PG and Research Department of Chemistry Poompuhar College (Autonomous) Melaiyur-609107

B.Sc., Chemistry



CHOICE BASED CREDIT SYSTEM SYLLABUS 2022- 2023 ONWARDS

POOMPUHAR COLLEGE (AUTONOMOUS), MELAIYUR -609107

Course structure under

CBCS B.Sc., Chemistry

(for the candidates admitted from the academic year 2022-2023 onwards

SEMESTER	TART	COURSE	TITLE	INSTRUCTION HOURS/WEEK	CREDIT	EXAM HOURS	MARKS I NTERNAL	MARKS EXTERNAL	TOTAL
	Ι	Language Course - I (LC)- Tamil	Tamil-I	5	3	3	25	75	100
	II	II English Language English – I Course - I (ELC) General Chemistry - I		5	3	3	25	75	100
T		Core Course –I (CC) General Chemistry - I		5	5	3	25	75	100
-	III	Core Course – II (CC)	Semi- Micro Analysis (P)	3	*	*	*	*	*
		First Allied Course - I (AC)	Physics – I	5	3	3	25	75	100
		First Allied Course - II (AC)	Physics (P)	3	*	*	*	*	*
	IV	Value Education	Value Education	2	1	3	25	75	100
	IV	Gender Studies	Gender Studies	2	1	3	25	75	100
		1000	Total	30	16	100			600
	Ι	Language Course - II (LC)- Tamil	Tamil-II	5	3	3	25	75	100
п	II	English Language Course - II (ELC)	English – II	5	3	3	25	75	100
11	ш	Core Course –II (CC)	Semi- Micro Analysis (P)	3	5	3	40	60	100
	111	Core Course – III (CC)	General Chemistry - II	5	5	3	25	75	100
		First Allied Course - I (AC)	Physics (P)	3	4	3	40	60	100
		First Allied Course - II (AC)	Physics – II	5	3	3	25	75	100
		Skill Based Elective - I	Adulteration in common food items	2	2	3	25	75	100
	IV	Environmental Studies	Environmental Studies	2	1	3	25	75	100
			Total	30	24				700
	Ι	Language Course - II (LC)- Tamil	Tamil-III	5	3	3	25	75	100
	II	English Language	English – III	5	3	3	25	75	100
m		Course - II (ELC)							
		Core Course –IV (CC)	General Chemistry - III	5	5	3	25	75	100
	III	Core Course – V(CC)	Volumetric Analysis (P)	3	*	*	*	*	*
		Second Allied Course - I (AC)	Maths – I/ Zoology	4	3	3	25	75	100

		Second Allied Course – II(AC)	Maths – II/ Zoology (P)	2	*	*	*	*	*
		Major Based Elective - I	Nano Chemistry	4	4	3	25	75	100
	IV	Non Major Elective -I	Energy Physics	2	2	3	25	75	100
			Total	30	20				600
	Ι	Language Course - IV (LC)- Tamil	Tamil-IV	5	3	3	25	75	100
	II	English Language Course – IV (ELC)	English – IV	5	3	3	25	75	100
IV		Core Course –V (CC)	Volumetric Analysis (P)	3	3	3	40	60	100
	III	Core Course – VI (CC)	General Chemistry IV	5	4	3	25	75	100
		Second Allied Course - II (AC)	Maths – II / Zoology (P)	3	3	3	25/40	75/60	100
		Second Allied Course - III (AC)	Maths – III / Zoology-II	5	4	3	25	75	100
	IV	Non Major Elective - II	Laser Physics	2	2	3	25	75	100
		Skill Based Elective - II	Adulteration in common food items - Practical	2	2	3	25	75	100
			Total	30	27				800
		Core Course – VII (CC)	Inorganic Chemistry - I	4	4	3	25	75	100
		Core Course – VIII (CC)	Organic Chemistry - I	4	4	3	25	75	100
		Core Course – IX (CC)	Physical Chemistry - I	4	4	3	25	75	100
V	III	Core Course – X (CC)	Gravimetric and Organic analysis (P)	3	*	*	*	*	*
		Core Course – XI (CC)	Physical Chemistry (P)	3	*	*	*	*	*
		Major based elective - II	Agricultural Chemistry	4	4	3	25	75	100
		Major based elective - III	Polymer Chemistry	4	4	3	25	75	100
	IV	Skill Based Elective - III	Industrial Chemistry	2	2	3	25	75	100
		Skill Based Elective - IV	Industrial Chemistry - Practical	2	2	3	40	60	100
			Total	30	24				700
		Core Course–X (CC)	Gravimetric and Organic analysis (P)	3	4	3	40	60	100
		Core Course – XI (CC)	Physical Chemistry (P)	3	4	3	40	60	100
		Core Course – XII (CC)	Inorganic Chemistry - II	5	5	3	25	75	100
VI	III	Core Course – XIII (CC)	Organic Chemistry - II	5	5	3	25	75	100
		Core Course – XIV(CC)	Physical Chemistry- II	4	4	3	25	75	100

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		Core Course – XIV(CC)	Analytical Chemistry	4	4	3	25	75	100
		Major based elective - IV	Pharmaceutical Chemistry	4	4	3	25	75	100
	IV	Soft Skills development	Soft Skills development	2	1	3	25	75	100
	V	Extension Activities	Extension Activities	-	1	-	-	-	-
			Total	30	32				900
			Grand Total		140				4400

Programme Outcomes:

PO1: Disciplinary Knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.

PO2: Critical Thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.

PO3: Problem Solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's earning to real life situations.

PO4: Analytical&Scientific Reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints. Ability to analyse, interpret and draw conclusions from quantitative / qualitative data; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.

PO5: Self-directed & Lifelong Learning: Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including "learning how to learn", through self-placed and self-directed learning aimed at personal development, meeting economic, social and cultural objectives.

PROGRAMME SPECIFIC OUTCOMES for UG

(PSOs): **The B.Sc. Chemistry** Program is successful in imparting the students the following qualities. PSO 1: Gain knowledge in terms of principles, concepts, techniques and processes in core chemistry and related disciplines

PSO 2: Acquire analytical skills through practical training using latest techniques, interpretation and presentation of data and skill sets in solving complex problems

PSO 3: Analyse and evaluate scientific, socio-economic problems and provide independent solutions based on modern scientific approach

PSO 4: Utilise the basic principles in the domain of chemistry and exchange ideas to sensitize the impact of the same on industry at large

PSO 5: Apply the theoretical and experimental ideas of chemistry in building a safe environment and acquire entrepreneurship skills through effective communication

SEMESTER – I CORE COURSE – I GENERAL CHEMISTRY – I

Objectives:

- 1. To learn the shape of atomic orbitals and various type of quantum number. To learn the periodic properties of elements and its classifications
- 2. To enable the students to acquire knowledge in the theory behind the volumetric analysis, this leads them to develop the knowledge in the principles of concentration, primary and secondary standards.
- 3. To understand and gain the basic knowledgeon the classification and IUPAC nomenclature of organic compounds.
- 4. To learn the covalent bonding inorganic molecules, electronic effect and reactive intermediates
- 5. To learn the various atomic models ii)To understand the quantum theory and wave mechanical concept iii) To learn the shapes of orbitals

UNIT I

ATOMIC STRUCTURE AND PERIODIC PROPERTIES

1.1 Atomic orbitals, Quantum numbers – principal, azimuthal, magnetic and spin quantum numbers and their significance – principles governing the occupancy of electrons in various quantum levels – pauli's exclusion principle, Hund's rule, Aufbau principle, (n+1) rule, stability of half – filled and fully filledorbitals.

1.2 Classification as s, p, d, & f block elements, periodic properties of elements - atomic volume, atomic and ionic radii, ionization potential, electron affinity and electronegativity along periods and groups – variation of metallic characters – Factors influencing the periodic properties.

UNIT II

PRINCIPLES OF VOLUMETRIC ANALYSIS

2.1 General principle: Types of titrations. Requirements for titrimetric analysis. Concentration systems: Molarity, molality, normality, ppm -problems. Primary and secondary standards, criteria for primary standards, preparation of standard solutions, standardization of solutions. Limitation of volumetric analysis, endpoint and equivalencepoint.

2.2 Neutralisation - titration curve, theory of indicators, choice of indicators. Use of phenolphthalein and methyl orange. Complexometric titrations: Stability of complexes, titration involving EDTA. Metal ion indicators and its characteristics. Problems based on titrimetricanalysis.

UNIT III

CLASSIFICATION AND NOMENCLATURE OF ORGANIC COMPOUNDS

3.1 Classification based on the nature of carbon skeleton and functional groups - classification of C and H atoms (primary/secondary/tertiary) - IUPAC system of nomenclature of common organic compounds (upto C-10) - alkanes, alkenes, alkynes, cycloalkanes and simple aromatic hydrocarbons.

3.2 Naming of organic compounds with one functional group - halogen compounds, alcohols, aldehydes, ketones, carboxylic acids and its derivatives. Cyano compounds, amines, nitro compounds (Both aliphatic and aromatic), phenol. Naming of

compounds with two functional groups - naming of compounds with branched carbonchains.

3.3 Naming of heterocyclic compounds containing one and two hetero atoms present in five/six memberedrings.

UNIT IV

COVALENT BONDING IN ORGANIC MOLECULES, ELECTRONIC EFFECT AND REACTIVEINTERMEDIATES

4.1 Covalent bonding – Concept of hybridization – Structure of organic molecules based on sp^3 , sp^2 and sphybridization.

4.2 Covalent bond properties of organic molecules bond length, bond angle – bond strength of C-H and C – C bonds – bond polarity – dipole moment - Vander Waal's interactions, Inter & Intra molecular forces and their effects on physical properties. Electronic effects: inductive effect, resonance effect - drawing of resonance structures – conditions for resonance – stability of resonance structure. Hyperconjucation – electromeric effect- steric effect- steric overcrowding- steric inhibition of resonance - steric enhancement. Influence of electronic effects – dipole moment - relative strengths of acids and bases - stability ofolefins.

4.3 Dissociation of bonds – homolysis and heterolysis - formation and stability of radicals, carbocations and carbanions.

UNIT V

ATOMIC STRUCTURE AND BASIC QUANTUM MECHANICS

5.1Rutherford's and Bohr's models of atom – Bohr's theory and origin of hydrogen spectrum. Sommerfield's extensionof Bohr's theory.

5.2Electromagnetic radiation – definitions for Wavelength, Wave number andfrequency. Dualism of light – Particle nature of radiation – black body radiation and Planck's quantum theory, photo electric effect and Compton effect. De Broglie equation - Heisenberg's uncertainty principle. Schrodinger wave equation (Derivation not needed). Wave functions and its physical significance of Ψ and Ψ^2 .

Outcome:

1. Gain knowledge about various quantum numbers and occupancy of electronson various quantum levels. Understandhowtheconceptof electro negativity and its variation overtheperiodictable can be used to rationalize the nature of the bonding in substances.

2. Theyknowthetheorybehindthevolumetricanalysis,whichgivestheinformationaboutthe concentration, and Primary & Secondary standards.

3. Studentslearnaboutorganiccompound with various functional groups and naming of organic compounds.

4. Studentslearnaboutthecovalentbondinginorganicmolecules,electroniceffectandreactive intermediates

5. StudentscangainknowledgeaboutatomicmodelsandbasicconceptofQuantumtheory.

5.1

REFERENCES

1. R.D. Madan, "Modern Inorganic Chemistry", 2nd edition, S. Chand & Company Ltd.,2000.

2. P.L. Soni, "Text book of Inorganic Chemistry", 20th revised edition, Sultan

Chand & Sons,2000.

3. B.R. Puri, L.R. Sharma, K.K. Kalia, Principles of Inorganic Chemistry, 23rd edition, New Delhi, ShobanLalNagin Chand & Co., (1993).

4. J.D. Lee, "Concise Inorganic Chemistry', 20th revised edition, Sultan Chand & Sons,2000.

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Chemistry, (35th edition), New Delhi- ShobanLalNaginchand and Co. (2013).

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9. A.I. Vogel, A Textbook of Quantitative Inorganic Analysis, ELBS and Longman London, 1975.

10. S.M. Khopkar, Basic Concepts of Analytical Chemistry New Age International Publisher,2009.

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	2	3	2
CO4	3	3	3	3	3
CO5	3	3	3	3	2

UNIVERSITYNOMINEE

HOD

FACULTY

SEMESTER - I & II CORE COURSE–II COREPRACTICAL-I VOLUMETRICANALYSIS

I. Titrimetric QuantitativeAnalysis

A. Acidimetry and alkalimetry

- 1. Estimation of HCl by NaOH using a standard oxalic acid solution
- 2. Estimation of Na_2CO_3 by HCl using a standard Na_2CO_3 solution

B. Permanganometry

- 3. Estimation of oxalic acid by KmnO4 using a standard oxalic acid solution
- 4. Estimation of Iron (II) sulphate by KmnO₄ using a standard Mohr's salt solution.
- 5. Estimation of oxalic acid by KMnO₄ using a standard Mohr's salt solution.

