POOMPUHAR COLLEGE (AUTONOMOUS), MELAIYUR – 609 107

Course Structure under CBCS

B.Sc., Chemistry

(for the candidates admitted from the academic year 2016 – 2017 onwards)

SEMESTER	PART	COURSE	TITLE	INSTRU HOURS/WEEK	CREDIT	EXAM Hrs	MARKS INTERNAL	MARKS EXTERNAL	TOTAL
I	I	Language course I (LC) - Tamil	Tamil - I	6	3	3	25	75	100
	II	English Language Course – I (ELC)	English - I	6	3	3	25	75	100
	III	Core Course – I (CC)	General Chemistry – I	5	5	3	25	75	100
		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	2	3	25	75	100
			Total	30	16				500
II	I	Language course II (LC) - Tamil	Tamil - II	6	3	3	25	75	100
	II	English Language Course – II (ELC)	English - II	6	3	3	25	75	100
	III	Core Course – II (CC)	Semi-micro Analysis (P)	3	5	3	40	60	100
		Core Course – III (CC)	General chemistry – II	5	5	3	25	75	100
		First Allied Course – II (AC)	Physics (P)	3	4	3	40	60	100
		First Allied Course – III (AC)	Physics - II	5	3	3	25	75	100
	IV	Environmental Studies	Environmental Studies	2	2	3	25	75	100
			Total	30	25				700
III	I	Language course III (LC) - Tamil	Tamil - III	6	3	3	25	75	100
	II	English Language Course – III (ELC)	English - III	6	3	3	25	75	100
	III	Core Course – IV (CC)	General Chemistry - III	5	5	3	25	75	100
		Core Course – V (CC)	Volumetric Analysis (P)	3	*	*	*	*	*
		Second Allied Course – I (AC)	Maths – I / Zoology – I	5	3	3	25	75	100
		Second Allied Course – II (AC)	Maths – II / Zoology (P)	3	*	*	*	*	*
	IV	Non Major Elective - I	Energy Physics	2	2	3	25	75	100
			Total	30	16				500

NUMBER OF PAPERS

Language Part – I (Tamil)	- 4
Language Part –II (English)	- 4
Core Course Theory	- 10
Core Course Practical	- 4
Allied Course Theory (Maths / Zoology)	- 5 / 4
Allied course Practical (Maths / Zoology)	- 1 / 2
Non-Major Elective	- 2
Skill Based Elective Theory	- 2
Skill Based Elective Practical	- 1
Major Based Elective	- 2
Value Education	- 1
Environmental Studies	- 1
Soft Skill Development	- 1
Gender Studies	- 1
Extension Activities*	- - (Credit only)

** Outside instruction hours*

Total papers	**- 39**
Total marks	**- 3900**
Total credits	**- 140**

Note:

	Internal Marks	/	External Marks
1. Theory	25		75
2. Practical	40		60

3. Separate passing minimum is prescribed for Internal and External marks

FOR THEORY

- The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]
  The passing minimum for University Examinations shall be 40% out of 75 marks [i.e. 30 marks]

FOR PRACTICAL

- The passing minimum for CIA shall be 40% out of 40 marks [i.e. 16 marks]
  The passing minimum for University Examinations shall be 40% out of 60 marks [i.e. 24 marks]

SEMESTER – I **CORE COURSE – I**

GENERAL CHEMISTRY - I

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+l) rule, stability of half – filled and fully filled orbitals.

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 ACID – BASE THEORY

2.1 Titrimetry - Preparation of standard solutions – Normality, Molarity, Molality and Mole fraction – primary and secondary standards.

2.2 Acids and Bases - Arrhenius, Protonic and Lewis Theories of acids and bases – Usnovich's generalized definition – reative strength of acids and bases – Dissociation constant of acids and bases –Levelling effect of water. Hard and soft acids and bases (HSAB)

2.3 Oxidation and Reduction Reactions - Oxidation and reduction – Different modes of definition - Balancing redox equations by oxidation number method and Ion-electron method – Equivalent weight of oxidizing and reducing agents.

UNIT III COVALENT BONDING, STRUCTURE AND RACTIVE INTERMEDIATES

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

3.2 Covalent bond properties of organic molecules bond length, bond angle, bond energy, bond polarity, dipole moment, inductive, mesomeric, electrometric, resonance and hyperconjugation.

3.3 Naming of organic compounds (up to 10 Carbon systems) – hydrocarbons, mono functional compounds and bi-functional compounds – Isomerism – Types of isomerism (structural and stereoisomerism) definition with examples.

3.4 Homolytic and Heterolytic cleavages of bonds, Charecteristics of nucleophilic, electrophilic and free radical reagents - Carbications, Carbanions and free radicals – their stability.

UNIT IV CHEMISTRY OF ALKANES AND CYCLOALKANES

4.1 Alkanes – sources of alkanes – general preparation – general properties – conformational analysis of ethane and n-butane.

4.2 Cyloalkanes – general Preparation – general properties - Relative stability of cyclopropane to cyclooctane - Bayer's Strain theory – Limitations – Conformational study of cyclohexanes, mono and disubstituted cyclohexanes.

UNIT V ATOMIC STRUCTURE AND BASIC QUANTUM MECHANICS

5.1 Rutherfords and Bhor's model of atom – Bhor's theory and origin of hydrogen spectrum. Sommerfield's extension of Bhor's theory.

5.2 Electromagnetic radiation – definitions for Wave length (ʎ), Wave number (υ) and velocity.

5.3 Dualism of light – Particle nature of radiation – black body radiation and Planck's quantum theory, photo electric effect and Compton effect of matter.

5.4 De Broglie hypothesis and Davisson and Germer experiment, Heisenberg's uncertenity principle. Schrodinger wave equation (Derivation not needed). Physical significance of Ψ and Ψ^2.

REFERENCE

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, Shoban Lal Nagin Chand & Co., (1993).

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

5. Morrison, R.T. and Boyd, R.N., Bhattacharjee, S. K. Organic Chemistry (7th edition), Pearson, India, (2011).

6. Bahl, B.S. and Bahl, A., Advanced Organic Chemistry, (12th edition), New Delhi, Sultan Chand & Co., (2010).

7. Puri B.R., Sharma L.R. and Pathania M.S. Principles of Physical Chemistry, (35th edition), New Delhi: Shoban Lal Nagin chand and Co. (2013)

8. Glasstone S. and Lewis D., Elements of Physical Chemistry, London, Mac Millan & Co Ltd.

FACULTY UNIVERSITY NOMINEE HOD

SEMESTER - I & II

CORE COURSE – II CORE PRACTICAL - I

SEMIMICRO ANALYSIS PRACTICAL

Semi micro Inorganic Qualitative Analysis

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

Cations to be studies

Lead, bismuth, copper, cadmium, iron, aluminium, manganese, cobalt, nickel, zinc, calcium, barium, strontium, magnesium and ammonium

Anions to be studies

Carbonate, sulphate, nitrate, chloride, flouride, borate, oxalate and phosphate

REFERENCE

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

Note:

Internal Marks: 40	External marks:		60
Marks Distribution for external	Practical	-	50 Marks
	Record	-	10 Marks
	Total	-	60 Marks
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:			15 Marks
Spotting			5 Marks

FACULTY **UNIVERSITY NOMINEE** **HOD**

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

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

2. **குணநலப்பேறும், சமுதாய நலனும்,** உலக சமுதாய சேவா சங்கம், வேதாத்திரி பதிப்பகம், 156, காந்திஜி ரோடு,ஈரோடு 635 001Web site: www. vethathiri.Org. இராண்டாம் பதிப்பு ஆகஸ்டு 2008.

