SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS)

CHENNAI - 600044.

Re accredited with A+ Grade by NAAC

BACHELOR OF SCIENCE

(Shift – I)

Under the faculty of Science

(Department of Chemistry)

CHOICE BASED CREDIT SYSTEM (CBCS)
OUTCOME BASED EDUCATION (OBE)

(Effective from the Academic Year 2020-21)

PROGRAMME PROFILE
(Department of Chemistry)
TOTAL CREDITS: 140

PART	COURSE	TITLE OF THE PAPER	CODE	L	T	H	C
		I SEMESTER					
I	Tamil/Hindi/Sanskrit	Tamil-I / Hindi-I / Sanskrit-I	20ULTFC1001/ 20ULHFC1001 20ULSFC1001	4	0	0	3
II	English	Foundation English-I	20UGEFC1001	4	0	0	3
III	Core Theory 1	General Chemistry-I	20UCHCT1001	4	0	0	3
III	Core Theory 2	General Chemistry-II	20UCHCT1002	4	0	0	3
III	Allied 1	Allied Mathematics-I	20UCHAT1001	6	0	0	5
		II SEMESTER					
I	Tamil/Hindi/Sanskrit	Tamil-II / Hindi-II / Sanskrit-II	20ULTFC2002/ 20ULHFC2002 20ULSFC2002	4	0	0	3
II	English	Foundation English-II	20UGEFC2002	4	0	0	3
III	Core Theory 3	General Chemistry-III	20UCHCT2003	4	0	0	3
III	Core Theory 4	General Chemistry-IV	20UCHCT2004	4	0	0	3
III	Core Practical 1	Core Practical-I	20UCHCP2001				
III	Allied 2	Allied Mathematics-II	20UCHAT2002	6	0	0	5
		III SEMESTER					
I	Tamil/Hindi/Sanskrit	Language(Tamil/Hindi/Sanskrit)					
II	English	English					
III	Core paper-V	General Chemistry-V	18UCHCT3005	4	0	0	3
III	Core Paper-VI	General Chemistry-VI	17UCHCT3006	4	0	0	3
III	Allied paper-III	Physics-I	20UCHAT3001	6	0	0	5
		IV SEMESTER					
I		Language(Tamil/Hindi/Sanskrit)					
II		English					
III	Core paper-VII	General Chemistry-VII	17UCHCT4007	4	0	0	3
III	Core Paper-VIII	General Chemistry-VIII	17UCHCT4008	4	0	0	3
III	Core Practical	Practical-II	13UCHCP2001	3	0	0	3
III	Allied paper-IV	Physics-II	20UCHAT4002	6	0	0	5
III	Allied Practical	Allied Physics practicals					
		0					
III	Core Paper-IX	Inorganic Chemistry-I	17UCHCT5009	4	0	0	3
III	Core Paper-X	Organic Chemistry-I	17UCHCT5010	4	0	0	3
III	Core paper-XI	Physical Chemistry-I	17UCHCT5011	4	0	0	3

III	**Core paper-XII**	**Analytical Chemistry**	**17UCHCT5012**	**4**	**0**	**0**	**3**
III	**Elective paper-I**	**Pharmaceutical Chemistry**	**17UCHCE5001**	**4**	**0**	**0**	**5**
		VI SEMESTER					
III	**Core Paper-XIII**	**Inorganic Chemistry-II**	**17UCHCT6013**	**4**	**0**	**0**	**3**
III	**Core Paper-XIV**	**Organic Chemistry-II**	**17UCHCT6014**	**4**	**0**	**0**	**3**
III	**Core paper-XV**	**Physical Chemistry-II**	**17UCHCT6015**	**4**	**0**	**0**	**3**
III	**Elective paper-II**	**Industrial Chemistry**	**17UCHCE6002**	**4**	**0**	**0**	**5**
III	**Elective paper-III**	**Research Based Project**	**14UCHER6001**	**4**	**0**	**0**	**5**
III	**Core Practical**	**Practical-III(Physical Chemistry)**	**13UCHCP6003**	**3**	**0**	**0**	**3**
III	**Core Practical**	**Practical-IV(Gravimetric Chemistry)**	**13UCHCP6004**	**4**	**0**	**0**	**3**
III	**Core Practical**	**Practical-V(Organic Chemistry)**	**13UCHCP6005**	**4**	**0**	**0**	**3**

L =LectureHrs; T =TutorialHrs; H = Hrsperweek; C =Credits

Assessment Model (from 2020 – 21 onwards)
Under graduation programme
40% Internal 60% External