C. Dichrometry

- 6. Estimation of $K_2Cr_2O_7$ by thiousing a standard $K_2Cr_2O_7$ solution.
- 7. Estimation of KMnO₄ by thio using a standard $K_2Cr_2O_7$ solution.
- 8. Estimation of Fe (III) by using K₂Cr₂O₇ using a standard Mohr's salt solution using internal and external indicators (not for examination).
- 9. Estimation of copper (II) sulphate by K₂Cr₂O₇ solution
- **D.** Applied Experiments (not for examination)
- 10. Estimation of Total Hardness of water
- 11. Estimation of available Chlorine in Bleaching Powder
- 12. Estimation of chloride ion in neutral solution

Scheme of Valuation

Maximum (60 Marks) Practical	-50 (Marks)
Record	- 5(Marks)
Procedure Writing	- 10(Marks)

Results	- <1%	- 45 Marks
	1 - 2%	- 35 Marks
	2 - 3%	- 25Marks
	3-4 %	- 15Marks
	>4%	- 10 Marks

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	2	3	2
CO4	3	3	3	3	3
CO5	3	3	3	3	2

FACULTY

UNIVERSITYNOMINEE

SEMESTER - I Value Education (மதிப்புக் கல்வி)

(Common to All UG Courses)

அலகு – I வாழ்வியல் தத்துவம்

வாழ்க்கை (ப. 2, குறள் - 629) – வாழ்வின் நோக்கம் (ப.61, குறள் - 46) – வாழ்க்கைத் தத்துவம் (ப. 61 - 69 குறள் - 131, 226) - இயற்கை நியதி (ப. 123 – 125, குறள் - 374) – பிற உயிர் பேணல் (ப. 137,138 குறள் - 322,327).

அலகு – II தனிமனிதப் பண்புகள்

பண்பாடு (ப. 132 - 136, குறள் - 72, 431) எண்ணம் ஆராய்தல் (ப. 70 – 77, 666, 282, 467) ஆசை சீரமைத்தல் (ப. 79 – 86, குறள் - 367) சினம் தவிர்த்தல் (ப. 87 - 98, குறள் - 158, 305, 306, 314) கவலை ஒழித்தல் (ப. 99 – 108, குறள் - 629) வாழ்த்தும் பயனும் (ப. 109 - 114, குறள் - 3)

அலகு – III சமுதாய மதிப்புகள் (குணநலப்பேறும், சமுதாய நலனும்)

குடும்பம் (ப. 87, குறள் - 45) – குடும்ப அமைதி (ப. 87 - 90, குறள் -1025) சமுதாயம் (ப. 93, குறள் - 446) – வாழக்கை முறை (ப. 101 - 103, குறள் - 952) – சகோதரத்துவம் (ப. 103 - 106, குறள் - 807) – பெண்ணின் பெருமை (ப. 99 - 100, குறள் - 56) ஐவகைக் கடமைகள் (தான், குடும்பம், சுற்றம், ஊர், உரகம்) (ப. 93 - 96, குறள் - 43,984) பொருளதாரம் (ப. 121 -123, குறள் - 754) – சுகாதாரம் - (ப. 123, குறள் - 298) – கல்வி (ப. 113, 123, 127, 128, குறள் - 400) – அரசியல் (ப. 124, குறள் - 691) மக்களின் பொறுப்பு (ப. 125, குறள் - 37) உலக அமைதி (ப. 103 - 106, குறள் - 572).

பார்வை நூல்கள்

- மனவளக்கலை யோகா, உலகு சமுதாய சேவா சங்கம், வேதாத்திரி பதிப்பகம், 156, காந்திஜி ரோடு, ஈரோடு 635 001 Web site: www. vethathiri.Org. முதற்பதிப்பு 2008 விலை ரூ. 70/-
- குணநலப்பேறும், சமுதாய நலனும், உலக சமுதாய சேவா சங்கம், வேதாத்திரி பதிப்பகம், 156, காந்திஜி ரோடு.ஈரோடு 635 001Web site: www. vethathiri.Org. இராண்டாம் பதிப்பு ஆகஸ்டு 2008.

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	3
CO2	3	3	3	3	3
CO3	2	3	3	2	3
CO4	3	3	3	3	3
CO5	3	2	3	3	3

FACULTY

UNIVERSITYNOMINEE

SEMESTER – I GENDER STUDIES

UNIT I

GENDER CONCEPT

Sex and Gender – Social communication of Gender – Gender perspectives of body – Gender discrimination – Gender stereotyping – Gender mainstreaming – Gender and work participation rate – Sexratio.

UNIT II

FEMINISM Vs GENDERSTUDIES

Women study as an agent of change – UGC'S initiatives – Women's studies in XI thplan – Beijing conference – Women development policies of nation and world – International women'sDay.

UNIT III

WOMEN'S DEVELOPMENT AND GENDEREQUALITY

National and state commission for women – All women police stations – Family court – Women and Child welfare – Laws regarding Female Foeticide (PCPNOT) – Rules against Eve testing – Role of NGO's – 73 th and 74 th Constitution Amendments.

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3

FACULTY

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SEMESTER- II CORE COURSE- III GENERAL CHEMISTRY- II

Objectives:

1. To understand the chemistry of s –block elements.

- 2. To understand the chemistry theories of acids and bases.
- 3. Toknowaboutpreparation, properties of some important aliphatic compounds.
- 4. Toknowaboutpreparation, properties of some important aromatic compounds
- 5. Tostudythegaslawsandthephysicalpropertiesofliquid.

UNIT I

S - BLOCK ELEMENTS

1.1 Position of hydrogen in the periodic table.

1.2 General characteristics of s – block elements. Compounds of s-block metals – oxides, hydroxides, peroxides, superoxide's-preparation and properties – oxo salts – carbonates – bicarbonates – nitrates and halides.

1.3 Anomalous behavior of Li andBe.

1.4 Extraction of beryllium – physical and chemical properties of Be – Uses – Extraction of Mg – physical and chemical properties –Uses.

UNIT II

ACID BASE CHEMISTRY

2.1 Acid Base Chemistry: Theories of acids and bases – Arrhenius, Bronsted-Lowry theory proton donor - acceptor system. Theory of solvent system, Lewis-electron dot system, Usanovich and Lux Flood concept.

2.2 pH of strong and weak acid solutions. Buffer solutions. Henderson equations. Preparation of acidic and basic buffers. Relative strength of acids and bases from Kaand Kbvalues.

2.3 Classification of solvents -- chemical reactions in water and liquid ammonia as solvents.

UNIT III

ALIPHATIC COMPOUNDS

3.1 Alkanes: preparations, physical properties, reactions, reactions with radical mechanism for substitution reaction –cracking.

3.2 Cycloalkanes:Preparation(small,medium&largeringcompounds)-reactions

- cycloaddition, dehalogenation, pyrolysis of calcium salt of dicarboxylic acid - Wurtz reaction - stability of cycloalkanes - Baeyer's strain theory.

3.3 Alkenes: Preparation from alcohol, haloalkane, dihaloalkanes and alkynes - reactions of alkenes - mechanisms involved in addition of hydrogen, halogen, hydrogen halide, hypohalous acid, water, hydroboration, hydroxylation, ozonolysis and epoxidation - peroxide effect - allylic substitution, oxidation by KMnO₄andpolymerization. Cycloalkenes: Preparation of conjugate dienes - reactions - 1,2 and 1,4 addition, polymerization and Diels- Alder reaction.

3.4 Alkynes: preparation, reactions - addition of hydrogen, halogen, hydrogen halide, water, HCN, CH_3COOH , hydroboration - dimerisation and cyclisation - acidity of terminal alkynes.

UNIT IV

AROMATIC COMPOUNDS

4.1 Aromaticity - definition - Huckel's rule - consequence of aromaticity - stability, carbon- carbon bond lengths in benzene ring, resonanceenergy.

4.2 Aromatic electrophilic substitution - general pattern of the mechanism involving σ and π complexes, mechanism of nitration, halogenation, sulphonation and Friedel-Crafts reaction.

4.3 Activating and deactivating substituents - orientation in mono substituted benzenes - reactions of aromatic side chain - halogenation and oxidation.

4.4 Methods of formation and chemical reactions of alkylbenzenes, biphenyl, naphthalene and Anthracene.

4.5 Synthesis of 3-nitrotoluene and 4-bromonitro benzene.

UNIT V

GASEOUS STATE AND LIQUID STATE

5.1 Ideal gas: Kinetic theory of gases - derivation of gas laws – Maxwells distribution of molecular velocities - Types of molecular velocities - collision diameter – collision frequency – mean freepath.

5.2 Behaviour of real gas –Vander Waals equation – importance of Vander Waals constants - Boyle temperature – critical constants of a gas and their relationship with Vander Waals equation – derivation of law of corresponding state.

5.3 Liquid state: Physical properties – vapour pressure – Trouton's rule – surface tension – Effect of temperature on surface tension – viscocity – effect of pressure and temperature – refraction – refractive index – specific and molarrefraction.

Outcome:

1. Getknowledgeaboutchemistryofs-blockelements.

- 2. StudentscanlearnaboutthechemistryTheoriesofacidsandbases.
- 3. Studentsgainknowledgeonthepreparation, properties and reactions of a liphatic compounds.
- 4. Studentscanabletoknowthebasicknowledgeofaromaticity, aromaticelectrophilic

substitution and synthesis of some important aromatic compounds.

5. Studentscanlearnaboutthebehaviorofgasesandliquidsandcansolvetheproblems regarding molecular velocities.

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4. Bhupinder Mehta and Manju Mehta, Organic Chemistry, 2ndedition, PHI Learning Pvt Ltd,2015.

5. M.K. Jain and S. C. Sharma, Modern Organic Chemistry, Visal Publishing Co,2015.

6. N. Tewari, Advanced Organic Reaction Mechanism, 3rdEdition, Books &Allied (P) Ltd, 2011.

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	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	2	3
CO5	3	3	3	3	3

FACULTY

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SEMESTER – II SKILL BASED ELECTIVE -I ADULTERATION IN COMMON FOOD ITEMS

Objectives:

To know about common adulterants, Food additives-preservatives, sweeteners, colour ant sand flavours.

UNIT I

1.1 Milk - importance of milk as food – composition, specific gravity, pH and its importance - common adulterants - their Harmful effects. Deduction and estimation of adulterants in milk.

1.2 Ghee – grades of ghee –adulteration in ghee and their detection.

1.3 Common adulterants in coffee powder, tea dust, chillipowder, turmeric powder, asafoetida, wheat flour, black pepper and pulses - deduction and their evileffects.

UNIT II

2.1 Oils - edible oils – non edible oils – specific gravity – degree of unsaturation – iodine value – polenske value and its significance.

2.3 Common adulterants and their detection in edible oil - deductions of mineral oil asadulterant.Somecommonedibleoils-coconutoil-oliveoil-groundnutoil – gingelly (sesame) oil – mustard oil – rice bran oils – corn oil – health tips.

UNIT III

3.1 Food additives – preservatives, sweeteners, colourants and flavours – their role and evileffects.

3.2 Pesticide residues in food – common pesticide residues - tolerance limit – general methods of determining pesticide residues - natural food poisons – a brief account.

REFERENCES

1. Gopalan R, Subramanian PS and Rengarajan K (1993) ``Elements of analytical chemistry" second revised edition, SultanChand.

Outcome:

Studentsgainknowledgeon commonadulterants,Foodadditives-preservatives,sweeteners, colourants and flavours.

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
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CO4	3	3	3	2	3
CO5	3	3	3	3	3

FACULTY

UNIVERSITYNOMINEE

SEMESTER – II ENVIRONMENTALSTUDIES

UNIT I

Definition Scope & Need for awareness. Natural resources of associated problems.

(a). Forest resources- use of over exploitation deforestation – mining –dams.

(b). ater resources- use of over utilization – surface & ground water – dams

– benefits of problems.

UNIT II

(c). Food resources- modern agriculture – over grassing – fertilizer – porlicide problems.

(d). Energy resources- use of alternate energy sources.

(e). Land resources-Land degradation–Soil erosion–deforestation.

UNIT III

Concept of Ecosystem producer – consumer – decomposer – Energy flow food chain–food web example of pond ecosystem.

UNIT IV

Biodiversity & its conservation – Values of biodiversity – India as a mega diversity nation – Hot spots. Threats to diversity – Conservation of biodiversity wild life conservation.

UNIT V

Environmental pollution causes effects & control measures of Air, Water, Noise, Thermal pollution & nuclear hazards – Disaster management flood – earthquake – cyclone – landslides.

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

FACULTY

UNIVERSITYNOMINEE

SEMESTER III CORE COURSE IV GENERAL CHEMISTRY III

Objectives:

1. To understand the characteristics of elements of Group IIIA, IVA and VA and the Chemistry of silicones

2. Toprovide the detailed chemistry about p-block elements especially Oxygen family, halogen family and noble gases

3. Tostudythepreparation and chemical reactions of alkylandarylhalides with mechanism and to apply the knowledge in the synthesis of the compound.

4. Tolearntheprinciples of Qualitative Inorganic Analysis and Reactions involved in the confirmatory tests.

5. Tolearnthenaturethecharacteristicsofcatalysisanditstypesii)Tostudythephenomenon of adsorption and its applications

UNIT I

P-BLOCK ELEMENTS – BORON, CARBON AND NITROGEN FAMILY

1.1 General characteristics of elements of Group III A – Anomalous behavior of Boron - diagonal relationship between Boron and Silicon – compounds of boron – Borax, Borazine, Boric acid and Diborane. Compounds of aluminium – Al_2O_3 , $AlCl_3$, alums – Alloys of aluminium.