FACULTY UNIVERSITY NOMINEE HOD

SEMESTER - II CORE COURSE - III

GENERAL CHEMISTRY – II

UNIT I CHEMICAL BONDING

1.1 Ionic bond – formation, variable electrovalency – Lattice energy, Born – Haber Cycle. Covalent bond - formation, variable covalency, maximum covalency, covalent character in ionic bond – Fajans Rule. Polarisation – partial ionic character of a covalent bond.

1.2 VB theory, MO theory – Basic principles of bonding and antibonding orbitals, applications of MOT to H_2 He_2, N_2 & O_2 – molecular orbital sequence, comparison of VB & MO Theories.

1.3 Hybridisation – Formation of $BeCl_2$ & BCl_3. VSEPR theory of simple inorganic molecules – $BeCl_2$, $SiCl_4$, PCl_5, SF_6, IF_7, XeF_6, BF_3 & H_2O.

1.4 Hydrogen bonding – Intermolecular & Intramolecular H_2 – bonding and consequences.

UNIT II CHEMISTRY OF s-BLOCK & ZERO GROUP ELEMENTS

2.1 Position of Hydrogen in the Periodic atomic hydrogen, nascent hydrogen. Occluded hydrogen, uses of hydrogen.

2.2 General characteristics of s-block elements – comparative study of elements – alkali metals and their hydroxides, oxides and halides,

2.3 Comparative study of elements - alkaline earth metals and their oxides, carbonates and sulphates - Diagonal relationship between Li & Mg, Be & Al

2.4 Zero group elements – position in the periodic table, occurrence, isolation, applications, compounds of Xe – XeF_6 & $XeOF_4$.

UNIT III CHEMISTRY OF ALKENES, DIENES AND ALKYNES

3.1 Alkenes: Nomenclature – Petroleum source of alkenes and aromatics – General methods of preparation of alkenes – Chemical properties – Markovnikov's rule and peroxide effect-Uses – Elimination reactions and its mechanisms (E1,E2).

3.2 Dienes: Structures and properties – conjugated dienes – stability and resonance – electrophilic addition – 1,2 addition and 1,4 addition.

3.3 Alkynes: Nomenclature – General methods of preparation – Physical properties – Chemical properties – Uses.

UNIT IV CHEMISTRY OF BENZENE AND BENZENOID COMPOUNDS

4.1 Aromaticity – Huckle's rule - structure of benzene – Benzene-preparation, chemical properties and uses. Aromatic electrophilic substitution reactions and mechanism – Orientation and reactivity in substituted benzenes.

4.2 Polynuclear aromatic hydrocarbons – Naphthalene from coal tar and petroleum – Laboratory preparation, Structure of Naphthalene, Aromatic character, Physical properties, Chemical properties and uses.

4.3 Anthracene, Phenanthrene from coal tar and petroleum, Laboratory preparation, Physical Properties, Chemical properties and uses.

UNIT V GASEOUS STATE

5.1 Gases – Boyle's law, Charle's law and Avagadro's law- ideal gas equation.

5.2 Real Gases- deviation from ideal behaviour – van der Waals equation of states- derivation – significance of critical constants- law of corresponding states- compressibility factor.

5.3 Maxwell's distribution of molecular velocities (Derivation not needed).Types of molecular velocities- mean, most probable and root mean square velocities-Inter relationships. Collision diameter, mean free path and collision number.

REFERENCE

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, Shoban Lal Nagin Chand & Co., (1993).
4. J.D. Lee, „Concise Inorganic Chemistry', 20th revised edition, Sultan Chand & Sons, 2000.
5. R. Gopalan, P.S. Subramanian & K. Rengarajan, "Elements of Analytical Chemistry", 2nd edition, Sultan Chand & Sons, 1991.
6. Morrison R.T. and Boyd R.N., Bhattacharjee S. K. Organic Chemistry (7th edition), Pearson India, (2011).
7. Bahl B.S. and Bahl A., Advanced Organic Chemistry, (12th edition), New Delhi, Sultan Chand & Co., (2010).
8. Puri B.R., Sharma L.R. and Pathania M.S. (2013) Principles of Physical Chemistry, (35th edition), New Delhi: Shoban Lal Nagin chand and Co.
9. Bahl B.S., Arun Bahl and Tuli G.D. (2012). Essentials of Physical Chemistry, New Delhi: Sultan Chand and Sons.

FACULTY UNIVERSITY NOMINEE HOD

SEMESTER – II

ENVIRONMENTAL STUDIES

UNIT I

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

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

(b). Water 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 – land slides.

FACULTY **UNIVERSITY NOMINEE** **HOD**

SEMESTER - III CORE COURSE - IV

GENERAL CHEMISTRY – III

UNIT I CHEMISTRY OF p-BLOCK ELEMENTS

1.1 General characteristics of p-block elements. Comparative studies of elements of III A & their compounds. Compounds of boron – boric acid, borax, diborane, borazole and boron nitride.

1.2 Extraction of Al and Pb - alums, alloys of Al.

1.3 Comparative studies of elements of IV A - Chemistry of oxides of carbon – CO, CO_2 – uses of CO_2 in fire extinguishers - Allotropic forms of carbon.

1.4 Compounds of nitrogen and phosphorous – $NH_2.NH_2$, H_2NOH, hydrazoic acid, PH_3 and P_2O_5 – preparation, structure and uses.

UNIT II CHEMISTRY OF p – BLOCK ELEMENTS – OXYGEN AND HALOGEN FAMILIES

2.1 Anomalous behaviour of oxygen – Paramagnetic nature of oxygen, preparation, properties, structure and uses of oxyacids of sulphur, classification of oxides based on their chemical behaviour – acidic oxide, amphoteric oxide and neutral oxides, Classification of oxides based on oxygen content – normal oxides, peroxides, super oxides, dioxides, sub oxides and mixed oxides.

2.2 General characteristics of halogen with reference of electronegativity, electron affinity. Peculiarities of fluorine, Hydrides, oxides and oxoacids of halogens, Inter halogen compounds and halogens – basic nature of iodine

UNIT III ORGANOHALOGEN COMPOUNDS

3.1 Haloalkanes - nomenclature – general methods of preparation, physical and chemical properties and uses. Nucleophillic substitution mechanisms (S_N1, S_N2 and S_Ni) – evidences – stereochermical aspects of nucleophillic substitution mechanisms.

3.2 Halobenzenes - general methods of preparation, physical and chemical properties and uses. Mechanisms of electrophillic and nucleophillic substitution reactions – theory of orientation and reactivity.

UNIT IV STEREOCHEMISTRY

4.1 Asymmetry and dissymmetry – isomerism - stereoisomers – enantiomers – diastereomers - geometrical isomerism – meleic and fumaric acid.

4.2 Chirality - optical isomerism – lactic and tartaric acid - optical activity - specific rotation.

4.3 Conventions used in stereochemistry: Newman, Sawhorse and Fischer notations and their interconversions. Cahn-Ingold-Prelog rules for simple molecules - R,S and D,L notations to express configurations - stereochemistry of biphenyls, allenes and spiranes.

4.4 Atropisomerism - erythro and threo conventions . Resolution of racemic mixture, racemization – Walden Inversion - asymmetric synthesis.

UNIT V SOLID STATE, LIQUID CRYSTALS AND COLLOIDS

5.1 Classification of solids- Isotropic and anisotropic crystals- elements of symmetry- basic seven crystal systems- laws of crystallography- representation of planes- miller indices, space lattice and unit cell.