S.No	Assessment Component	Marks	Weighted %
A.	**Theory**		
1	**INTERNAL ASSESSMENTS**	2 x 50 = 100	15
	Continuous Assessment Test(best two out of three)		
2	Quiz/Group Discussion/Seminar/Assignment/Role Play/ Case Study/ Open Book/ snap Test/ Video Presentation/ Review (any three to be considered)	3 x 10 = 30	15
3	MCQ (one test to be conducted online during the semester)	20	05
4	**Attendance***	**05***	**05**
5	**EXTERNAL ASSESSMENT**	75	60
	End semester examinations		
	Grand Total		**100**
B	**Practical**		
1	INTERNAL ASSESSMENTS	2 x 50 = 100	15
	Continuous Assessment Test(best two out of three)		
2	Record + Observation	10 +10 = 20	15
3	MCQ (one test to be conducted online during the semester)	20	05
4	**Attendance***	**5***	**05**
5	**EXTERNAL ASSESSMENT**	60	60
	End semester Examinations		

	Grand Total		**100**

Attendance* - awarding marks for attendance (out of 5)

Attendance below 60% = 0 marks; 61% to 75% = 3 marks; 76% to 90% = 4 marks; above 91% = 5 marks

SEMESTER I

GENERAL CHEMISTRY- I

TOTALHOURS: 60 **SUB CODE: 20UCHCT1001**

CREDIT: 3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1. To study the shapes of molecules and relative stability of carbo cations, carbanions and free radicals
2. To understand the mechanism of substitution and Elimination reactions
3. To compare the characteristics of Ionic, Covalent and metallic bonds
4. To utilize the principles of Green chemistry
5. To understand the usage and handling of chemicals

COURSE OUTCOMES: on completion of the course the students will be able to…

CO No.	CO Statement
CO1	Recognize the basic terminology involved in organic chemistry
CO2	Study the nature of organic reactions
CO3	Explain the nature of chemical bonding
CO4	Interpret the principles of green chemistry
CO5	Know the handling of chemicals

SYLLABUS

UNIT – I BASICS OF ORGANIC CHEMISTRY (15 h)

1.1 Organic Compounds: Hybridization, shapes of molecules – methane, ethane, ethylene, acetylene and benzene

1.2 Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications and dipole moment

1.3 Homolytic and Heterolytic fission with suitable examples; Curly arrow rules, formal charges; electrophiles and nucleophiles; nucleophilicity and basicity; types, hybridisation and their relative stability of carbocations, carbanions and free radicals

UNIT – II ORGANIC REACTIONS AND THEIR MECHANISM (15 h)

Introduction to types of organic reactions and their mechanism: Addition, Elimination – mechanism of E_1 and E_2 reactions and Substitution reactions – Mechanisms of SN^1, SN^2, and SN^i reactions, Elimination versus Substitution – effects of structure, substrate, solvent, nucleophile and leaving groups, Hofmann and Saytzeff's rule.

UNIT III CHEMICAL BONDING – I (20 h)

3.1 lonic bond: General characteristics, condition for the formation of ionic bond, factors influencing the formation of ionic bonds, radius ratio rule and its limitations, Covalent character in ionic compounds, polarizing power and polarizability, Fajan's rules, Factors affecting the polarisation of an ion, Consequences of Fajan's rule, Born-Haber cycle and its application, Solvation energy

3.2 Covalent bond: Lewis structure, Formal charge calculation, Bent's rule, Valence Bond theory (Heitler-London approach), Molecular orbital theory. Molecular orbital diagrams of diatomic molecules N_2, O_2, C_2, B_2, F_2, CO, NO, Valence shell electron pair repulsion theory (VSEPR), shapes of simple molecules and ions containing lone pairs and bond pairs of electrons H_2O, NH_3, PCl_5, SF_6, IF_7, BF_3. Ionic character in covalent compounds: Bond moment and dipole moment. Percentage ionic character from dipole moment and electronegativity difference.

3.3Metallic Bond: Nature of bonding in metals: Band theory of metals.

3.4 Weak Chemical Forces: Hydrogen bonding – intramolecular and intermolecular hydrogen bonding

UNIT IV GREEN CHEMISTRY (5 h)

Introduction to green chemistry – the need for green chemistry, goals, twelve principles and limitations of green chemistry. Examples of green synthesis/reaction

UNIT V HANDLING OF CHEMICALS AND ANALYSIS (5 h)

General precautions for avoiding accidents, Hazards in laboratory, Poisoning, laboratory safety measures, handling of acids, ethers, toxic and poisonous chemicals,antidotes,thresholdvapour concentration, First aid techniques

TEXT BOOKS

1. Bahl and Arun Bahl, Organic Chemistry
2. B. R. Puri, L. R. Sharma, K. C. Kalia, Principles of Inorganic Chemistry
3. Glasstone and Lewis, Elements of Physical Chemistry
4. P.L.Soni Inorganic Chemistry
5. B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry

REFERENCE BOOKS

1.J. D. Lee, Concise Inorganic Chemistry
2.F. A. Cotton, G. Wilkinson and P. L. Guas, Basic Inorganic Chemistry
3.R. T. Morrison And R. N. Boyd, Organic Chemistry
4.J. E. Huheey, E. A. Kieter and R. L. Keiter, Inorganic Chemistry
5.D. F. Shriver and P. W. Atkins, Inorganic Chemistry