1.2 General characteristics of elements of Group IV A – Allotropic forms of carbon – graphite and diamond - chemistry of oxides of carbon. Preparation of Silicon – Comparison of properties of Carbon and Silicon –Silicates – classification and structure. Silicones – preparation properties and uses.

2.1 General characteristics of elements of V A Group – Preparation of nitrogen – Physical and chemical properties of nitrogen – uses – Chemistry of some compounds of nitrogen – hydrazine, hydroxylamine, hydrazoic acid. Preparation of phosphorus – Oxides of Phosphorous.

UNIT II

P - BLOCK ELEMENTS – OXYGEN, HALOGEN FAMILY AND NOBLE GASES

2.2 Anomalous behavior of oxygen – Structure and allotropy of oxygen, classification of oxides – peroxides, sulphoxides, basic oxides, amphoteric oxides, acidic oxides, neutral oxides. Allotropy of Sulphur - Oxides of Sulphur – oxiacids of sulphur.

2.3 General characteristics of halogen with reference of electronegativity, electron affinity, oxidation states, and oxidizing power – peculiarities of fluorine, Hydrides, oxides and oxi acids (structure only) of halogens

2.4 Inert gases – position in the periodic table – isolation from atmosphere – General characteristics – Structure and shape of xenon compounds – XeF_{2} , XeF_{4} , XeF_{6} , $XeOF_{2}$, $XeOF_{4}$ – uses of noble gases.

UNIT III

HALOALKANES AND HALOARENES

3.1 Classification of alkyl halides - methods of formation from alcohols, alkanes, alkenes – allylic/ benzylic bromination and chlorination – Hundiecker reaction,

Finkelstein reaction and Swart'sreaction.

3.2 Nucleophilic substitution reactions - mechanisms of nucleophilic substitution reactions- $S_N 2$, $S_N 1$ and S_N ireactions with energy profiled in a grams-evidences and factors influencing the mechanisms – stereochemical aspects of nucleophillic substitution mechanisms.

3.3 Methods of formation of aryl halides - nucleophilc substitution reactions of arylhalides.

UNIT IV

4.1 Qualitative Inorganic Analysis

Dry test, flame test - Wet tests for acid radicals – Interfering acid radicals- Theory of Interference- Elimination of Interfering acid radicals.

4.2 Principles of group separation: Solubility Product – common ion effect

4.3 Reactions involved in the confirmatory tests: One confirmatory test for each of the following radicals - Sulphate, nitrate, carbonate, chloride, fluoride borate, phosphates anions and Pb⁺², Cu⁺², Cd⁺², Bi⁺², Fe⁺², Fe⁺³, Al⁺³, Cr⁺³, Co⁺², Ba⁺², Ca⁺², Sr⁺², Mn⁺², Ni⁺², Zn⁺², Mg⁺² cations.

UNIT V

CATALYSIS AND ADSORPTION

5.1 Catalysis- characteristics- - different types-homogeneous-heterogeneous-acid-base catalysis- auto catalysis-theories of catalysis-intermediate compound formation theory and adsorption theory- kinetics of enzyme catalysis - MichaelisMenton equation. – applications of catalysis

5.2 Adsorption-definition- physisorption and chemisorptions - factors influencing adsorption of gases on solids – Freundlich adsorption isotherms- Langmuir adsorption isotherm – Applications of adsorption.

Outcome:

1. Studentscanlearnaboutthep-blockelements,Boron,CarbonandNitrogenfamily.

 $2. \ Students can learn about the p-block elements, Oxygen family, halogen family and no bleg as essentiations of the state of the st$

3. Important Name Reactions with mechanism involved in both the preparations and properties of alkyl and aryl halides can be studied. Relative reactivities bring about better understanding to carry out the reaction to get more yield of the products. Synthesis and uses of DDT and BHC promotes the application of the knowledge acquired.

4. It clarifies the topic of catalysis and its applications, and the also the concept of adsorption and its significance.

5. Studentscanlearnthecharacteristicsofcatalysisanditstypesii)Tostudythephenomenon of adsorption and its applications.

REFERENCES

1. K. S. Tewari and N. K. Vishnoi, A Text Book of Organic Chemistry, 4thedition, Vikas Publishing House Pvt Ltd,2017.

2. Arun Bahl and B.S. Bahl, A Text Book of Organic Chemistry, 22ndedn, S Chand & Company,2016.

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8. P.L. Soni, Text book of Ionrganic Chemistry, 20threvised edition, Sultan chand& Sons, 2000.

9. B.R. Puri, L.R. Sharma, K.K. Kalia, Principles of Inorganic Chemistry, 23rdedition, New Delhi, ShobanLal Nagin Chand & Co.,1993.

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FACULTY UNIVERSITYNOMINEE HOD

SEMESTER – III & IV CORE COURSE –V CORE PRACTICAL –II

SEMIMICRO INORGANIC QUALITATIVEANALYSIS

Analysis of a mixture containing two cations and two anions of which one will be an interfering ion. Semi-micro methods using the conventional schemewithsodiumsulphidemay beadopted.

Cations to be studied:

Lead, Bismuth, Copper, Cadmium, Iron, Aluminium, Manganese, Cobalt, Nickel, Zinc, Calcium, Barium, Strontium, Magnesium and Ammonium.

Anions to be studied:

1. Non Interfering Acid Radicals:

Carbonate, Sulphate, Nitrate and Chloride

2. Interfering Acid Radicals:

Flouride, Borate, Oxalate and Phosphate.

Note:	
Internal Marks	- 40
External marks	- 60
Marks Distribution for external Practical	- 50Marks
Record	- 10 Marks
Total	- 60Marks
4 radicals correct with suitable tests	- 50 Marks
3 radicals correct with suitable tests	- 40 Marks
2 radicals correct with suitable tests	- 30 Marks
1 radicals correct with suitable tests	-15Marks
Spotting	- 05Marks
REFERENCE	

1. Venkateswaran V. VeerasamyR.Kulandaivelu A.R., Basic principles of practical Chemistry. 2nd edition, New Delhi, Sultan Chand & sons(1997).

	PO1	PO2	PO3	PO4	PO5
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FACULTY

UNIVERSITYNOMINEE

SEMESTER- III MAJOR BASED ELECTIVE– I NANO CHEMISTRY

Objectives:

Toknowaboutbasicsofnanochemistry, nanoparticles, nanocomposites, experimental techniques in nanochemistry and green chemistry

UNIT-I

BASICS OF NANOCHEMISTRY

Introduction, Definition – Length scales – Importance of Nanoscale and its technology - Self assembly – Materials and molecules, Porous solids, Nanowire, Nanomachine and Quantum Dots.

UNIT-II

NANOPARTICLES

Introduction, Types of nanoparticles, Pure metals – Gold, Silver and Cobalt; Metal oxides – Silica, Iron oxide, Techniques to synthesize nanoparticles, Characterization of nanoparticles, Applications and significance of nanoparticles.

UNIT-III

NANOCOMPOSITES

Introduction, Polymer as matrix, Nylon, Polystyrene, Epoxy resins, Nanomaterials as fillers – Nanofibre and Nanoclays; Fabrication and processing of composites, Nanostructured materials, Applications of nanocomposites.

UNIT IV

EXPERIMENTAL TECHNIQUES IN NANOCHEMISTRY

Characterization of nanoparticles and nanocomposites, Instrumentation and practical details of Transmission electron microscopy(TEM), Field emission Scanning electron Microscopy(FESEM), Scanning electron microscopy(SEM) and Scanning Transmission electron microscopy (STEM)

UNIT-V

GREEN CHEMISTRY

Introduction. Principles, atom economy and scope. Introduction to alternative approaches. Solvent free reactions – principle, scope, utility of solvent free conditions, Applications-Alkylation,Oxidation,synthesis of anthracene-maleic anhydride adduct.

Solvent free microwave assisted organic synthesis, Green reactions-Dieckmann condensation, Diels Alder reaction, Clemensen reduction, Grignard reaction, Esterificatiobn and enamine reactions.

Outcome:

Studentsgainknowledgeonbasicsofnanochemistry,nanoparticles,nanocomposites,experimental techniques in nanochemistry and green chemistry

REFERENCES:

1. Nanomaterials and Nanochemistry, C. Brechigneae, P. Houdy, M. Lahmai (Eds) Springer 2007

- 2. Core concepts in Supramolecular chemistry and Nanochemistry, J. W. Steed,
- 3. D. R.Turner, K. Wallace, Wiley, 2007
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FACULTY

UNIVERSITYNOMINEE

SEMESTER IV CORE COURSE VI GENERAL CHEMISTRY IV

Objectives:

- 1. The objective of this unit is to introduce the students about the transition elements.
- 2. Toknowaboutbasicmetallurgicalprocesses.
- 3. Tostudythepreparationandpropertiesofalcohols,PhenolsEthers

and poxides with mechanisms and to apply the knowledge in the synthesis of alcohol derivatives.

- 4. Tounderstandthenatureofcolloidsandnanomaterials
- 5. Tounderstandthekineticsandthetheoriesofreactionrate.

UNIT I

CHEMISTRY OF d-BLOCK ELEMENTS

1.1 Chemistry of transition elements – electronic configuration – group study of titanium, vanadium, chromium and iron metals.

1.2 Comparative study of zinc group metals- galvanization, evidences for the existence of mercurous ion $asHg_2^{2+}$.

1.3 Horizontal comparison of Fe, Co, Ni groups.

1.4 Interstitial compounds – nitrides, carbides, hydrides, borides of Ti, V, Cr and their industrial uses. Important uses of transition metals and their alloys. Toxicity of Cd and Hg.

UNIT II

METALLURGY

2.1 Occurrence of metals – definition of minerals and ores - concentration of ores – froth floatation, magnetic separation, calcination, roasting, smelting, flux, aluminothermic process.

2.2 Extraction processes – Chemical reduction – electrolytic reduction – metal displacement.

2.3 Refining methods – Zone refining – Van Arkel de Boer methods –

electrolyticrefining.

UNIT III

ALCOHOLS, PHENOLS AND ETHERS

3.1 Preparation of alcohols through reduction, hydroboration, hydration, oxymercuration and Grignard reaction. Reactions of alcohol - with metals, esterification with mechanism, oxidation, dehydration, conversion to alkyl halides.

3.2 Preparation of phenols - acidity of phenol Vs alcohols - relative acid strength of substituted phenols - reactions of phenols - esterification, oxidation, Kolbe's, Reimer-Tiemann, Gattermann, electrophilic substitutionreactions.

3.3 Ethers – preparations, reactions –epoxide.

3.4 Synthesis of aspirin, 3 and 4-nitro phenol, and t-butyl methylether.

UNIT IV

COLLOIDS AND NANOMATERIALS

4.4 Colloids - Distinguishing characteristics of colloids, suspensions and solutions-Types of colloidal dispersions-Optical properties-Tyndall effect– Kinetic properties – Brownian motion - Electrical properties – Helmholtz and diffuse double layers – electro kinetic or zeta potential – electrophoresis and its applications - Coagulation – methods of coagulation – Hardy Schultz law – Hofmeister series -Protective colloids – protective action – gold number – applications- Emulsions – classification, preparation, Gels – preparation – properties (thixotropy, syneresis and imbibition).

4.5 Nanomaterials – introduction - self-assembly – materials and molecules –self assembled mono layers- nano wires- types of nano particles- pure gold, silver and cobalt-metal oxides- alumina and titania- synthesis by physical vapor deposition method-reduction method.

UNIT V

CHEMICAL KINETICS

5.1 Definition of order and molecularity – rate of reaction - derivation of rate constant of a first and second order (equimolar concentration of reactants) reactions - derivation of half-lifeperiod.

5.2 Effect of temperature on reaction rate – Arrhenius equation – concept of activationenergy.

5.3 Collision theory– failures of CT – Lindemann theory of unimolecular reaction. Absolute reaction rate theory – derivation of rate constant of a bimolecular reaction – comparison between ARRT and CT – Significance of free energy of activation and entropy of activation.

Outcome:

1. Thestudentswillacquireknowledgeoftransitionmetalalloys,applicationsoftransitionelement s.

2. Studentstoknowthebasicsofmetallurgyandtheprinciplesofextractionandrefiningonmetals.

3. The reactions of Alcohols, Phenols Ethers and Epoxides with mechanisms can be well understood and applied in the synthesis of compounds mentioned and many other important alcohol related compounds in industrial and medicinal fields.

4. LearnthechemistryofcolloidsandNanomaterials.

5. Students can gain knowledge about kinetics and its theories and can solve the problems related to kinetics

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3. Arun Bahl and B.S. Bahl, A Text Book of Organic Chemistry, 22ndedn, S Chand & Company, 2016.

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FACULTY

UNIVERSITYNOMINEE

SEMESTER - IV NON MAJOR ELECTIVE-II CHEMISTRY OF CONSUMER PRODUCTS

Objectives:

To know about so a ps and detergents, milk and milk products, dyes, paints and varnishes

UNIT I

SOAPS AND DETERGENTS

1.1. Manufacture of soaps - Toilet and transparent soaps - different ingredients used in toilet soaps - cleaning action of soaps - Detergents and types of detergents.

UNIT II

MILK AND MILK PRODUCTS

2.1. Composition of milk - physical properties of milk - Effect of heat- pasteurization - Effect pasteurization – Homogenization - Ice cream and milk powder.