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

5.3 Definition and types of Colloids- preparation, Purification (dialysis, electrodialysis and ultrafilteration) and stability of colloids, gold number. Properties of colloids- kinetic, optical and electrical properties.

5.4 Emulsions – Types of emulsions, preparation, properties and applications. Gels – classification of gels, preparation properties and applications.

REFERENCE

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

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

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

4. Gurdeep Raj, Advanced Inorganic Chemistry', 20th revised edition, Sultan Chand & Sons, 2000.

5. Morrison R.T. and Boyd R.N., Bhattacharjee S. K. Organic Chemistry (7th edition), Pearson India, (2011).

6. Bahl B.S. and Bahl A., Advanced Organic Chemistry, (12th edition), New Delhi, Sultan Chand & Co., (2010).

7. Glasstone S. and Lewis D., Elements of Physical Chemistry, London, Mac Millan & Co Ltd.

8. Puri B.R., Sharma L.R. and Pathania M.S. (2013) Principles of Physical Chemistry, (35th edition), New Delhi: Shoban Lal Nagin Chand and Co.

FACULTY **UNIVERSITY NOMINEE** **HOD**

SEMESTER – III & IV

CORE COURSE – V CORE PRACTICAL - II

VOLUMETRIC ANALYSIS

I. Titrimetric Quantitative Analysis

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.
3. Estimation of oxalic acid by KMnO4 using a standard oxalic acid solution.
4. Estimation of Ferrous ion by $KMnO_4$ using a standard Mohr's salt solution.
5. Estimation of $K_2Cr_2O_7$ by thio using a standard $K_2Cr_2O_7$ solution.
6. Estimation of As_2O_3 using I_2 solution and standard Arseneous oxide solution.
7. Estimation of Chloride (in neutral and Media).

II. Applied Experiments

1. Estimation of Total Hardness of water

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 %	- 25 Marks
		3 – 4 %	- 15 Marks
		> 4 %	- 10 Marks

FACULTY **UNIVERSITY NOMINEE** **HOD**

SEMESTER - III

NON MAJOR ELECTIVE – I

AGRICULTURAL CHEMISTRY

UNIT I SOIL SCIENCE

1.1 Definitions of soils, properties of soils, physical property components – Soil types – structure and Texture, soil water, soil air and soil temperature. Chemical properties – soil mineral matters – soil colloids. Soil organic matters

UNIT II FERTILIZERS

2.1 Nitrogen fertilizers – Effect of nitrogen on plant growth and development. Importance of nitrogenous fertilizers – ammonium nitrate and its uses – urea formula and its uses – Ammonium sulphate examples and uses.

2.2 Phosphatic fertilizers – Effect of phosphorus on plant growth and development – importance of phosphatic fertilizers – examples and uses.

2.3 Potassium fertilizers – Function of potassium on plant growth – examples and uses.

2.4 Complex fertilizers and mixed fertilizers – composition and uses, Manures – bulky organic manures – Farmyard manure – handling and storage – Method of composting, green manuring.

UNIT III PESTICIDES, INSECTICIDES, FUNGICIDES AND HERBICIDES

3.1 Pesticides, insecticides, fungicides and herbicides - Definition and classification with example – Toxicity, safety measures when using pesticides Pollutions caused by pesticides and insecticides and their control.

REFERENCE

1. N.C.Brady, *The Nature and properties of soils* - Eurasia publishing house, (P) Ltd. 9th Ed. 1984.
2. Biswas, T.D.and Mukeherjee S.K. 1987 *Text book of soil science*.
3. A.J.Daji (1970) *A Text book of soil science* – Asia publishing house, Madras.
4. Donahue, R.L.Miller, R.W.and shickluna, J.C. 1987. *Soils – An introduction to soils and plant Growth* – Prentice Hall of India (P) Ltd., New Delhi.
5. Colling, G.H. 1955, *Commercial Fertilizers* – McGraw Hill Publishing Co., New York.

6. Tisdale, S.L.Nelson, W.L. and Beaton, J.D. 1990, *Soil fertility and fertilizers*. Macmillan publishing company, New York.
7. Hesse, P.R.1971. *A text book of soil chemical analysis* John Murray, New York.
8. Jackon, M.L. 1958, *Soil Chemical Analysis*. Prentice Hall of India, New Delhi.
9. Buchel, K.H. 1983. *Chemistry of pesticides* – John wiley & Sons, New York.
10. Melnikov, N.N.1971. *Chemistry of pesticides* Vol.36 of Residue Review-springer verlac, New York.
11. Sree Ramula, U.S.1979, *Chemistry of Insecticides and Fungicides* – Oxford and IBH publishing Co., New Delhi.

FACULTY **UNIVERSITY NOMINEE** **HOD**

SEMESTER - IV CORE COURSE - VI

GENERAL CHEMISTRY - IV

UNIT I METALLURGY AND d – BLOCK ELEMENTS

1.1 Occurrence of metals – concentration of ores – froth floatation, magnetic separation, calcinations, roasting, smelting, flux, aluminothermic process – purification of metals – electrolysis, zone refining, van Arkel de Boer methods.

1.2 Chemistry of transition elements – electronic configuration – general periodic trend - comparative study of titanium, vanadium, chromium, manganese and iron groups - coinage metals.

1.3 Comparative study of zinc group metals – galvanization, evidences for the existence of mercurous ion as Hg_2^{2+} - Chemistry of photography.

UNIT II CHEMISTRY OF f – BLOCK ELEEMENTS

2.1 General characteristics of f-Block elements – comparative account of lanthanides – occurrence, oxidation states, magnetic properties. Separation of lanthanides by ion exchange and solvent extraction methods – lanthanide contraction.

2.2 Comparative account of actinides - occurrence, oxidation states, magnetic properties. Separation of actinides by ion exchange and solvent extraction methods. Chemistry of thorium and uranium – occurrence, ores, extraction and uses.

UNIT III CHEMISTRY OF ORGANOMETALLIC COMPOUNDS

3.1 Introduction – preparation of organomagnesium compounds- physical and chemical properties- uses. Organozinc compounds – general preparation, properties and uses.

3.2 Organolithium, organocopper compounds – preparation, properties and uses.

3.3 Organolead, organophosphorous and organoboron compounds– preparation, properties and uses.

UNIT IV CHEMISTRY OF ALCOHOLS, PHENOLS AND ETHERS

4.1 Nomenclature – industrial source of alcohols - laboratory preparation of alcohols — physical properties – chemical properties uses.

4.2 Glycols and glycerols – preparations, physical and chemical properties and uses.

4.3 Phenols - preparation of phenols including di and tri hydric phenols – physical and chemical properties – uses – aromatic elctrophilic substitution mechanism – theory of orientation and reactivity.

4.4 Ethers – preparation, physical, chemical properties and uses.

UNIT V CHEMICAL KINETICS

5.1 Rate of reaction- rate equation, order and molecularity of reaction. Rate Laws- rate constants- derivation of first order rate constant and characteristics of zero order, first order and second order reactions with any one example. Methods of determination of order of reactions.

5.2 Effect of temperature on reaction rate - concept of activation energy, Arrhenius equation. Theories of reaction rates - collision theory - derivation of rate constant of bimolecular reaction - failure of collision theory- Lindemann's theory of unimolecular reaction.

5.3 Theory of absolute reaction rates – derivation of rate constant for a bimolecular reaction - significance of entropy and free energy of activation. Comparison of collision theory and absolute reaction rate theory (ARRT).

