paints Do Metallic Paints Also Fade?
11. How Is Carbon Dioxide Removed From Blood Before It Is Exhaled?
12. How Does Chlorine In Swimming Pools Kill Harmful Organisms, And Why Is It The Chemical Of Choice?
13. *What Is Meant By Ozonised Mineral Water?*

14. What Is RDX? (B) What Are Antioxidants?
15. What Are The Constituents Of Gum ?
16. If One Has A Drink Soon After Eating mints The Inside Of The Mouth Feels Much Colder Than Normal. Why?

UNIT III **6 Hrs.**

Chemistry In Physical Sciences:

17. How Is Age Of Fossils Determined?
18. Where Does Sand Come From?
19. Why Is Lava Flowing Out Of Volcano Hot?
20. How Is Rain Produced Artificially ?
21. A) How Do Wells In The Beach Yield Good Drinking Water?
    B) Is Rain Water Hundred Percent Pure? Can We Use It For Drinking Water?
22. Is There A Simple Way To Check The Purity And Genuineness Of Mineral Water Available In The Market?
23. *What Is The Best Method Of Water Purification* ?
24. (A) How Do Fruits Ripen ? (B) How Does Temperature Affect Ripening Bananas?

UNIT IV **6 Hrs.**

Applied Chemistry:

25. How Do Trees Reduce Air Pollution?
26. Beetroot Contains A Red Colour Pigment Called Betacyanin . Does It Aid In The Formation Of Blood Cells In Any Way?
27. Why Does Turmeric Powder Turn Red In Colour When Mixed With Slaked Lime?
28. *What Are Refrigerants ? How Do They Chill The Contents Inside A Fridge?*
29. A) What Is Meant By Empty Calories Got By Drinking Alcoholic Beverages?
    B) How Do Certain Beverages Give A Felling Of Freshness?
30. In Some Cities Extensive Fogging With Chemicals Such As Malathion Is Being Done Routinely To Control Mosquitoes. This Chemicals Gets Deposited On The Fruits And Vegetables Being Grown In Our Gardens. Is It Safe To Eat Those Fruits?

31. How Does Salt Decrease The Melting Point Of Ice?
32. How Do We Dry Clean Our Clothes?

UNIT V **6 Hrs.**

Chemical Technology:

33. What Are The Constituents Of Mosquito Mats? Are They Not Harmful To Human?
34. What Will Happen If Unleaded Petrol Is Used In Two – Wheelers?
35. Why Do We Mix Oil With Petrol For Two Wheelers?
36. What Are Artificial Teeth Made Of?
37. Nickel – Cadmium Cells Used In Rechargeable Torch Light's, Shavers, Etc, Are Said To Have A Memory Effect. What Is This Memory Effect And How Does This Affect The Battery Performance?
38. *Why Is Fuel Used In Airplanes Different From Those Used In Motor Vehicles?*
39. What Is The pH Of Rain Water? Is The pH Suitable For Drinking ?
40. What Does The Term Vacuum Evaporated Printed On Iodised Salt Packets Mean?

Note : *Italics* denotes Topics for Self Study

REFERENCE BOOK

1. *The Hindu Speaks On Scientific Facts – Volume I & II,* Nov.2002 & Dec. 2004 Editions.

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

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 2016- 2017 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 polorimetry.

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 $\pm 2^0$C - 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

PREPARATION / 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.

Self –Learning paper - Group – V (Optional)

Subject Title- General Awareness – (Online Examination)

Subject Code (13AUGSL05)

CONTENTS*

***Reference**

BOOK TITLE : GENERAL AWARENESS

Year of Publication : January 2010

Published by : Vellalar College for Women (Autonomous)

(For Private Circulation 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 KCl 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 polorimetry.