UNIT III

DYES, PAINTS AND VARNISHES

3.1. Classification based on chemical constitution-Azo dyes-Preparation and uses of methyl orange. Triphenyl methane dyes - Preparation and uses of malachite green. Phthalein dyes - Preparation and uses of phenolphthalein. Anthraquinone dyes - Preparation and uses of alizarin andindigo.

3.2. Classification of Paints - Constituents and their functions- Requirements for good paint - Setting of the paint. Varnishes -Types of varnishes-Constituents and their functions.

Outcome:

Students gain knowledge on so aps and detergents, milk and milk products, dyes, paints and varnishes

REFERENCES

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FACULTY UNIVERSITYNOMINEE HOD

SEMESTER - IV SKILL BASED ELECTIVE - II SBE PRACTICAL

DETECTION OF ADULTERANTS IN FOOD

LIST OF EXPERIMENTS

1. Determination of specific gravity of milk using lactometer and specific gravity bottle.

- 2. Determination of pH of milk
- 3. Determination of protein content in milk
- 4. Determination of antibiotics in milk
- 5. Determination of iodine value of oils
- 6. Common tests for detection of adulterants in oils
- 7. Test for detection of adulterants in asafetida
- 8. Detection of adulterants in chilli powder, turmeric powder
- 9. Detection of Saccharin in sweets
- 10. Determination of adulterants in wheat powder, tea dust and ghee.

REFERENCES

- 1. Gopalan R, Subramanian PS and Rengarajan K (1993) ``Elements of analytical chemistry'' second revised edition, SultanChand.
- 2.

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FACULTYUNVERSITY NOMINEEHOD

SEMESTER V CORE COURSE VII INORGANIC CHEMISTRY I

Objectives:

1. Tointroducethestudentsabouttheinnertransitionelements.

- 2. To expose the students about the basic concepts of coordination complexes.
- 3. Tohelpthestudentstounderstandthefactsofreactionsandreactionmechanismincomplexes.

4. (I)To know the Methods of synthesis, Mechanism and reactions of carbonyls and nitrosyl. (ii) To

know the preparation, properties, structure and bonding of organometal lic compounds.

5. Thisunitisdesigned to enable the students to make sense of bonding in organometallic compounds and photochemistry of organometallic compounds.

UNIT-I

CHEMISTRY OF f-BLOCK ELEMENTS

1.1 General characteristics of f-block elements – comparative account of lanthanides and actinides.

1.2 Lanthanide series – separation by ion exchange and solvent extraction methods – lanthanide contraction and its consequences.

1.3 Actinide series – separation of actinides by ion e exchange and solvent extraction methods – oxidation states and generalproperties.

1.4 Uranium and Thorium – occurrence, ores, extraction and uses.

UNIT II

COORDINATION CHEMISTRY I

2.1 Introduction – Ligand - types of ligands - unidentate, bidentate and polydentate ligands, chelating ligands and chelates- IUPAC nomenclature of coordination compounds.

2.2 Isomerism in coordination compounds - Structural isomerism, hydrate isomerism, coordination isomerism, ionisation isomerism, linkage isomerism and coordination positionisomerism.

2.3 Stereoisomerism - Geometrical isomerism of four and six coordinate complexes, optical isomerism of four and six coordinate complexes.

UNIT III

COORDINATION CHEMISTRY -II

3.1 Theories of coordination compounds - Werner and Sidgwick theories-

Valence bond theory, limitations of valence bondtheory.

3.2 Crystal field theory – splitting of d orbitals in octahedral, tetrahedral and square planar fields – Crystal field stabilization energy (CFSE) - factors affectingCFSE.

UNIT IV

COORDINATION CHEMISTRY -III

4.1 Labile and inert complexes, stability of coordination compounds – thermodynamic and kinetic stability, relationship between stepwise formation constant and overall formation constant, factors affecting the stability of complexes.

4.2 Unimolecular and biomolecularnucleophilic substitution reactions in octahedral and square planar complexes, trans effect – theories of trans effect and applications.

4.3 Biologically important coordination compounds - Chlorophyll, haemoglobin and vitaminB12.

UNIT V

CARBONYLS AND NITROSYL AND ORGANOMETALLIC COMPOUNDS

5.1. Metal carbonyls - Mono and binuclear carbonyls of Ni, Fe, Cr, Co andMn – preparation, structure, reactions, bonding and uses.

5.2 Nitrosyl compounds - Classification - nitrosyl chloride and sodium nitroprusside - preparation, properties and structure.

5.2. Organo metallic compounds of alkenes, alkynes and cyclopentadienes – preparation, properties, structure andbonding.

Outcome:

1. The students will acquire knowledge of transition metal alloys, applications of inner transition elements.

 $2. \ The students become familiar with the nomenclature and theories of coordination compounds.$

3. Enable the students to apply the theory to the complexes and applications of coordination complexes in inorganic analysis.

4. Students can derive an easy and elegance way of giving methods of synthesis of aldehydes/ketones/carboxylic acids, mechanism of nucleophilic reactions and oxidation-reduction reactions

5. The students will able to identify the bonding in organometallic compounds and photochemistry of organometallic compounds.

REFERENCES

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2. W.U. Malik, G.D. Tuli and R.D. Madan, S.Chand and Company Ltd., Selected topics in Inorganic Chemistry', 7th edition, 2001.

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FACULTY

UNIVERSITYNOMINEE

SEMESTER – V CORE COURSE – VIII ORGANIC CHEMISTRY I

Objectives:

1. Tounderstandaboutstereochemistry, symmetry elements, optical activity and conformational analysis of acyclic and cyclic compounds.

2. Toknowthemethodsofsynthesisofreactionsofcarbonylcompoundsandtheirderivatives

3. Toknowthemethodsofsynthesisofcarboxylicacidsanditsderivatives.

4. Toknowthepreparation, properties and applications of N-containing compounds.

5. To study about the basic concepts, characteristic features, preparation and reaction of heterocyclic compounds.

UNIT I

ISOMERISM

1 Stereoisomerism - types -optical isomerism - chirality – idea of asymmetry and dissymmetry - sequence rules -R,S notations of simple aliphatic compounds - D, L notations– erythro, thero conventions – optical activity – resolution of racemic mixture –Conformations of cyclohexane. Walden inversion Stereochemistry of molecules with axial chirality – biphenyls, allenes and spiranes- concept of atropisomerism. Projection formulae -Newman projection and Sawhorse formulae, Fischers and flying wedge formulae

UNIT II

CARBONYL COMPOUNDS AND THEIR DERIVATIVES

2.1 Common methods for the synthesis of aldehydes and ketones-synthesis of aldehydes from acid chlorides, Stephen's reduction - Gattermann-Kosch. Synthesis of ketones from nitriles, Friedel- Crafts and Hoesch reactions.

2.2 Molecular orbital picture of carbonyl groups. Acidity of α -hydrogen.

Mechanism of nucleophillic additions to carbonyl group. Addition of HCN, alcohols, sodium bisulfite, Grignard reagents -condensation with ammonia and its derivatives - Aldol, Perkin, Benzoin and Knoevenagel condensations, Wittig reaction, Mannich reaction, Reformatsky reaction and Cannizaro reaction. Oxidation by Tollen's reagent, KMnO₄. Reduction by H₂/Ni, H₂-Pd-C, NaBH₄, LiAlH₄, MPV, Clemmenson and Wolff-Kischner reductions.

2.3 General methods of preparation of aromatic carbonyl compounds – physical and chemical properties- uses.

UNIT III

CARBOXYLIC ACIDS AND ITS DERIVATIVES

3.1 Preparation of carboxylic acids, acidity of carboxylic acids, effects of substituents on acid strength, acidity of aliphatic vs aromatic acids. Reactions of carboxylic acids - Hell-Volhard-Zelinsky reaction, Synthesis of acid chlorides, esters and amides, Reduction of carboxylic acids, methods and mechanism of decarboxylation.

3.2 Methods of preparation and chemical reactions of dicarboxylicacids.

3.3 Preparation and reactivity of carboxylic acid derivatives - acid chlorides, amides and anhydrides – Nucleophilic substitutions at acyl carbon. Synthesis of active methylene compounds – diethyl malonate and ethyl acetoacetate.

3.4 General methods of preparation of aromatic carboxylic acids- physical and chemical properties- uses.

UNIT IV

NITROGEN CONTAINING COMPOUNDS

4.1 Preparation of nitroalkanes and nitroarenes-Chemical reactions of nitro alkanes and nitroarenes - reductions in acidic, neutral and alkaline media.

4.2 Methods of preparation of alkyl and aryl amines - Gabriel phthalimide reaction and Hofmann reaction - separation of a mixture of primary, secondary and tertiary amines - Hinsberg's and Hofmann's method - Structural features effecting basicity of amines - basicity of aliphatic and aromatic amines - reactions of amines.

4.3 Aryl diazonium salts - preparation, stability, reactions and synthetic transformations.

4.4 Amino acids - essential and nonessential - methods of preparation - zwitterions formation - isoelectric point - chemical reactions of amino acid. Polypeptides and proteins.

UNIT V

HETEROCYCLIC COMPOUNDS

5.1 Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine - Comparison between basicity of pyridine, piperidine and pyrrole.

5.2 Preparation and reactions of indole, quinoline and isoquinoline with special reference to Fisher indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis.

Outcome:

1. Studentscangaintheknowledgeonstereochemistry,symmetryelements,opticalactivityand conformational analysis of acyclic and cyclic compounds

2. Studentscanderiveaneasyandelegancewayofgivingmethodsofsynthesis,mechanismand reactions of carbonyl compounds and their derivatives

3. Studentscanderiveaneasyandelegancewayofgivingmethodsofsynthesismechanismand reactions of carboxylic acids and its derivatives.

4. Studentscangettheknowledgeonpreparation, properties and applications of N-

containingcompounds.

5. Itbringsanideaofthesynthesis, reactions, applications and important features of heterocyclic compounds.

REFERENCES

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FACULTY UNIVERSITYNOMINEE HOD

SEMESTER V CORE COURSE IX PHYSICAL CHEMISTRY I

Objectives:

- 1. Tounderstandthebasicsoffirstlawofthermodynamicsandthelawsofthermochemistry
- 2. Tostudythesecondlawofthermodynamics,theconceptofentropy,conceptofGibbsFreeener gy and their applications.
- 3. Tounderstandthebasicsofthirdlawofthermodynamics.
- 4. *i)TounderstandRaoult'slaw,nonidealsolutionsandColligativepropertiesii)Toderivethe thermodynamic relationship between vapour pressure and Colligative properties*
- 5. *i)TounderstandPhaseruleanditsapplicationtovarioussystemsii)TouseClausius Clapeyron equations for the various phase transitions*

UNIT I

FIRST LAW OF THERMODYNAMICS AND ITS APPLICATIONS

1.1 System-surrounding-Intensive and extensive variables; state and path functions; isolated, closed and open systems - zeroth law of thermodynamics. First law of thermodynamics-mathematical form- Heat capacity, relation between C_P and C_V . Isothermal process: Calculations of w, q, dE and dH for the reversible expansion of ideal gases under isothermal and adiabatic conditions.

1.2 Joule- Thomson effect-derivation of Joule- Thomson coefficient for ideal gases and real gases, inversion temperatures. Variation of enthalpy change of reaction with temperature (Kirchoff's equation). –Hess's law of constant heat of summation- Bond energy and its calculations.

UNIT II

THERMODYNAMICS – II

2.1 Second law of Thermodynamics – Its need – Different statements – Carnot cycle –Derivation of efficiency of heat engine – Carnot's theorem.

2.2 Concept of entropy – definition and physical significance of entropy – entropy change in reversible and irreversible processes – Entropy changes of an ideal gas with change in P,T and V,T. Entropy criterion for spontaneous and equilibrium processes in isolated system

2.3 Helmholtz Free Energy (A) and Gibbs Free Energy(G) –variation of Gibb's free energy change with T and P- Gibbs–Helmholtz Equation — change of phase – Clapeyron – Clausius equation.

UNIT III

THERMODYNAMICS - III

3.1 Chemical potential – Gibbs – Duhem relations – variation of Chemical potential with T and P.

3.2 Third law of Thermodynamics – Nernst heat theorem – statement of third law– concept of residual entropy – evaluation of absolute entropy from heat capacity. Exception to III law.

3.3 Equilibrium constant and free energy change- thermodynamic derivation of law of mass action- equilibrium constants in terms of pressure and concentration.

3.4 Thermodynamic interpretation of Lechatelier's principle (Concentration, temperature, pressure and addition of inert gases). Equilibrium constant and free energy change – Vant Hoff's reaction isotherm.

UNIT IV

SOLUTIONS

4.1 Dilute solutions- Colligative properties, relative lowering of vapour pressure, osmosis, law of osmotic pressure - concept of elevation of boiling point and depression of freezing point (Derivation required). Determination of molecular masses –abnormal behavior of solutions (non ideal solutions) – association and dissociation in solutions.

4.2 Raoult's law, Henry's law, Ideal and non-ideal solutions, completely miscible liquid systems-benzene and toluene. Dreviation from Raoult's law and Henry'S law. Duhem - Margules equation. Theory of fractional distillation. Azeotropes- HCl – water.

4.3 Partially miscible liquids- phenol- water system. Lower and upper CSTs – effect of impurities on CST. Completely immiscible liquids- principle and applications of steam distillation. Nernst distribution law –derivation.