REFERENCE

1. B.R. Puri, L.R. Sharma, K.K. Kalia, Principles of Inorganic Chemistry, 23rd edition, New Delhi, Shoban Lal Nagin Chand & Co., (1993).
2. R.D. Madan, "Modern Inorganic Chemistry", 2nd edition, S. Chand & Company Ltd., 2000.
3. J.D. Lee, Concise Inorganic Chemistry', 20th revised edition, Sultan Chand & Sons, 2000.
4. Morrison R.T. and Boyd R.N., Bhattacharjee S. K. Organic Chemistry (7th edition), Pearson India, (2011).
5. Bahl B.S. and Bahl A., Advanced Organic Chemistry, (12th edition), New Delhi, Sultan Chand & Co., (2010).
6. Puri B.R., Sharma L.R. and Pathania M.S. (2013) Principles of Physical Chemistry, (35th edition), New Delhi: Shoban Lal Nagin Chand and Co.
7. Samuel Glasstone (1974), Thermodynamics for Chemists (3rd printing), East- West Edn.
8. Puri B.R., Sharma L.R. and Pathania M.S. (2013), Principles of Physical Chemistry, (35th edition), New Delhi: Shoban Lal Nagin Chand and Co.
9. Gurtu J.N. and Amit Gurtu (1979), Chemical Kinetics, 5th Edn, Mittal K.K.

FACULTY UNIVERSITY NOMINEE HOD

SEMESTER - IV SKILL BASED ELECTIVE - I

ADULTERATION IN COMMON FOOD ITEMS

UNIT I

1.1 Milk - importance of milk as food – composition, specific gravity and pH - 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, chilli powder, turmeric powder, asafetida, wheat flour, black pepper and pulses - deduction and their evil effects.

UNIT II

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

2.2 Common adulterants and their detection in edible oil - deductions of mineral oil as adulterant. Some common edible oils – coconut oil – olive oil - groundnut oil – gingelly (sesame) oil – mustard oil – rice bran oils – corn oil – health tips.

UNIT III

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

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

REFERENCE

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

FACULTY UNIVERSITY NOMINEE HOD

SEMESTER - IV NON MAJOR ELECTIVE - II

CHEMISTRY OF CONSUMER PRODUCTS

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 and indigo.

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

REFERENCE

1. A text book of applied chemistry for home science and sciences, Thangamma Jacop.
2. Chemical process Industries – Norrish Shreve. R. and Joseph A. Brink Jr. McGraw Hill. Industrial Book Company, London
3. Industrial Chemistry by K. Sharma. Goel Publishing House. Meerut 1995.
4. Fundamental concept of applied chemistry by Jayashree Ghosh. 1st edition (2006) S. Chand & Company Ltd., New Delhi.

FACULTY UNIVERSITY NOMINEE HOD

SEMESTER - V CORE COURSE - VII

INORGANIC CHEMISTRY - I

UNIT I COORDINATION CHEMISTRY - I

1.1 Introduction - Types of ligands: unidentate, bidentate and polydentate ligands, chelating ligands and chelates- IUPAC nomenclature of coordination compounds.

1.2 Isomerism in coordination compounds: Structural isomerism, hydrate isomerism, coordination isomerism, ionisation isomerism, linkage isomerism, coordination position isomerism.

1.3 Stereoisomerism: Geometrical isomerism of four and six coordinate complexes, optical isomerism of four and six coordinate complexes, Werner and Sidgwick theories.

UNIT II COORDINATION CHEMISTRY - II

2.1 Theories of coordination compounds: Valence bond theory, limitations of valence bond theory, crystal field theory – splitting of d orbitals in octahedral, tetrahedral and square planar fields, Crystal field stabilization energy (CFSE), factors affecting CFSE.

2.2 Molecular orbital theory: Molecular orbital diagram for [Co(NH3)6]3+. Ligand field theory. (An elementary treatment only).

UNIT III COORDINATION COMPOUNDS - III

3.1 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.

3.2 Unimolecular and biomolecular nucleophilic substitution reactions in octahedral and square planar complexes, trans effect – theories of trans effect and applications.

3.3 A few biologically important coordination compounds: Chlorophyll, haemoglobin and vitamin B12.

UNIT IV CARBONYLS AND BINARY METALLIC COMPOUNDS

4.1 Metal carbonyls: Mono and binuclear carbonyls of Ni, Fe, Cr, Co and Mn –preparation, structure, reactions, bonding and uses.

4.2 Binary metallic compounds: borides, carbides, hydrides and nitrides – classification, preparation, properties and uses.

4.3 Organo metallic compounds of alkenes, alkynes and cyclopentadienes.

UNIT V NITROSYL COMPOUNDS AND METALLIC BONDING

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

5.2 Metallic state – packing of atoms in metals (BCC, FCC, HCP and simple cube) – theories of metallic bonding – electron gas, Pauling and band theories.

5.3 Conductors – n-type and p-type, transistors – uses.

REFERENCE

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

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

3. Gopalan R, Text Book of Inorganic Chemistry, 2nd Edition, Hyderabad, Universities Press, (India), 2012.

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

5. B.R. Puri, L.R. Sharma, K.C. Kalia, „Principles of Inorganic Chemistry', 21st edition, Vallabh Publications, 2004-2005.

6. J.E. Huheey, „Inorganic Chemistry', 4th edition, Pearson Education. Inc. 1993.

7. F.A. Cotton, „Advanced Inorganic Chemistry', 6th edition, John Wiley & Sons, Pvt. Ltd., 2003 – 2004.

8. R. Gopalan, P.S. Subramanian and K. Rengarajan, „Elements of Analytical Chemsitry', 2nd edition, Sultan Chand & Sons, 1991.

FACULTY **UNIVERSITY NOMINEE** **HOD**

SEMESTER - V CORE COURSE - VIII

ORGANIC CHEMISTRY - I

UNIT I CHEMISTRY OF CARBONYL COMPOUNDS

1.1 Introduction – Nomenclature – Laboratory preparation of Aliphatic carbonyl compounds - oxidation of alcohols, catalytic dehydration of alcohols, oxidation of alkenes, Hydration of alkenes, Hydrolysis of gem, dihalides, from Grignard reagents, oxo and wacker process.

1.2 Molecular orbital picture of carbonyl group – Nucleoplilic addition mechanism at carbonyl group – Acidity of ά hydrogen.

1.3 Physical and Chemical properties and uses.

1.4 General methods of preparation of Aromatic carbonyl compounds - physical and chemical properties – uses.

1.5 comparative study of Aromatic and Aliphatic aldehydes.

UNIT II CHEMISTRY OF CARBOXYLIC ACIDS

2.1 Aliphatic and Aromatic Monocarboxylic acids – Nomenclature – General methods of preparation – physical properties, chemical properties and uses.

2.2 Acidity of carboxylic acids – Inductive effect and Resonance effect on Acidity.

2.3 Preparation of dicarboxylic acids – physical and chemical properties – phthalic acids.

2.4 Derivatives of carboxylic acids – preparation and physical and chemical properties of acyl chloride and Amides, Nucleophilic substitution mechanism at acyl carbon.

2.5 Oils and Fats – Fatty acids – Manufacture of soap – Mechanism of cleaning action of soap.

UNIT III CHEMISTRY OF NITROGEN COMPOUNDS

3.1 Nitroalkanes and Alkyl nitrites – Preparation and properties of Elhylnitrite – preparation and properties of Nitromethane – Difference between Nitroalkane and alkylnitrite.

3.2 Aromatic nitrocompounds – Nitrobenzene – preparation - Effect of substituents on basicity – Reduction of nitrobenzene under different conditions.

3.3 Amines - Primary, secondary, tertiary and quaternary ammonium compounds – preparation - Effect of substituents on basicity of aliphatic and aromatic amines – Mechanism of carbylamine and diazotisation reaction.

3.4 Comparisons of Aliphatic and Aromatic amines.

3.5 Diazonium compounds – preparation and synthetic importance of Benzene diazonium chloride and diazoacetic ester.

UNIT IV HETEROCYCLIC COMPOUNDS

4.1 Introduction - Nomenclature, preparation and properties of furan, pyrrole, Thiophene.

4.2 Comparison of basicities of pyrrole, pyridine and piperidine with amines.

4.3 synthesis and reactions of quinoline, isoquinoline and indole with special reference to Skraup, Bischler – Napieralski and Fischer - indole synthesis.

4.4 Structural Elucidation of quinoline.

UNIT V INDUSTRIAL ORGANIC CHEMISTRY

5.1 Dyes – Theory of colour and constitution – chromophore – Auxochrome – classification according to application and structure.

5.2 Preparation and uses of the following dyes **-** Methylorange, congo red, Bismark Brown, Malachite green, crystal violet, Phenolphthalein, fluorescein, Alizarin and indigo.

5.3 Polymers – definition – types of polymers - Preparation - Teflon – Nylon 66 – Nylon 6, Alkyd resins, Dacron, Polystyrene, Polyurethane, Melamine formaldehyde resin – Bakelite.

5.4 Synthetic rubbers – Neoprene and Buna rubbers.

REFERENCE

1. A Text book of organic Chemistry - B.S.Bahl – Arun Bahl – 12th revised Edition. S.Chand & Co, New Delhi.
2. Text book of organic chemistry P.L.Soni – H.M. Chawla – Sultan chand & sons, 29th Edition, New Delhi.
3. Organic chemistry – Morrison and Boyd. 6th Edition, Allyn and Bacon Inc.
4. Organic Chemistry – Vol. I and Vol. II, 6th Ed., I. L. Finar - ELBS

FACULTY UNIVERSITY NOMINEE HOD

SEMESTER - V CORE COURSE – IX

PHYSICAL CHEMISTRY - I

UNIT I THERMODYNAMICS - I

1.1 System and surroundings – isolated, closed and open systems – state of the system – intensive and extensive properties and variables – Thermodynamic processes – reversible and irreversible – isothermal and adiabatic processes – state and path functions.

1.2 First law of Thermodynamics – statement – Definition of Internal energy, Enthalpy and Heat capacities – Relationship between Cp and Cv. Calculation of work done (W) for expansion of ideal gas under isothermal condition of reversible process. Joule's law - Joule - Thomson effect - Joule – Thomson co-efficient (μ_{JT}) - inversion temperature.

1.3 Thermochemistry – Relation between enthalpy of reaction at constant volume (q_v) and at constant pressure (q_p) – Temperature dependance of Heat of reaction – Kirchoff's equation – Bond energy and its calculation from thermochemical data – Heat of formation – Heat of solution and dilution - Hess law of constant heat summation.

UNIT II THERMODYNAMICS – II

2.1 Second law of Thermodynamics – Need for the law – Different statements of the law – Carnot cycle – Derivation of efficiency of heat engine – Carnot's theorem – Thermodynamic scale of temperature.

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 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 (Ortho and Para hydrogen, CO, N_2O and ice)

3.3 Equilibrium constant and free energy change - thermodynamic derivation of law of mass action - equilibrium constants in terms of pressure and concentration – NH_3, PCl_5 and $CaCO_3$.

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

4.2 Partially miscible liquids - phenol- water, triethylamine - water and nicotine - water systems. Lower and upper CSTs – effect of impurities on CST. Completely immiscible liquids- principle and applications of steam distillation. Nernst distribution law – derivation.

4.3 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 not required).

4.4 Determination of molecular masses – abnormal behavior of solutions (non ideal solutions) – association and dissociation in solutions.

UNIT V THERMODYNAMICS OF PHASE CHANGES

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 crystalization - Freezing mixtures.

REFERENCE

1. Puri B.R, Sharma L.R, Pathania M.S Principles of Physical Chemistry, New Delhi Shobar Lal, Nagin Chand & Co (1993)l.
2. Maron and Prutton Physical Chemistry, London, Max millan.
3. P.C.Rakshit Physical Chemistry, Sadhana Press Pvt. Ltd. Kolkatta.
4. Gurdeep Chatwal R, Photochemistry, Good publishing House.
5. Raman, K. (1990), Group theory and its application to Chemistry, New Delhi: Tata McGraw-Hill.
6. Samuel Glasstone (1974), Thermodynamics for Chemists (3rd printing), East- West Edn.
7. Rajaram J. and Kuriacose, J.C. (1986) Thermodynamics for students of Chemistry, New Delhi: Lal Nagin Chand.
8. Glasstone S. and Lewis D., Elements of Physical Chemistry, London, Mac Millan & Co Ltd.

9. Atkins P.W. (1994), Physical chemistry, (5th edition), Oxford University press.

10. Sangaranarayanan, M.V., Mahadevan, V., Text Book of Physical Chemistry, 2nd Edition, Hyderabad, Universities Press, (India) 2011.

FACULTY **UNIVERSITY NOMINEE** **HOD**

SEMESTER - V MAJOR BASED ELECTIVE – I

ANALYTICAL CHEMISTRY

UNIT I LABORATORY HYGIENE AND SAFETY

1.1 **Laboratory safety measures** - Storage and handling of corrosive, flammable, explosive, toxic, carcinogenic and poisonous chemicals. Precautions to avoid poisoning.

1.2 **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.

1.3 **Evaluation of analytical data -** Errors in chemical analysis, classification of errors. Determinate errors, instrumentals errors, personal errors, constant errors and proportional errors. Correction of determinate errors. Random errors - minimizing errors. Precision, accuracy, significant figures, mean, median, mean deviation, standard deviation, curve fitting and method of least squares.

UNIT II SEPRATION AND PURIFICATION TECHNIQUES

2.1 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.

2.2 **Chromatography** - principles involved in adsorption, partition and ion - exchange chromatography. Column Chromatography - principle, types of adsorbents, preparation of the column and application. 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.

2.3 Paper chromatography - principle, development of chromatogram, ascending, descending and radial paper chromatography. Ion - exchange chromatography - principle - types of resins - experimental techniques - separation of Na – K and Cl^- and Br^- mixture. Electrophoresis and its applications.

UNIT III 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 – Beer – lambert's law (Statement only) - Nessler's and photo electric colorimetry - principle - advantages of colormeric estimation. Estimation of NI^{+2} and $Fe^{+3.}$

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

REFERENCE

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

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

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 College Publishers.

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

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

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

FACULTY UNIVERSITY NOMINEE HOD

SEMESTER – V

SKILL BASED ELECTIVE - II

ANALYTICAL ASPECTS OF SOME COMMON DRUGS

UNIT I

1.1 Drugs – Definition – sources of Drugs – (Raw materials). Classification of Drugs – Biological classification (Drugs acting on CNS Chemotherapeutic drugs, Pharmaco – Dynamic agents, Metabolic diseases and Endocrine functions) – chemical classification – Nomenclature of Drug – prescription drugs – Non prescription drugs.