UNIT V

PHASE EQUILIBRIA

5.1 Phase rule – Definition of terms – Phase rule – Derivation – Applications – One component systems - H_2O and sulphur systems – super cooling, sublimation – Two component systems – simple eutectic (Pb-Ag, Bi-Cd) - desilverisation of lead – compound formation with congruent melting point (Mg - Zn) – incongruent melting point (Na-K) – solid solutions (Ag-Au system) - Fractional crystallization - Freezingmixtures.

Outcome:

- 1. Students gainknowledgeabout conceptof First law of Thermodynamics and its applications and also explain the laws of Thermochemistry.
- $\label{eq:constraint} 2. \ Students can acquire knowledge about second and third law of thermodynamics$
- 3. i)Givesanexplanationaboutidealandnon-idealsolutionsanditsapplicationsii)Interpretsthe relationship between vapour pressure and colligative properties.
- 4. Bringsaboutthetheoryofphaseruleanditsapplicationstovarioussystems; and to study the clausius clapeyron equations.

REFERENCES

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3. Maron S.H.and Lando J.B. Fundamentals of Physical Chemistry, Macmillan.

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FACULTY

UNIVERSITYNOMINEE

SEMESTER - V &VI CORE COURSE –X GRAVIMENTRIC & ORAGANIC ANALYSIS PRACTICAL

GRAVIMETRIC ANALYSIS

- 1. Estimation of Lead as leadchromate.
- 2. Estimation of Barium as bariumchromate.
- 3. Estimation of Nickel as Nickel DMGcomplex.
- 4. Estimation of Magnesium as Magnesiumoxinate
- 5. EstimationofCalciumascalciumoxalatemonohydrate
- 6. Estimation of Barium as bariumsulphate.
- 7. Estimation of Lead as leadsulphate.

ORGANIC QUALITATIVE ANALYSIS

Analysis of simple organic compounds (a) characterization of functional groups (b) confirmation by preparation of solid derivatives / characteristic colour reactions.

Note: Mono – functional compounds are given for analysis. In case of bifunctional compounds, students are required to report any one of the functional groups.

ORGANIC PREPARATION

Preparation of Organic compounds involving the following chemical conversions.

- 1. Oxidation: Benzoic acid frombenzaldehyde
- 2. Hydrolysis:Salicylic acid from salysilaldehyde
- 3. Nitration : m-Dinitro benzene from nitro benzene
- 4. Nitration: Picric acid from phenol
- 5. Bromination:Tri bromo aniline from aniline
- 6. Tri bromo phenol from phenol
- 7. p- Bromo acetanilide from acetanilide
- 8. Osazone from glucose

DETERMINATION OF PHYSICAL CONSTANTS

Determination of boiling / melting points by semi micro method

MARK DISTRIBUTION

Internal evaluation	- 40
External evaluation	- 60
Record	- 5+5=10
Gravimetry	- 25
Org. Preparation & org Analysis	- 25
Org. Preparation	- 6
Phy Constant	- 4

Org.analysis	-15
Aromatic/Aliphatic	-2
Sat/Unsat	-2
Spl.Element	-3
Functionalgroup	- 5 Derivatives

REFERENCES

1. Venkateswaran .V., Veeraswamy. R., Kulandaivelu.A.R., Basic principles of practical chemistry, 2nd edition, New Delhi, Sultan Chand & Sons,(1997)

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	2	3	3
CO4	3	3	3	3	3
CO5	2	3	3	3	3

FACULTY

UNIVERSITYNOMINEE

SEMESTER – V & VI CORE COURSE–XI PHSICAL CHEMISTRY PRACTICAL

LIST OF EXPERIMENTS

- 1. Critical SolutionTemperature
- 2. Effect of impurity on Critical solutionTemperature
- 3. TransitionTemperature
- 4. RastMethod
- 5. Phase Diagram (Simple eutectic system)
- 6. Kinetics of Ester Hydrolysis
- 7. Partition Co-Efficient of iodine between water and carbon tetrachloride.
- 8. Conductometric Acid BaseTitration
- 9. Potentiometic RedoxTitration
- 10. Determination of cellconstant

MARK DISTRIBUTION

Internal	- 40
Ext Evaluation	- 60
Record	- 10
Procedure writing with formula	- 10
Practicals	- 40

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
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FACULTY

UNIVERSITYNOMINEE

SEMESTER- V MAJOR BASED ELECTIVE- II AGRICULTURALCHEMISTRY

Objectives:

To know about Soil, Fertilizer, Plant Nutrients and Manures, Pesticides and Insecticides & Fungicides and Herbicides

UNIT I

SOIL

1.1 Definition of soil, soil composition - Soil formation – Factors of soil formation – soil forming processes.

1.2 Soil Physical properties –particle size distribution – soil texture and structure - pore space, soil air, soil temperature, soil water.

1.3 Soil chemical properties – soil mineral matter – soil colloids – inorganic colloids – clay minerals – amorphous – Ion exchange reactions. Organic colloids – soil organic matter, decomposition – Humus formation. – significance on soil fertility. Acidic and alkaline soils – their formation and reclamation.

UNIT II

FERTILIZER

2.1Fertilizer - definition – classification of fertilizers – nitrogenous fertilizers [Urea, NH_4NO_3 , $(NH_4)_2SO_4$ and CAN] - Effect of nitrogen on plantgrowth and development - deficiency symptoms-synthetic nitrogenous fertilizers.

2.2Phosphate fertilizers – Effect of phosphorous on plant growth and development – deficiency symptoms - super phosphate & Bone meal. Potassium fertilizers – functions of Potassium on plant growth and development-deficiency symptoms–KCl,KNO₃ and K_2SO_4 .

2.3Secondary and micro nutrients – their functions on plant growth and development-complex and mixed fertilizers-their advantages. Types of pollution caused by fertilizers – effects and their control.

UNIT III

PLANT NUTRIENTS AND MANURES

3.1 Biofertilizers- rhizobium, azospirillum, azotobacter, cyanobacteria, phosphobacteria. Complex and mixed fertilizers – their manufacture and composition.

3.2 Green Manures – Green leaf manure – bulky organic and concentrated organic manures – Compost – Farm yard manures handling and storage of compost.

3.3 Enriched farm yard manures –leaf litters and farm wastes – oil cakes, fish meal, blood, horn and hoof meal.

UNIT IV

PESTICIDES AND INSECTICIDES

4.1Pesticides – definition –classification of pesticides – mode of action - General methods of formulation – emulsifiable concentrate, water miscible liquids, wettable powders, dusts, granules.

4.2Insecticides – Natural organic insecticides (plant products). Nicotine, pyrethrum and rotenone. Inorganic insecticides – Arsenical fluorides and borates. Synthetic organic insecticides –D.D.T and B.H.C. Safety measures in handling them - pollution caused by pesticides in secticides and their control. **UNIT V**

FUNGICIDES AND HERBICIDES

5.1Fungicides – definition – classification. Inorganic fungicides– Sulphur compounds, copper compounds, boredeaux mixture and mercuric compounds. 5.2Herbicides - definition – classification. Inorganic herbicides – arsenical compounds, boron compounds, cyanides, chlorates and sulphamates. Organic herbicides - Nitro-compounds, chlorinated compounds -2,4D – compounds – urea herbicides, alachlor and acaricides.

5.3 Attractants – Repellants – Fumigants and Defoliants. *Outcome:*

Studentsgainknowledgeon Soil, Fertilizer, PlantNutrientsandManures, PesticidesandInsecticides & Fungicides and Herbicides

REFERENCES

1. Biswas, T.D.andMukeherjee S.K. 1987 Text book of soilscience.

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CO5	3	3	3	3	3

FACULTY

UNIVERSITYNOMINEE

SEMESTER – V MAJOR BASED ELECTIVE - III POLYMER CHEMISTRY

Objectives

Toknowaboutpolymersandrubbers, properties and reactions of polymers, polymerization techniques and moulding technique, chemistry of commercial polymers & advances in polymers

UNIT 1

INTRODUCTION TO POLYMERS AND RUBBERS

Basics of polymers – monomers and polymers - definition .classification ofpolymers on the basis applications - thermosetting and thermoplastics -distinction among plastics. Functionality -. Copolymers. Degree of polymerization. Types of polymerization reactions – chain polymerization -freeradical and ionic polymerization – coordination and step polymerization reactions- polyaddition and polycondensation.

UNIT II

PROPERTIES AND REACTIONS OF POLYMERS

Properties: Glass transition temperature (Tg) -definition – factors affecting Tg.Relationship between Tg and molecular weight. Importance of Tg. Molecularweight of polymers: number average (Mn), weight average (Mw), sedimentationand viscosity average molecular weights.

Reactions: Hydrolysis – hydrogenation– addition – substitutions – cross linking and cyclisations reaction. Polymer degradation- thermal, photo and oxidation degradation of polymers (basics only).

UNIT III

POLYMERIZATION TECHNIQUES AND MOULDING TECHNIQUE

Polymerization techniques: bulk, solution, emulsion, melt condensation and interfacial polycondensation polymerization.

Moulding technique: Injection, compression, extrusion, rotational and calendaring. **UNIT IV**

CHEMISTRY OF COMMERCIAL POLYMERS

Preparation, properties and uses of the polymers: Polyethylene, polypropylene, polystyrene, PVC, teflon and polymethylmethacrylate, polycarbonate, polyurethanes, polyamides (Kevlar), urea-formaldehyde resin, epoxy resins.

UNIT V

ADVANCES IN POLYMERS

Biopolymers – biomaterials. Polymers in medical field – High temperature and fire – resistant polymers. Silicones – conducting polymers- carbon fibers.(basic idea only) and polymer composites.

Outcome:

Students gain knowledge on polymers and rubbers, properties and reactions of polymers, polymerization techniques and moulding technique, chemistry of commercial polymers & advances in polymers

REFERENCES

1. Billmeyer F.W., Text book of polymer science, Jr. John Wiley and Sons, 1984.

2. Gowariker V.R., Viswanathan N.V. and Jayader Sreedhar, Polymer Science, Wiley Eastern Ltd., New Delhi, 1978.

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anmol Publications Private Ltd., New Delhi, 1989.

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FACULTY

UNIVERSITYNOMINEE

SEMESTER V SKILL BASED ELECTIVE – III INDUSTRIAL CHEMISTRY

Objectives

To know about Dye Chemistry, Laboratory Safety and Hygiene

UNIT I

DYE CHEMISTRY - I

Dyes - theory of color and constitution - chromophore, auxochrome, classification according to application and structure - preparation and uses of azo dyes –triphenyl methane dyes - malachite green, indigo dyes – Reactive dyes, methylene blue, methyl orange and Phenol red.

UNIT II

DYE CHEMISTRY - II

Definition – types and uses of Sizing, Desizing, Scouring, Singeing, Bleaching (Chlorite, Hypochlorite and Peroxide). Textile Printing (actual printing method, post treatment method past – ageing - streaming) and Textile finishing - Cropping – dispersion process.

UNIT III

LABORATORY SAFETY AND HYGIENE

Laboratory safety measures - Storage and handling of corrosive, flammable, explosive, toxic, carcinogenic and poisonous chemicals. Precautions to avoid poisoning. Simple first aid procedures for accidents - Acid in eye, alkali in eye, acid burns, alkali burns, bromine burns, Poisoning, Inhalation of gases, cut by glasses and heat burns. Waste disposal - fume disposal - precautions for avoiding accidents.

Outcome:

Students gainknowledge on Dye Chemistry, Laboratory Safety and Hygiene

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	2	3	3	3
CO3	3	3	3	3	3
CO4	3	3	2	3	3
CO5	3	3	3	3	2

FACULTY

UNIVERSITYNOMINEE

SEMESTER - V SKILL BASED ELECTIVE - IV SBE PRACTICAL INDUSTRIAL CHEMISTRY PRACTICAL

- 1. Pre-treatments: Desizing, Scouring, Bleaching and Dyeing
- 2. Combination on percentage shade,

0.5% Shade, 1% Shade, 2% Shade, 2% Combination Shade

3. Fiber identification tests

For Cotton, Wool, Jute, Viscose, Silk and Polyester

4. Preparation of Dye

Methyl Orange and Phenol red.

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FACULTY

UNVERSITY NOMINEE

SEMESTER VI CORE COURSE XII INORGANIC CHEMISTRY II

Objectives

- 1. To introduce the students about the composition and stability of the nucleus and types of nuclearreactions.
- $\label{eq:constraint} 2. \quad To enlight enthest udents about the Natural and artificial radioactivity.$
- 3. To expose the students to the basic concepts of structure of solids, electrical and magnetic properties of solids
- $\label{eq:construct} 4. \quad To help the students to understand the facts of crystal systems and structure of solids.$

 $\label{eq:constraint} To enlight enthest udents about the inorganic polymers and industrial chemistry$

UNIT I

NUCLEAR CHEMISTRY I

1.1 Introduction – composition of nucleus and nuclear forces – nuclear stability – mass defect – binding energy – packing fraction – N/P ratio – magic numbers – nuclear models – liquid drop – Shell and collective model.

1.2 Isotopes – detection and separation – deviation of atomic weights from whole numbers – isobars, isotones and isomers – types of nuclear reactions- modes of decay - fission and fusion – atom bomb and hydrogen bomb.

UNIT II

NUCLEAR CHEMISTRY II

2.1 Natural and induced radioactivity – radioactive decay – half-life period – radioactive displacement law – radioactive series – Radioactive techniques – Geiger Muller and ionization counters. Natural radioactivity – Detection and measurement of radioactivity – radioactive series including neptunium series – group displacement law – Rate of disintegration and half-life period – Average life period.

2.2 Artificial radioactivity – induced radioactivity – uses of radioisotopes – hazards of radiations – nuclear energy – nuclear reactors – nuclear fission and fusion – energy source of the sun and stars – carbon dating – rock dating. Radioactive waste disposal – applications of nuclear science in agriculture, biology and medicine – Atomic power projects in India.

UNIT III

SOLID STATE CHEMISTRY -I

3.1 Classification of solids – amorphous and crystalline solids – Van der waals crystals – covalent crystals – Laws of crystallography – Elements of symmetry – Weiss and Miller indices – Crystal systems and Bravais lattices.

3.2X-ray diffraction - derivation of Bragg's equation - determination of structures of NaCl by Debye Scherrer (powder method) and rotating crystal methods.

3.3 Metallic state – packing of atoms in metals (BCC, FCC, HCP and simple cube)

– theories of metallic bonding – electron gas, Pauling and band theories. Semiconductors – n-type and p-type, transistors –uses.

– Binary metallic compounds - borides, carbides, hydrides andnitrides - classification, preparation, properties and uses.

UNIT IV

SOLID STATE CHEMISTRY -II

4.1 Ionic bonding – lattice energy – Born equation and its derivation, Radius ratio rule – application - structure of solids like zinc blend, wurtzite, fluorite, CdI_2 – crystal

defects – Schottky and Frenkel defects. Hume-rothary ratio and its significance.

4.2 Some special class of compounds – clathrates – examples and structures – Intertitial and non stoichiometric compounds.

UNIT V

INORGANIC POLYMERS AND INDUSTRIAL CHEMISTRY

5.1 Coordination polymers, metal alkyls, phosphonitrilic polymers. Composition, properties and uses of beryl, asbestos, talc, mica, feldspar and zeolite.

5.2 Gaseous fuels - Natural gas, gobar gas, water gas, semi water gas, carburetted water gas, producer gas and liquified petroleum gas (LPG) – composition, manufacture and applications.

5.3 Safety matches - Introduction, raw materials and manufacturing method.

5.4 Paints and varnishes - Definition, types, Different constituents and their functions.

5.5 Cement - Manufacture – wet and dry processes, composition and

5.6 setting of cement- importance of gypsum

Outcome:

 $\label{eq:construction} The students become familiar with the concept so fnuclear reactions.$

Thestudentswillgainknowledgeaboutatombomb, hydrogenbombandapplications of radioisotopes in agriculture and medicine, and atomic power projects in India.

ThestudentswillhaveabetterunderstandingoftheapplicationsofXRD, semiconductors, superconductors and solid state lasers.

 $\label{eq:construct} The students acquire knowledge of crystal structures and crystal defects$

 $\label{eq:theta} The students will gain knowledge about in organic polymers and industrial chemistry$

REFERENCES

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2. Gilreath, "Fundamental concepts of Inorganic Chemistry', 18th Printing, McGraw Hill International Book Company,1985.

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4. P.L.Soni, "Text Book of Inorganic Chemistry', 20th revised edition, Sultan Chand & Sons,2000.

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FACULTY

UNIVERSITYNOMINEE

HOD

45

SEMESTER VI CORE COURSE XIII ORGANIC CHEMISTRY II

Objectives

- $1. \ \ To understand clearly about the classification and structural features of Carbohydrates.$
- $\label{eq:construction} 2. \quad To learn the classification, structure and properties of natural products and polymers$
- 3. Tounderstandaboutrearrangementreactions and its synthetic applications.

TostudythebasicconceptsinvolvedinspectroscopictechniquesofUV,IR,NMRandMass spectroscopy and their instrumentation techniques along with its applications

UNIT-I CARBOHYDRATES

1.1 Carbohydrates: Definition - Classification with suitable examples - Classification of sugars as reducing and nonreducing sugars - Stereochemistry of carbohydrates: D- and L- configurations - Erythro and threo diastereomers - Anomers and epimers with suitableexamples

1.2 Monosaccharides: Classification of monosaccharides with suitable examples – Glucose - properties of glucose - Epimerisation of glucose - Anomers of glucose and mutarotation - Fructose and its properties - Conversion glucose into fructose and vice-versa - Formation of osazone and glycosides - Fischer open structure and evidences for open structure - Haworth projection cyclic structures (pyranose and furanose) and evidences for cyclic structures of glucose and fructose - Stepping up - Kiliani- Fischer synthesis and stepping down - Ruff degradation ofmonosaccharides

1.3 Disaccharides: Sturcture of sucrose and Maltose.

1.4 Polysaccharides: Starch- Cellulose and its important derivatives (elementary treatment).

UNIT-II

NATURAL PRODUCTS AND POLYMERS

2.1 Alkaloids: Definition - classification with suitable examples for each class - properties – general structural elucidation - Sources, isolation, physiological activities - structural elucidation and synthesis of conine and nicotine.

2.2 Terpenoids: definition, isoprene rule, special isoprene rule and classification with suitable examples - Isolation, general structure elucidation-structure elucidation and Synthesis of citral and geraniol.

2.3 Polymers-definition- classification - preparation of Nylon 6 6, Nylon 6, Dacron, Bakelite, melamine, neoprene, Buna-N, Buna-S and biodegradable polymers.

UNIT III

MOLECULAR REARRANGEMENTS

3.1 Molecular Rearrangements – types of rearrangements (Nucleophilic and electrophilic).

3.2 Mechanism for the following rearrangements – pinacol- pinacolone, benzilbenzilic acid, benzidine, Claisen, Fries, Hofmann, Curtuis, Beckmann, dienonephenol.

3.3 Photochemical reactions of ketones- Norrish type I and II.

UNIT IV

APPLICATIONS OF UV-VISIBLE AND IR SPECTROSCOPY

4.1 UV and Visible Spectroscopy: Possible electronic transitions in an organic compound. Selection rule. Solvent effect. Chromophore and auxochromes. Various types of shifts in λ max and in ϵ max. Calculation of λ max of an organic compound by

Woodward and Feiser rule - dienes. Applications of UV and Visible spectroscopy in organic Chemistry.

4.2 Infrared spectroscopy: number and types of fundamental vibrations – modes of vibrations and their energies, position of IR absorption frequencies for functional groups like aldehydes, ketones, alcohols, acid and amide – factors affecting the frequency absorption- conjugation, inductive effect and hydrogen bonding.

UNIT V

Applications of NMR and Mass Spectroscopy

5.1 Nuclear magnetic Resonance Spectroscopy (NMR): Principle, equivalent and non- equivalent protons- shielded and deshielded protons –anisotropy – chemical shift- reference compound TMS- Splitting of signals – NMR spectrum of simple molecules (n-propyl bromide and iso-propylbromide)

5.2 Mass Spectrometry: Basic principles - instrumentation - Representation of mass spectrum. Molecular ion - identification of parent ion - isotopic peaks - Determination of molecular formula - meta stable peak. General fragmentation. Mass spectra of ethylbenzene, methoxyethane and acetophenone.

Outcome:

- $1. \ Students can able to notify different types of carbohydrates and its structural properties$
- 2. Studentscanlearnabouttheclassification, structure and properties of natural products and polymers
- $\ \ 3. \ \ It reveals the types of rearrangement reactions and its synthetic applications.$
- 4. Can able to know all the spectroscopic techniques in the electromagnetic spectrum. Study of Instrumentation techniques very much useful to identify the simple as well as complex organic molecules.

REFERENCES

1. Davis, A. J. Fairbanks, Carbohydrate Chemistry, Oxford Chemistry Primer, Oxford University Press, 2002.

2. L. Finar, Organic Chemistry Vol-1, 6thedn, Pearson Education Asia,2004.

3. J.Clayden, N. Greeves, S. Warren, Organic Chemistry, 2ndedn, Oxford,2012.

4. R. Silverstein, M., Bassler, G. C., Morrill, T. C. Spectrometric Identification of Organic Compounds , John Wiley and Sons, INC, Fifth edition,1991.

5. W. Kemp, Organic Spectroscopy, Palgrave, 1991.

6. D. L. Pavia et al, Introduction to Spectroscopy, 5thEdition, Cengage Learning India Ed.2015.

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FACULTY

UNIVERSITYNOMINEE

SEMESTER VI CORE COURSE XIV PHYSICAL CHEMISTRY II

Objectives

- 1. Toknowthefundamentalconceptsofconductancestudies
- 2. (i)Tolearnthefundamentalsofelectrochemicalcellsandthecalculations of cellpotentialii)To know about the electrodes and electro chemical series and its applications
- 3. i)Tounderstandvarioustypesofphotochemicalprocessii)Tostudythelawsofphotochemistryiii) To learn the kinetics of photochemical reactions. (iii) To equip learners with concepts of symmetrical elements and outcome
- 4. Toknowthebasicprinciplesofspectroscopyii)Tolearnstheprinciplesofrotationalspectroscopy

UNIT-I

ELECTRICAL CONDUCTANCE AND TRANSFERENCE

1.1 Metallic and electrolytic conductors – specific, equivalent and molar conductance – measurement of conductance.– variation of conductance with dilution for strong and weak electrolytes (qualitative explanation).

1.2 Transport number and its determination by Hittorff and moving boundary method — Kohlrausch law and its applications – Applications of conductivity measurements – solubility product and conductometric titrations- Ostwald's dilution law and itsapplications.

1.3 Theory of strong electrolytes – Debye- Huckel-Onsager theory — Wein effect and Debye- Falkenhangeneffect.

UNIT-II

GALVANIC CELLS AND APPLICATIONS

2.1. Galvanic cells – reversible and irreversible electrodes and cells – standard cellemf and its measurement–

2.2. Types of electrodes – electrode reactions – electrode potentials - reference electrodes – standard electrode potentials. Derivation of Nernest equation for electrode potential and cell emf– electrochemical series and its applications –cell emf.

2.3. calculation of ΔG , ΔH , ΔS and k from emf measurements.

2.4. Applications of emf measurement — determination of pH using quinhydrone and glass electrodes – potentiometric titrations. storage cells – lead acid battery.

UNIT-III: PHOTO CHEMISTRY AND GROUP THEORY

3.1 Photochemistry - Consequences of Light Absorption - The Jablonski Diagram – Radiative and Non radiative transitions - Phosphorescence – Fluorescence – Internal Conversion – Inter System Crossing - Laws of Photo chemistry – Grothus -DraperLaw–Stark-EinsteinsLaw–Lambert'sLaw–Beer-Lambert'sLaw–Quantum efficiency. Photochemical reaction — Kinetics of Hydrogen-Chlorine Reaction – Photosensitization and Quenching – Chemiluminescence and bio-luminescence.

3.2 Group Theory - Symmetry elements and symmetry operations $-C_n$, σ , S_n , i and E symmetry operations of the following molecules- H_2O , BF_3 and NH_3 .

UNIT IV SPECTROSCOPY - I

4.1. Spectroscopy – definition– the regions of various types ofspectra.

4.2. Microwave spectroscopy - Rotational spectra of a rigid diatomic molecule – Condition for a molecule to be active in Microwave region – rotation constant (B) and selection rule for rotational transition.

4.3. Infrared Spectroscopy - Vibrations of diatomic molecules –Harmonic oscillator-Zero point energy, Force constant and Dissociation energy – Condition for a molecule to be active in the IR region – Selection rules for vibrational transition – Fundamental bands and overtones.

UNIT V SPECTROSCOPY – II

5.1. Raman Spectroscopy - Rayleigh scattering and Raman Scattering - Stokes and Anti-stokes lines in Raman Spectra –Condition for a molecule to be Raman active

– Comparison of Raman and IR Spectra – Rule of Mutual Exclusion.

5.2. UV- Visible spectroscopy-conditions- Franck-Condon principle – types of electronic transitions.

5.3. NMR Spectroscopy - Theory of NMR Spectra – Nuclear spin and conditions for a molecule to give rise to NMR spectrum–chemical shift - δ and τ scales – Reasons for using TMS as a Reference- Theory of Spin – Spin coupling – splitting of NMR signals – NMR spectrum of pure and acidified Ethanol.

Outcome:

- 1. students can gain knowledge on electro chemical conductance and the applications of conductance measurements.
- $2. \ \ students can learn about the galvanic cells and its applications$
- $3. \ (i) Gainknowledge about photochemical reactions. (ii) Students can learn the basic sofgroup theory \\$
- 4. studentscangainknowledgeongeneralbasicprinciplesofspectroscopy.studentscanacquire knowledge on rotational spectroscopy and its applications.

REFERENCES

1. Puri B.R., Sharma L.R., and Pathania M.S., PrinciplesofPhysical

- 2. Chemistry, Vishal PuyblishingCompany.
- 3. Banwell C.N., Fundamentals of Molecular Spectroscopy, 3rd Ed., New Delhi, 1983.
- 4. Glasstone. S, Introduction to Electrochemistry Affiliated East West press, 1966.