UNIT II

2.1 Disease – Definition – Classification – Causes – treatment and prevention of some common diseases – Malaria pilariasis – plague – Diphtheria – Wooping cough, mumps, tuberculosis – cholera typhoid, dysentery – jaundice – asthma – epilepsy piles – leprosy.

2.2 Biological role of Sodium, potassium, Calcium and lodine (Elementary level)

UNIT III

3.1 Analgesics - Narcotic and non – Narcotic analgesics, Antipyratic and Anti inflammatory agents, Anti diabetics, Anti Allergic, Anti hypertensive, Antiseptic drugs, Disinfectants, Anesthetics (general and local) - Antibiotics - Definition with Examples.

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SEMESTER – V

SKILL BASED ELECTIVE – III

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 fat / protein content of milk.
4. Determination of antibiotics in milk.
5. Determination of iodine value of oils.
6. Common tests for detection of adulterants in oils.
7. Tests for detection of adulterants in asafoetida.
8. Detection of adulterants in chilli powder, turmeric powder and pulses.
9. Detection of saccharin in sweets.
10. Determination of pesticide residues by spectrometric / gas chromatographic methods.

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SEMESTER – V & VI

CORE COURSE – X CORE PRACTICAL - III

PHSICAL CHEMISTRY PRACTICAL

LIST OF EXPERIMENTS

1. Critical Solution Temperature
2. Effect of impurity on Critical solution Temperature
3. Transition Temperature
4. Rast Method
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 – Base Titration
9. Potentiometic Redox Titration
10. Determination of cell constant

MARK DISTRIBUTION

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

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SEMESTER - V & VI

CORE COURSE – XI CORE PRACTICAL IV

GRAVIMENTRIC & ORAGANIC ANALYSIS PRACTICAL

GRAVIMETRIC ANALYSIS

1. Estimation of Lead as lead chromate.
2. Estimation of Barium as barium chromate.
3. Estimation of Nickel as Nickel DMG complex.
4. Estimation of Magnesium as Magnesium oxinate
5. Estimation of Calcium as calcium oxalate monohydrate
6. Estimation of Barium as barium sulphate.

ORGANIC QUALITATIVE ANALYSIS AND ORAGANIC PREPARATION

ORGANIC 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. Incase of bi-functional 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 2. Reduction 3. Hydrolysis 4. Nitration 5. Bromination
6. Diazotization
7. Osazone formation

DETERMINATION OF PHYSICAL CONSTANTS

Determination of boiling / melting points by semimicro method

MARK DISTRIBUTION

Internal	: 40	Ext. 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
Functional group	-5
Derivatives	-3

REFERENCE

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

FACULTY **UNIVERSITY NOMINEE** **HOD**

SEMESTER - VI **CORE COURSE - XII**

INORGANIC CHEMISTRY - II

UNIT I NUCLEAR CHEMISTRY - I

1.1 Introduction, nuclear structure – composition of the nucleus, sub-atomic particles, nuclear forces, nuclear stability – mass defect and binding energy, whole number rule and packing fraction, n-p ratio, odd even rules, nuclear models – liquid drop and shell models, isobars, isotones and isomers.

1.2 Isotopes – detection, physical and chemical methods of separation.

1.3 Radioactivity – introduction – radioactive emanations – characteristics of α, β and γ-rays, disintegration theory, modes of decay-group displacement law, rate of integration and half-life period, disintegration series, Geiger-Nuttal rule.

UNIT II NUCLEAR CHEMISTRY - II

2.1 Detection and measurement of radioactivity – Wilson cloud chamber, Geiger – Muller counter.

2.2 Artificial radioactivity – nuclear transformation – classification of nuclear reactions, fission – atom bomb, fusion – hydrogen bomb – nuclear reactor – atomic power projects in India.

2.3 Applications of radioisotopes as tracers in medicine, agriculture carbon dating and rock dating – radioactive waste disposal - Hazards of radiations.

UNIT III INORGANIC POLYMERS

3.1 Inorganic polymers – coordination polymers, metal alkyls, phosphonitrilic polymers.

3.2 Silicates – classification into discrete anions – one, two and three dimensional structures with typical examples.

3.3 Composition, properties and uses of beryl, asbestos, talc, mica, feldspar and zeolite.

UNIT IV INDUSTRIAL CHEMISTRY

4.1 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.

4.2 Safety matches : Introduction, raw materials and manufacturing method.

4.3 Paints and varnishes : Definition, types and composition.

4.4 Glass : Composition, manufacture, types and uses.

4.5 Cement: Manufacture – wet and dry processes, composition and setting of cement.

UNIT V SOLID STATE CHEMISTRY AND SPECIAL CLASS OF COMPOUNDS

5.1 Radius ratio rule – Its application in determination of structure of solids like zinc blend, wurtzite, fluorite, CdI_2 and NiH_2 – crystal defects – Schotty and Frenkel defects.

5.2 Some special class of compounds – clathrates – examples and structures – Intertitial and non stoichiometric compounds – Silicones – composition, manufacture, structure, properties and uses.

REFERENCE

1. R.D. Madan, "Modern Inorganic Chemistry", 2nd edition, S. Chand & Company Ltd., 2000.
2. Gilreath, „Fundamental concepts of Inorganic Chemistry', 18th Printing, McGraw Hill International Book Company, 1985.
3. S. Glasstone, „Source book on Atomic Energy', East-West Press, 1967.
4. R.Gopalan, P.S. Subramanian and K. Rengarajan, „Elements of Analytical Chemsitry', Sultan Chand & Sons, 2nd edition, 1991.
5. P.L.Soni, „Text Book of Inorganic Chemistry', 20th revised edition, Sultan Chand & Sons, 2000.

FACULTY UNIVERSITY NOMINEE HOD

SEMESTER - VI CORE COURSE - XIII

ORGANIC CHEMISTRY - II

UNIT I HEMISTRY OF CARBOHYDRATES

1.1 Carbohydrates – definition - classification, preparation and properties of mono saccharides (glucose and fructose).

1.2 D and L designations – configuration of D-glucose and D-fructose.

1.3 Mono saccharide - interconversion, ascending and descending series, muta rotation, epimerisation – cyclic structure.

1.4 Structure elucidation of glucose - open chain and cyclic structure of glucose (Fischer and Haworth projection formulas).

1.5 Disaccharide – sucrose, maltose – structure.

1.6 Polysaccharide – starch – cellulose and its important derivatives (elementary treatment).

UNIT II CHEMISTRY OF PROTEINS AND VITAMINS

2.1 Amino acids – classification, general methods of preparation and reactions of aminoacids, zwitterion – isoelectric points, action of heat on □□□□□and **δ** amino acids.

2.2 Peptides and proteins – Peptide linkage – polypeptide – classification of proteins (by chemical composition and by molecular shape) – primary, secondary, tertiary and quaternary structure of proteins – denaturation of proteins – colour reactions of proteins

2.3 Nucleic acids – elementary treatment of DNA and RNA.

2.4 Vitamins (structural elucidation not needed) – classification, biological importance of vitamins A, B_1, B_2, B_6, B_{12} and C.

UNIT III CHEMISTRY OF NATURAL PRODUCTS

3.1 Alkaloids – isolation, classification - general methods of elucidating structure – structural elucidation and synthesis of conine, piperine and nicotine.

3.2 Terpenes – isolation, classification – isoprene, special isoprene rule, general methods of structural elucidation – structural elucidation and synthesis of citral, geraniol, limonene and menthol.