5. Albert Cotton. F, Chemical Applications of Group Theory, Third Edition John Wiley & Sons, Singapore, 2003.

6. Rohatgi K.K – Muherjee, Fundamentals of Photochemistry, Wiley Eastern Ltd. (1986).

7. Bahl B.S., ArunBahl and Tuli G.D. (2012). Essentials of Physical Chemistry, New Delhi- Sultan Chand andSons.

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spectroscopy, 4th edition, McGraw hill publishing companylimited.

10. Russell S. Drago, (1978), Physical methods in Inorganic chemistry, East- west studentedition.

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FACULTY

UNIVERSITYNOMINEE

SEMESTER VI CORE COURSE XV ANALYTICAL CHEMISTRY

Objectives

- 1. To studyabouttheprinciples and classification of separation methods, and also to provide, the methods of separation techniques and its applications.
- 2. Toprovide the principles of gravimetric analysis, methods and characteristic features of precipitation techniques, and the analysis of thermal analytical methods.
- 3. Tounderstandtheconceptsoftheorybehindthethermoanalyticalmethods, electroanalytical techniques and spectro analytical techniques.

UNIT I

SEPRATION AND PURIFICATION TECHNIQUES - I

1.1 General principle involved in the precipitation, separation of precipitates, filtration and sample drying, desiccants, vacuum drying. Principle and techniques of distillation, fractional distillation, vacuum distillation, and steam distillation.

1.2 Chromatography - Column Chromatography - principle, types of adsorbents, preparation of the column and application.

UNIT II

SEPRATION AND PURIFICATION TECHNIQUES - II

2.1 Thin layer chromatography – principle, choice of adsorbent and solvent, preparation of chromatoplates, R_f values, factors affecting the R_f values, Significance of R_f values.

2.2 Paper chromatography - principle, development of chromatogram, ascending, descending and radial paper chromatography. Ion - exchange chromatography - principle - types of resins - experimental techniques.

UNIT II

GRAVIMETRIC ANALYSIS AND THERMO ANALYTICAL METHODS

3.1 Gravimetric analysis - principle – theories of precipitation – solubility product and precipitation – conditions of precipitations – types of precipitants – specific and selective precipitants – organic and inorganic precipitants – Purity of precipitates – co-precipitation – post precipitation – precipitation from homogeneous solution – use of sequestering agents.

3.2 Thermo analytical methods Principle of Thermo gravimetric analysis (TGA) and Differential thermal analysis (DTA)– Instrumentation for TGA and DTA. Characteristics and factors affecting TGA and DTA curves. TGA and DTA analysis of calcium oxalate monohydrate.

UNIT IV

ELECTRO ANALYTICAL TECHNIQUES

4.1 Electrogravimetry – Redox potential - theory of electrogravimetric analysis - determination of copper (by constant current procedure).

4.2 Electrolytic separation of metals - Principle - separation of copper and nickel, principles of electrodeposition - overvoltage.

4.3 Coulometry -principle of coulometric analysis – coulometry at controlled

potential – instrumentation and technique – separation of nickel and cobalt. **UNIT V**

SPECTRO ANALYTICAL TECHNIQUES AND ESTIMATION

5.1 Colorimetry – Nessler's and photo electric colorimetry-principle-advantages of

colormeric estimation.EstimationofNi⁺²and Fe⁺³.

5.2 Determination of percentage purity of the commercial samples washing soda and bleaching powder. Principle and estimation of phenol, aniline and glucose. *Outcome:*

- $1. \ Clearly brings about the principles and methods of separation techniques and their applications.$
- 2. Brings about the methods of gravimetric analysis; can able to know the concepts and methods of precipitation techniques and Thermal Gravimetric Analysis.
- 3. Bringsaboutthemethods of thermoanalytical methods, electroanalytical techniques and spectro analytical techniques; can able to know the concepts and methods

REFERENCES

1. Gopalan R, Subramanian PS and Rengarajan K (1993) ``Elements of analytical chemistry'' second revised edition, SultanChand.

2. Gurdeep R Chatwal, Sham K. Anand (2005) ``Instrumental methods of chemical analysis", Himalaya publishinghouse.

3. Vogel A.I. Text Book of Quantitative Inorganic analysis," The English Language Book Society, Fourth edition.

4. Douglas A. Skoog, Donald M. West and F. J. Holler, Fundamentals of Analytical chemistry, 7thedition, Harcourt CollegePublishers.

5. Mendham J., Denny R. C., Barnes J.D., Thomas M., Vogel's Test book of Quantitative Chemical analysis 6th edition, Pearsoneducation.

6. Sharma, B. K., Instrumental methods of chemicalanalysis, Goel Publishing House, Merrut(1999).

7. S.M. Khopkar, Basic concepts of analytical chemistry, New age International Pvt. Ltd., New Delhi,1998.

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FACULTY

UNIVERSITYNOMINEE

SEMESTER VI MAJOR BASED ELECTIVE - IV PHARMACEUTICAL CHEMISTRY

Objectives

To know about Chemistry of Heterocyclics, Composition of Blood Plasma, Alkaloids, Vitamins & Anaesthetics

UNIT – I

CHEMISTRY OF HETEROCYCLICS

A brief introduction - drugs derived from pyridine derivatives – Tripelennamine and mepyramine.

QUINOLINE DERIVATIVES

Chloroquine, amodiaquine and primaquine, Pyrimidines – Ureides and barbiturates.

ANTIBIOTICS

Pharmacological action – structural elucidation synthesis, assay and uses of chloramphenicol, Streptomycin and penicillin.

UNIT – II

COMPOSITION OF BLOOD PLASMA

Analysis of serum proteins, Functions of plasma, Osmotic regulation, function of hemoglobin. Transport of Oxygen and maintenance of pH of blood. Analysis of hemoglobin in blood. Rh factor. Blood pressure- normal, high and low Blood pressure and their control. Diagnostic test for sugar, salt and cholesterol in serum.

Medicinally important compounds of Al, P, As and Fe- their preparation and applications.

UNIT – III

ALKALOIDS

General methods of extraction from a plant source, colour reactions and detection. Morphine and Quinine with special reference to structure relationship (SAR) and uses.

CHEMISTRY OF SULPHONAMIDES

Sulphadiazine, Sulphapyridine, phthalyl sulphathiazole, sulpha furazole, and prontosil – Preparations and uses.

UNIT – IV

VITAMINS

Classification, importances and the sources of vitamines. Clinical estimation of proteins, glucose, urea, blood cholesterol and Haemoglobin.

ANALGESICS

Classification, Narcotic analgesic– Morphine and derivatives. synthetic analgesics – pethidine and methadones. Antipyretic analgesics. Salicylic acid derivatives, indolyl dertivatives and p-aminopheno derivatives, synthesis, action and uses.

$\mathbf{UNIT} - \mathbf{V}$

ANAESTHETICS

Preparation and uses of general and local Gaseous anaesthetics - their

Vinyl ether, methoxy fluorane Halogenated hydrocarbons like chloroform, halothane, trichloroethylene, ethylchloride, cyclopropane, nitrous oxide. Intravenous anaesthetics

– Thiopentone sodium, Methoxyhexitone and propanidid. Local anaesthetics – cocaine and its derivatives.

ANTISEPTICS AND DISINFECTANTS

Phenols and related compounds, Organic mercurials. Dyes, cationic surface active agents, miscellaneous agents like chloramines -T, Chlorhexidine, dequalinium chloride, formaldehyde and nitrofurazone.

Outcome:

Studentsgainknowledgeon ChemistryofHeterocyclics,CompositionofBloodPlasma,Alkaloids, Vitamins & Anaesthetics

REFERENCES

1. A text book of pharmaceutical chemistry –Jayashree Ghosh

2. A text book of pharmaceutical chemistry –laksmi

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FACULTY

UNIVERSITYNOMINEE

SEMESTER – VI SOFT SKILL

UNIT I

KNOWTHYSELF/UNDERSTANDING SELF

Introduction to soft skill – Self-discovery–Developing – Forming values – goal setting – Career planing.

positive attitude

UNIT II

COMMUNICATION SKILLS/COMMUNICATOIN WITH OTHERS

Art listening – Art of reading – Art of speaking – Developing important relationship – Art of writing – e-mail technique – resume writing.

UNIT III CORPORATESKILLS

Developing body language – Time management – Stress management – Group discussion – Mock GD – Mock Interview.

REFERENCES

1. A text book of developing soft skills.Dr.K.Meena&Dr.V.Ayothi.

2. Soft skills. Dr.K.AlexS.Chand& Company Ltd, Ram Nagar, New Delhi – 110055.

- 3. Developing the leader withinyou John C Maxwell.
- 4. Good to great by JimCollins.

The seven habits of highly effective people Stephen Covey

FACULTY UNIVERSITYNOMINEE HOD

SEMESTER – VI GENDER STUDIES

UNIT I

GENDER CONCEPT

Sex and Gender – Social communication of Gender – Gender perspectives of body – Gender discrimination – Gender stereotyping – Gender mainstreaming – Gender and work participation rate – Sexratio.

UNIT II

FEMINISM Vs GENDERSTUDIES

Women study as an agent of change – UGC'S initiatives – Women's studies in XI thplan – Beijing conference – Women development policies of nation and world – International women'sDay.

UNIT III

WOMEN'S DEVELOPMENT AND GENDEREQUALITY

National and state commission for women – All women police stations – Family court – Women and Child welfare – Laws regarding Female Foeticide (PCPNOT) – Rules against Eve testing – Role of NGO's – 73 th and 74 th CostitutionAmendments.

FACULTY

UNIVERSITYNOMINEE

SEMESTER – III ALLIED COURSE –I ALLIED CHEMISTRY - I (for B.Sc., Mathematics and Physics)

Objectives

ToknowaboutCoordination chemistry, Hyperconjugation, Aromatic compounds, Thermodynamics & Chemical equilibrium.

UNIT I

1.1Coordination chemistry –Definition of central metal ion – Ligand – Coordination number – types of ligands – Werner theory of Coordination compounds, chelates – properties of chelates – importance and uses of EDTA – Biological role of haemoglobin and chlorophyll.

1.2IndustrialChemistry

Fuel gases – Water gas, producer gas, LPG gas Gobar gas and natural gas.

1.3Fertilisers – definition - requisites for good fertilizers – classification - nitrogen fertilizers – calcium ammonium nitrate and urea – phosphorus fertilizers - calcium super phosphate and triple super phosphate – potassium fertilizers - potassium nitrate and potassium chloride their role in growth and development of plant – deficiency symptoms - mixed fertilisers, micronutrients and their role in Plant growth and development - Biofertilisers.

1.4Soaps and detergents – an elementary idea about preparation and manufacture cleaning action of soap and detergents.

UNIT II

2.1Polar effects - Inductive effect – Relative Strength of Aliphatic monocarboxylic acid and aliphatic amines.

2.2Hyperconjugation – Consequences of hyperconjugation – Heat of hydrogenation, Bond length and dipolemoment.Steric effect – steric accelerated reaction and steric inhibitedreaction.

2.3Halogen containing compounds – Importance of chloorohydro carbon used as solvents and pesticides – choloform, carbon tetra chloride , DDT,BHC.

2.4 Types of solvents – polar and nonpolar - dissolving nature of solvents.

UNIT III

3.1Aromatic compounds - Benzene Structure, aromaticity, resonance, conditions for Resonance, Resonance energy, Resonance Hybrid and stability of benzene. Typical substitution reaction of Benzene- Nitration, halogenation and alkylation (with mechanism). Polynuclear hydrocarbons – naphthalene – Isolation from coal tar, properties and uses.

3.2Organic reactions Without Mechanism - Biuret, Decarboxylation, Benzoin, Perkin, Cannizaro, Claisen, Haloform, Carbyl amine, Coupling reactions.

3.3Chemotherapy explanations (Structures not necessary) with two examples each for Analgesics, Antibacterial, Anti-inflammatory, Antidiabetics, Antiseptic, Disinfectant, Anaesthetics- local and general.

UNIT IV

4.1Thermodynamics– System and surroundings – Types of systems – state and path function – Thermodynamic processes.

Zeroth Law and First law of thermodynamics – different statements – Second

law of thermodynamics - different statements only - Carnot cycle - Derivation of efficiency of heat engine.

4.2Phase rule–definition of Phase, component, degrees of Freedom – definition of phase rule - one component system – water system – Reduced Phase rule – Pb-Ag system.

UNIT V

5.1Chemical equilibrium –Law of mass action – equilibrium constant – homogeneous and heterogeneous equilibria with examples - derivation of K_P and K_C for the decomposition of HI, CaCO₃ andPCl₅.

5.4 Chemical Kinetics –rate of reaction – rate equation - order of reaction – molecularity of reaction, Difference between order and molecularity – different methods of determination of order of the reaction. Effect of temperature on reaction rate – Arrhenius equation – concept of activation energy – significance of activation energy.

Outcome:

StudentsgainknowledgeonCoordinationchemistry,*Hyperconjugation*,*Aromaticcompounds*, *Thermodynamics* & *Chemical equilibrium*.

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FACULTY

UNIVERSITYNOMINEE

SEMESTER III & IV ALLIED COURSE-II PRACTICAL (Volumetric and organic Qualitative Analysis)

I VOLUMETRICANALYSIS

- **1.** Acidimetry and alkalimetry
- (a) Strong acid VS strongbase
- (b) Weak acid VS strongbase
- 2. Permanganometry
- (a) Estimation of ferrous sulphate
- (b) Estimation of oxalic acid
- 3. Iodometry
- (a) Estimation of potassium dichromate
- II ORGANICANALYSIS

A study of the reactions of the following organic Compounds.

1. Amine, 2. Amide, 3. Aldehyde, 4. Ketone, 5.Acid, 6. Corbohydrate and 7. Phenol.

The students may be trained to perform the specific reactions like tests for elements (nitrogen only), aliphatic or aromatic, saturated or unsaturated and functional group present and record their observations.

Scheme for practical Evaluation.

Organic Qualitative Analysis	20
Volumetric Estimation	35
Record	5
Internal Assessment	40
	100

Volumetric Analysis (35 Marks)

Procedure - 5 Marks Results < 2% - 30Marks 2-3% - 20Marks 3-4% - 10Marks > 4% - 5 Marks Organic Qualitative Analysis Identification of Nitrogen - 4 Marks Saturated on unsaturated -3 Marks Aliphatic or Aromatic -3 Marks Preliminary reactions with Procedure -5 Marks Functional group identified Correctly -5 Marks

FACULTY

UNIVERSITYNOMINEE

SEMESTER-IV ALLIED COURSE -III ALLIED CHEMISTRY - II (for B.Sc., Mathematics and Physics)

Objectives

To know about Nuclear Chemistry, Carbohydrates, Synthetic polymers, Electrochemistry & Surface Chemistry.

UNIT I

1.1 Nuclear Chemistry- Fundamental particles of nucleus - isotopes, isotones and isomers – Differences between chemical reactions and nuclear reactions, Nuclearfusion and nuclear fissionreaction.

1.2 Metallic bond- Electron gas - Pauling and band theories - Semiconductors – intrinsic, extrinsic, n-type and p-typesemiconductors.

UNIT II

2.1 Carbohydrates- Classification – glucose– preparation and properties – Elucidation of structure of glucose.

2.2 Amino acids and proteins- Amino acids – Classification based on structure. Essential and non – essentials amino acids – Preparation and properties – peptides (elementary Treatment) – Proteins – Classification based on physical properties and biological functions. Structures of proteins – primary and secondary structure (elementarytreatment).

UNIT III

3.1 Synthetic polymers– polymers – classification of polymers - Teflon alkyl andepoxyresins, polyesters–preparation and uses.

3.2 Heterocyclic compounds- Furan, pyrrole and pyridine – preparation and properties–basicpropertiesofpyridineandpyrrole.

3.3 Stereoisomerism- Optical isomerism – Lactic and tartaric acid – racemisation and resolution. Geometrical isomerism – maleic and fumaricacids.

UNIT IV

4.1 Surface Chemistry- Emulsions, gels – preparation, properties and applications.Electrophoresis, Chromatography – Column, paper and thin layer Chromatography.

4.2 Photochemistry -Laws of Photochemistry – definition of Lamberts law, Beer lamberts law, Grothus Drapper law and Einstein law – Photosensitization, Quantum yield and applications of Photo Chemistry.

UNIT V

5.1 Electrochemistry -Specific and equivalent conductivities – their determination. An elementary idea of Arrhenius theory. Ostwald's Dilution law with derivation - Kohlrausch law, conductometric titrations.

5.2 pH and buffer–Definition of pH and buffer - Importance of pH and buffers in living systems – pH determination by colorimetric and electrometricmethods. *Outcome:*

StudentsgainknowledgeonCoordinationchemistry,Hyperconjugation,Aromaticcompounds, Thermodynamics & Chemical equilibrium.

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FACULTY

SEMESTERIII ALLIED COURSE- I ALLIED CHEMISTRY –I Far D.So. Zoology, [®]Distack)

(For B.Sc, Zoology &Biotech)

Objectives

To know about fundamental concepts, fuel gases, plant nutrients and fertilizers, industrial organic chemistry, colloidal state and chromatography and pharmaceutical chemistry.

UNITI

FUNDAMENTAL CONCEPTS

Bonding – nature of bonds – ionic, covalent, coordinate and hydrogen bonds - Cleavage of covalent bonds – homolytic and heterolytic fission – electrophiles, nucleophiles and free radicals . Types of organic reactions – substitution, addition, elimination, rearrangement – definition and examples. Hybridisation – states of hybridization of carbon in methane, ethane, ethylene, acetylene.

UNITII

FUEL GASES, PLANT NUTRIENTS AND FERTILIZERS

Fuel gases – natural gas, water gas, semi water gas, carburetted water gas, producer gas, LPG and oil gas – composition, manufacture (elementary idea) and uses. Plant nutrients – major nutrients – role of nitrogen, phosphorus and potassium in plant life, micronutrients. Fertilizers – definition, urea, ammonium sulphate, superphosphate of lime, triple superphosphate and potassium nitrate – preparation and uses.

UNITIII

INDUSTRIAL ORGANIC CHEMISTRY

Pesticides – DDT, BHC – preparation and uses. Refrigerant – freon 12 – preparation, properties and uses. Polymers – definition, classification – natural and synthetic, homo and copolymers, natural polymers – cotton, silk and wool, preparation and applications of the synthetic polymers – polythene, PVC, teflon and nylon. Synthetic dyes – classification, preparation and uses of methyl orange and indigo, foodcolours.

UNIT IV

COLLOIDAL STATE AND CHROMATOGRAPHY

Colloidal system – definition, types -Emulsions– definition, types – o/w and w/o emulsions – tests for identification, properties and applications. Gels – definition, classification, preparation and properties – syneresis, imbibition and thixotropy. Electrophoresis – applications. Chromatography–column and paper chromatography – experimental proceduresonly.

UNITV

PHARMACEUTICAL CHEMISTRY

Antiseptic & disinfectants – phenolic compounds – Dettol, phenyle & Lysol – Definition – differences – medicinal uses and side effects. Anaesthetics – general anaesthetics and local anaesthetics – Definition, examples, uses and side effects.

Analgesics – narcotic– morphine & pethidine, non-norcotic – salicylic acid & its derivatives – medicinal uses and side effects. Organic pharmaceutical aids – Preservatives, antioxidants, colouring, flavouring and sweetening agents – Definition, examples and uses. *Outcome:*

*Studentsgainknowledgeon*fundamentalconcepts,fuelgases,plantnutrientsandfertilizers, industrial organic chemistry, colloidal state and chromatography and pharmaceutical chemistry.

REFERENCE

1. Text Book of Ancillary Chemistry, V.Veeraiyan et al, revised edition, 1997.

- 2. Allied Chemistry, **R. Gopalan** and **S. Sundaram**, S. Chand & Sons, 2ndedition,1993.
- 3. Text Book of Organic Chemistry, P.L. Soni and H.M. Chawla, S.Chand & Sons, ,

29thedition, 2014 (UnitIII).

4. Principles of Inorganic Chemsitry, **B.R. Puri, L.R. Sharma** and **K.C. Kalia** Vishal Publishing Co, Reprint 2016 (Unit I &II).

5. Principles of Physical Chemistry, **B.R.Puri, L.R. Sharma**, Vishal Publishing Company, Jalandhar, 44thedition 2009. (UnitIV)

6. A text book of pharmaceutical chemistry, **Jayashree Ghosh**, S.Chand and Company Ltd., New Delhi, 1stedition, 2004. (Unit V)

7. Pharmaceutical Chemistry, **S. Lakshmi**, S.Chand & Company Ltd., New Delhi, 3rdedition, 2004. (UnitV)

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FACULTY

UNIVERSITYNOMINEE

SEMESTER IV ALLIED COURSE- III ALLIED CHEMISTRY –II (For B.Sc, Zoology & Biotech)

Objectives

To know about acids, bases and catalysis, carbohydrates and vitamins, amino acids, proteins and nucleic acids, enzymes and food chemistry.

UNIT I

ACIDS, BASES AND CATALYSIS

Acids and bases – Arrhenius and Lewis theories of acids and bases, pH scale, buffer solutions – definition – examples of acidic and basic buffer solutions, importance of pH and buffer in living systems. Hardness of water – types and determination of hardness by EDTA titration. Catalysis – types of catalysis, characteristics of catalysts, promoters and catalytic poison, biocatalysts – enzyme catalysis, industrial applications of catalysts.

UNIT II

CARBOHYDRATES AND VITAMINS

Carbohydrates – classification, glucose and fructose – sources, manufacturing method, reactions of glucose, derivatives of starch and cellulose – applications. Vitamins – classification, sources and deficiency diseases of vitamins A, D, E, K, C, B₁, B₂, B₅, B₆, and B₁₂.

UNIT III

AMINO ACIDS, PROTEINS AND NUCLEIC ACIDS

 α -Amino acids – essential and non essential amino acids, α -amino acid-preparation by Gabriel-phthalimide reaction and Strecker's method, isoelectric point, zwitter ion formation, action of heat, ninhydrin test. Peptides – definition only, proteins – classification, characteristics and biological functions, elementary treatment of primary and secondary structure. Nucleic acids – DNA & RNA – composition and structure (elementary treatment), differences between DNA &RNA.

UNIT IV

ENZYMES

Definition – Nomenclature and classification – factors affecting enzyme activity – concentration of enzymes – concentration of substrate (Michaelis- Menton equation) – effect of temperature – effect of P^{H} – effect of product concentration– effect of activators – effect of time – effect of light and radiation – enzymes inhibition (reversible, irreversible and allosteric) – Enzyme specificity – Energy profile diagram for mechanism of enzyme action. **UNIT V**

FOOD CHEMISTRY

Food additives – sweetners, preservatives, emulsifying and stabilizing agents, flavouring agents, antioxidants and colouring agents. Food adulteration – definition and types of adulterations – adulterants in soft drinks, milk and milk products, edible oils and fats. Packaging hazards – prevention and control. Simple tests for common adulterants in coffee powder, tea leaves, cane sugar, honey, turmeric, common salt, dhals, and icecreams.

Outcome:

Studentsgainknowledgeonacids, bases and catalysis, carbohydrates and vitamins, aminoacids, proteins and nucleic acids, enzymes and food chemistry.

REFERENCE

1. Text Book of Organic Chemistry, **P.L. Soni and H.M. Chawla**, S. Chand & Sons, 27thedition, 1997.

2. PrinciplesofPhysicalChemistry, B.R.Puri, L.R.Sharma, VishalPublishingCompany,

3. Jalandhar, 44thedition 2009. (Unit IV)

4. Elements of Physical Chemistry, **B.R. Puri, L.R. Sharma, M.S. Pathania,** Vishal Publishing Co. 43rdedition, 2008-09. (UnitI)

5. TextBook of Biochemistry, **O.P. Agarwal and G.R. Agarwal**, Goel Publishing House, 7thedition, 1993. (Unit III &IV)

6. Chemistry for Changing Times, **John W.Hill**, St. edition, subject Publishing House, 1986 (UnitII)

7. Ref: Biochemistry by U. Satyanarayana and U. Chakrapani., Third edition 2006 (Revised reprint : 2007), Arunabha Sen books and allied P. Ltd., Kolkata(UnitIV).

8. Food Additives – Characteristics, Detection and Estimation, **S.N. Mahindru** Tata McGraw Hill Publishing Company Limited. (UnitV).

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	3
CO2	2	3	3	3	3
CO3	3	3	3	3	2
CO4	3	3	3	3	3
CO5	3	3	3	2	3

FACULTY

UNIVERSITYNOMINEE

ELECTIVE-III NON MAJOR ELECTIVE – I AGRICULTURALCHEMISTRY

Objectives

Toknowaboutsoilscience, fertilizers, pesticides, insecticides, fungicides and herbicides. **UNITI**

SOILSCIENCE

Definition of soils, properties of soils, physical property – components – soil types – structure and texture, soil water, soil air and soil temperature. Chemical properties – soil material – soil coloids – soil organic matters.

UNIT II FERTILIZ

FERTILIZ

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Fertilizer – definition – classification – on the basis of elements present – organic and inorganic– nitrogenous fertilizers – effect of nitrogen on plant growth and development – deficiency symptoms – examples – manufacture of urea.

Phosphatic fertilizers – effect of phosphors on plant growth and development – deficiency symptoms – examples – manufacture of super phosphate.

Potassium fertilizers – function of potassium on plant growth – deficiency symptoms and examples – preparation of KNO₃.

Complexfertilizersandmixedfertilizers-compositionanduses, manures-

bulkyorganic manures – farmyard manure – handling and storage – method of composing – green manuring.

UNIT III

PESTICIDES, INSECTICIDES, FUNGICIDES AND HERBICIDES

Pesticides, insecticides, fungicides andherbicides –definitionandclassification with examples – toxicity, safety measures when using pesticides – pollutions caused by pesticides and insecticides and the control.

Outcome:

Studentsgainknowledgeonsoilscience, fertilizers, pesticides, insecticides, fungicides and herbicides. **REFERENCE**

- 1. N.C.Brady, The Nature and properties of soils Eurasia publishing house (P)Ltd., 9thEd, 1984.
- 2. Biswas, T.D. and Mukeherjee S.K, 1987 Textbook of soil science
- 3. A.J.Daji(1970)ATextbookofsoilscience–Asiapublishinghouse, madras
- 4. Donahue, R.L.Miller, R.W.andShukluna, J.C, 1987, Soils–Anintroduction to soil and plant Growth Prentine, Hall of India (P)Ltd., New Delhi
- 5. CollingG.H1959,CommercialFertilizers–McGrawHillpublishingCo.,NewYork.

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	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3