UNIT IV MOLECULAR REARRANGEMENTS

4.1 Molecular rearrangements – types of rearrangement (nucleophilic and electrophilic).

4.2 Mechanism for the following re-arrangements pinacol – pinacolone, benzil – benzilic acid, benzidine, Claisen, Fries, Hofmann, Curtius, Lossen, Beckmann, dienone – phenol and Orton.

4.3 Photochemical reactions of ketones – Norrish type I and II.

UNIT V ORGANIC SPECTROSCOPY

5.1 UV – VIS spectroscopy – types of electronic transitions – solvent effects on λ max – Woodward – Fieser rules – calculation of λ max : dienes and α, β unsaturated carbonyls.

5.2 IR spectroscopy – number and types of fundamental vibrations – modes of vibrations and their energies, position of IR absorption frequencies for functional groups like aldehyde, ketone, alcohol, acid and amide – factors affecting the frequency absorption – conjugation, inductive effect and hydrogen bonding.

5.3 NMR spectroscopy – principle – equivalent and non equivalent protons – shielded and deshielded protons, anisotropy, chemical shift – TMS, tau and delta scales, integral, splitting of signals – spin – spin coupling, NMR spectrum of EtOH, n – propyl bromide and isopropyl bromide.

REFERENCE

1. Finar I.L., Organic Chemistry, Vol 1 & 2, (6th edition) England, addison Wesley Longman Ltd. (1996).
2. Morrison R.T., Boyd R.N., Organic Chemistry, (4th edition) New York, Allyn & Bacon Ltd., (1976)
3. Bahl B.S, Arun Bahl, Advanced Organic Chemistry, (20th revised edition) New Delhi, S. Chand and Co., (2011)
4. Pine S.H., Organic Chemistry, (4th edition) New Delhi, McGraw – Hill International Book Company (1986)
5. Seyhan N. Ege. Organic Chemistry, New York, Houghton Mifflin Co., (2004)
6. William Kemp, Organic Spectroscopy, 3rd edition, ELBS.

FACULTY UNIVERSITY NOMINEE HOD

SEMESTER - VI **CORE COURSE - XIV**

PHYSICAL CHEMISTRY – II

UNIT I ELECTRICAL CONDUCTANCE

1.1 Specific conductance and Equivalent conductance – Cell Constant – Determination of Conductance – Variation of Conductance on dilution.

1.2 Transport Number and Hittorf's rule – Determination of Transport Number by Hittorf method and moving boundary method.

1.3 Kohlrausch's Law and its applications - measurements and Applications of conductance. Conductometric tritrations – Arrhenius Theory of Electrolytic dissociation – Ostwald's dilution Law – applications and limitations. Debye - Huckel Theory of strong electrolytes – The elementary treatment of the Debye - Huckel – onsager equation – Wein effect – Debye Falkhenhagen effect – Solubility product of a sparingly soluble salt – common ion effect.

UNIT II ELECTROCHEMICAL CELLS

2.1 Galvanic cells – Cell reaction – Half–cell reaction – Reversible and irreversible cells – Conventional representation of Electrochemical cells – Electromotive force of a cell. Calculation of thermodynamic quantities of cell reactions (ΔG, ΔH, ΔS and K).

2.2 Types of Reversible Electrodes – Metal / metal ion; metal / insoluble salt; gas electrodes – Redox electrodes – Single electrode potential – Sign of electrode potential – Nernst Equation - Standard Electrode - Hydrogen electrode – Calomel electrode – Standard electrode potentials – Electrochemical Series – Calculation of standard potential (E^o)

2.3 Potentiometric titrations -Acid-Base titrations- Oxidation-reduction (Redox) titrations- Precipitation titrations.

UNIT III PHOTOCHEMISTRY AND GROUP THEORY

3.1 **Photochemistry** - Consequences of Light Absorption - The Jablonski Diagram – Radiative and Non radiative transitions – Laws of Photo chemistry – Grothus -Draper Law – Stark - Einsteins Law – Lambert's Law – Beer - Lambert's Law – Quantum efficiency – Comparison of H_2 - Cl_2, H_2 – Br_2 & H_2 – I_2. Photochemical reaction — Kinetics of Hydrogen-Chlorine Reaction – Photosensitization and Quenching – Chemiluminescence.

3.2 **Group Theory:** Symmetry elements and symmetry operations – C_n, σ, S_n, i and E – Group postulates – Types of Groups – abelian group and cyclic groups – Construction of Group Multiplication Table for H_2O molecule. Point Groups –definition - elements (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 of spectra.

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 – Calculation of Internuclear distance in diatomic molecules.

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

5.2 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.

5.3 NMR Spectroscopy: Theory of NMR Spectra – Nuclear spin and conditions for a molecule to give rise to NMR spectrum – The 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.

REFERENCE

1. Puri B.R., Sharma L.R., and Pathania M.S., Principles of Physical Chemistry, Vishal Puyblishing Company.
2. Banwell C.N., Fundamentals of Molecular Spectroscopy, 3rd Ed., New Delhi, 1983.
3. Glasstone. S, Introduction to Electrochemistry Affiliated East – West press, 1966
4. Albert Cotton. F, Chemical Applications of Group Theory, Third Edition John Wiley & Sons, Singapore, 2003.
5. Rohatgi K.K – Muherjee, Fundamentals of Photochemistry, Wiley Eastern Ltd. (1986).
6. Bahl B.S., Arun Bahl and Tuli G.D. (2012). Essentials of Physical Chemistry, New Delhi: Sultan Chand and Sons.
7. Moore W. J. (1972), Physical chemistry, 5th Edition, Orient Longman Ltd.
8. Colin Bannwell N and Elaine Mc Cash M, Fundamentals of molecular spectroscopy, 4th edition, Mc Graw hill publishing company limited.
9. Russell S. Drago, (1978), Physical methods in Inorganic chemistry, East-west student edition.

FACULTY UNIVERSITY NOMINEE HOD

SEMESTER - VI

MAJOR BASED ELECTIVE – II

AGRICULTURAL CHEMISTRY

UNIT I SOIL SCIENCE

1.1 Definition of soil, soil composition - Soil forming rocks and minerals – classification – weathering of rocks and minerals – processes of weathering and factors affecting them. Soil formation – Factors of soil formation – soil forming processes – soil profile.

1.2 Soil Physical properties – particle size distribution – soil texture and structure - bulk density, particle density, pore space, soil air, soil temperature, soil water – significance of physical properties to plant growth.

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. Nutrient availability and its evaluation. Soil salinity, acidic and alkaline soils – their formation and reclamation.

UNIT II FERTILIZER

2.1 Fertilizer - definition – classification of fertilizers – nitrogenous fertilizers [Urea, NH_2Cl, $(NH_4)_2SO_4$ and CAN]- Effect of nitrogen on plant growth and development - deficiency symptoms - synthetic nitrogenous fertilizers.

2.2 Phosphate 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, KNO_3 and K_2SO_4.

2.3 Secondary and micro nutrients – their functions on plant growth and development - complex and mixed fertilizers – their advantages.

2.4 Types of pollution caused by fertilizers – effects and their control.

UNIT III PLANT NUTRIENTS AND MANURES

3.1 Biofertilizers - rhizobium, azospirillum, azotobacter, cyanobacteria, phosphobacteria.

3.2 Complex and mixed fertilizers – their manufacture and composition.

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

3.4 Enriched farm yard manures – composting of coir pith – sugarcane trash and leaf litters and farm wastes – oil cakes, fish meal, blood, horn and hoof meal.

UNIT IV PESTICIDES AND INSECTICIDES

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

4.2 Insecticides – Natural organic insecticides (plant products). Nicotine, pyrethrum and rotenone. Inorganic insecticides – Arsenical fluorides and borates. Synthetic organic insecticides – D.D.T, B.H.C, methoxychlor, chloredane, endosulfon. Organophosphorous compounds – Carbamic acid derivatives – mode of action.

4.3 Safety measures in handling them - pollution caused by pesticides, insecticides and their control.

UNIT V FUNGICIDES AND HERBICIDES

5.1 Fungicides – definition – classification. Inorganic fungicides – Sulphur compounds, copper compounds, boredeaux mixture and mercuric compounds. Organic fungicides - dithiocarbamates and dithane.

5.2 Herbicides - definition – classification. Inorganic herbicides – arsenical compounds, boron compounds, cyanamides, cyanides, chlorates and sulphamates. Organic herbicides - Nitro-compounds, chlorinated compounds - 2 ,4D – compounds – urea herbicides, alachlor.

5.3 Acaricides and Rodenticides - definition – Fenson, azo benzene, Parathion and Malathion.

5.4 Attractants – Repellants – Fumigants and Defoliants.

REFERENCE

1. Biswas, T.D.and Mukeherjee S.K. 1987 *Text book of soil science*.
2. A.J.Daji (1970) *A Text book of soil science* – Asia publishing house, Madras.
3. Donahue, R.L.Miller, R.W.and shickluna, J.C. 1987. *Soils – An introduction to soils and plant Growth* – Prentice Hall of India (P) Ltd., New Delhi.
4. Hesse, P.R.1971. *A text book of soil chemical analysis* John Murray, New York.
5. Jackon, M.L. 1958, *Soil Chemical Analysis*. Prentice Hall of India, New Delhi.
6. Buchel, K.H. 1983. *Chemistry of pesticides* – John wiley & Sons, New York.
7. Sree Ramula, U.S.1979, *Chemistry of Insecticides and Fungicides* – Oxford and IBH publishing Co., New Delhi.

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SEMESTER – VI

SOFT SKILL

UNKIT I KNOWTHYSELF/UNDERSTANDING SELF

1.1 Introduction to soft skill – Self-discovery – Developing positive attitude – Forming values – goal setting – Career pplaning.

UNIT II COMMUNICATION SKILLS/COMMUNICATOIN WITH OTHERS

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

UNIT III CORPORATE SKILLS

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

REFERENCE

1. A text book of developing soft skills. Dr. K.Meena & Dr. V.Ayothi.
2. Soft skills. Dr. K.Alex S.Chand & Company Ltd, Ram Nagar, New Delhi – 110 055.
3. Developing the leader within you John C Maxwell.
4. Good to great by Jim Collins.
5. The seven habits of highly effective people Stephen Covey.

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SEMESTER – VI

GENDER STUDIES

UNIT I GENDER CONCEPT

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

UNIT II FEMINISM Vs GENDER STUDIES

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

UNIT III WOMEN'S DEVELOPMENT AND GENDER EQUALITY

3.1 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 Costitution Amendments.

FACULTY **UNIVERSITY NOMINEE** **HOD**

SEMESTER – III ALLIED COURSE – I

GENERAL CHEMISTRY - I

UNIT I

1.1 Coordination 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.

1.2 Industrial Chemistry

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

1.2.2 Fertilisers – requisites for good fertilizers – Nitrogen fertilizers - ammonium nitrate and urea – phosphorus fertilizers - calcium supre phosphate and triple super phosphate – potassium fertilizers - potassium nitrate and potassium chloride - mixed Fertilisers, micronutrients and their role in Plant life and Bio Fertilisers.

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

UNIT II

2.1 **Polar effects** - Inductive effect – Relative Strength of Aliphatic monocarboxylic acid and aliphatic amines. Resonance – Condition for resonance, Consequences of resonance – resonance energy, Basic property of aniline and acidic property of phenol. Hyperconjugation – Consequences of hyperconjugation – Heat of hydrogenation, Bond length and dipole moment. Steric effect – steric accelerated reaction and steric inhibited reaction.

2.2 Halogen containing compounds - Importance of chlorohydrocarbon used as solvents and pesticides – chloroform, carbon tetrachloride DDT, BHC

2.3 Types of solvents - polar Nonpolar – dissolving Nature of solvents.

UNIT III

3.1 Aromatic compounds - Benzene structure, aromaticity, resonance and stability of benzene.

Typical substitution reaction

(i) Nitration
(ii) Halogenation
(iii) Alkylation

} With mechanism

Polynuclear hydrocarbon - napthalene – Isolation from coal tar, properties and uses.

3.2 Organic reactions

(i) Biuret
(ii) Decarboxylation
(iii) Benzoin
(iv) Perkin
(v) Cannizaro
(vi) Claisen
(vii) Haloform
(viii) Carbyl amine
(ix) Coupling reactions

} Without Mechanism

3.3 chemotherapy

Explanations with two examples each for

(i) Analgesics
(ii) Antibacterial
(iii) Anti-inflammatory
(iv) Antidiabetics
(v) Antiseptic and disinfectant
(vi) Anaesthetics - local and general

} Structures not necessary

UNIT IV

4.1 Thermodynamics – system and surroundings – open system, closed system and isolated system – state and path function – Thermodynamic processes – reversible and irreversible processes. Adiabatic and isothermal processes - First law of thermodynamics – different statements – Second law of thermodynamics - different statements only – Carnot cycle – Derivation of efficiency of heat engine.

4.2 Phase rule – definition of Phase, component, degree of Freedom – definition of phase rule - one component system - water system.

UNIT V

5.1 Chemical 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, $CaCo_3$ and PCl_5.

5.2 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. Activation energy – significance of activation energy – effect temperature and reaction rate.

FACULTY **UNIVERSITY NOMINEE** **HOD**

SEMESTER III & IV

ALLIED COURSE. II PRACTICAL

(Volumetric and organic Qulitative Analysis)

I VOLUMETRIC ANALYSIS

1. Acidimetry and alkalimetry
   (a) Strong acid VS strong base
   (b) Weak acid VS strong base
   (c) Determination of hardness of water
2. Permanganometry
   (a) Estimation of ferrous sulphate
   (b) Estimation of oxalic acid
3. Iodometry
   (a) Estimation of potassium dichromate
   (b) Estimation of potassium permanganate

II ORGANIC ANALYSIS

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
Int Assessment	- 40
	100

Volumetric Analysis (35 Marks)

Procedure - 5 Marks

Results

< 2%	- 30 Marks
2-3%	- 20 Marks
3-4%	- 10 Marks
> 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 **UNIVERSITY NOMINEE** **HOD**

SEMESTER – IV **ALLIED COURSE – III**

GENERAL CHEMISTRY - II

UNIT I

1.1 **Nuclear Chemistry** - Fundamental particles of nucleus - isotopes, isotones and isomers – Differences between chemical reactions and nuclear reactions, Nuclear fusion and nuclear fission reaction.

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

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 (elementary treatment).

UNIT III

3. 1 **Synthetic polymers** – polymers – classification of polymers - Teflon alkyl and epoxy resins, polyesters – preparation and uses.

3.2 **Heterocyclic compounds**- Furan, pyrrole and pyridine – preparation and properties – basic properties of pyridine and pyrrole.

3.3 **Stereoisomerism** - Optical isomerism – Lactic and tartaric acid – racemisation and resolution. Geometrical isomerism – maleic and fumaric acids.

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 and applications.

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 electrometric methods.

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