WEBSITES & e-LEARNING:

1. www.virtlab.com
2. http://nptel.ac.in
3. MATLAB
4. Mooc.org
5. http://swayam.gov.in

Mapping of CO with PSO:

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	1	2	0	3	1	3
CO2	1	2	0	3	2	3
CO3	1	1	3	2	2	1
CO4	2	2	1	2	0	0
CO5	2	2	0	2	1	3
Average	**1.6**	**1.8**	**0.8**	**2.4**	**1.2**	**2**

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

QUESTION PAPER PATTERN END SEMESTER EXAMINATION:

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K1,K2,K3	Section-A Multiple choice Questions(1 mark) 25 questions	One (Or) two words	25X1=25	50	
K2,K3,K4,K5 ,K6	Section-B 5out of 7questions (5 marks)	Short answers/ problems	5X5=25 marks		

SEMESTER-I

GENERAL CHEMISTRY- II

TOTALHOURS:60 **SUB CODE: 20UCHCT1002**

CREDIT:3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1. To gain knowledge in the field of atomic spectra and wave mechanics
2. To understand the periodic law and significance of various factors of periodicity
3. To compare the chemistry of alkanes and cycloalkanes
4. To know the crystal size, structure and properties in solid state chemistry
5. To know the theories of acids and bases

COURSE OUTCOMES: on completion of the course the students will be able to…

CO No.	CO Statement
CO1	Discuss the applications and limitations of atomic spectra and to calculate the effective nuclear charge
CO2	Understand the periodicity of the elements
CO3	learn about various methods of preparation and mechanism of alkanes and cycloalkanes
CO4	Study the properties of solid state chemistry
CO5	Recognize the basic concept of acid base theory and its application in qualitative concepts

SYLLABUS

UNIT I ATOMIC STRUCTURE (10 h)

1.1 Atomic spectra: Atomic spectrum of hydrogen - black body radiation - photoelectric effect - Compton effect, Bohr's Model of an atom: postulates, applications, and limitations

1.2 Wave mechanics: de Broglie equation, Heisenberg's Uncertainty Principle and its significance, Schrödinger's wave equation (no derivation), significance of ψ and ψ^2.

1.3 Quantum numbers - Shapes of s, p, d and f orbitals - degenerate energy states.

1.4 Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table

1.5 Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations

UNIT II PERIODICITY OF ELEMENTS (15 h)

2.1 *s, p, d,*and *f* block elements, the long form of periodic table – oxidation states and variable valency

2.2 Periodic properties:– atomic radii, ionic radii, covalent radii, ionisation potential, factors affecting ionization potential, applications of ionization potential, electron affinity - trends of electron affinity, electronegativity - Pauling's/ Mulliken's/ Allred Rachow's electronegativity scales, variation of electronegativity with partial charge and hybridization, Sanderson's electron density ratio

UNIT III CHEMISTRY OF ALIPHATIC HYDROCARBONS – ALKANES AND CYCLOALKANES (15 h)

3.1 Preparation of alkanes: Wurtz reaction, Kolbe's electrolytic method, Wurtz–Fittig reactions, hydrogenation of alkenes, Corey House method

3.2 Reactions: Mechanism of halogenation, sulphonation, nitration, and oxidation

3.3 Cycloalkanes: Preparation using Wurtz reaction, Dieckmann's ring closure

3.4 Reactions: Mechanism of substitution and ring–opening reactions

3.5 Baeyer's strain theory and theory of strainless rings

UNIT IV SOLID STATE (10 h)

4.1 Crystalline and amorphous solids, Isotrophy and Anisotrophy, Symmetry in crystal systems, Elements of symmetry, space lattice and unit cells, Bravais lattice, Laws of Rational Indices

4.2 Packing of ions in crystals; Born-Landé equation (No derivation), Madelung constant

4.3 Laws of crystallography – Miller indices, simple cube, body centered cube and face centered cube

4.4 Structure of NaCl and CsCl, X–ray diffraction (Bragg's equation derivation)

4.5 Imperfections in crystals – Point defect – Schottky and Frenkel defect

UNIT V: (10 h)

5.1 Theories of acids and bases: Arrhenius theory, acids and bases in protic solvents, Bronsted–Lowry theory, Lewis theory, hard and soft acids and bases – HSAB principle.

5.2 Non aqueous solvents: classification–protic and aprotic solvents

5.3 Principles of qualitative analysis: concept of solubility product, common ion effect, its application in qualitative analysis

TEXT BOOKS

1. B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry
2. Puri, Sharma, Kalia, Principles of Inorganic Chemistry
3. Bahl and Arun Bahl, Advanced Organic Chemistry
4. P.L.Soni, Inorganic Chemistry
5. Jerry March, Advanced Organic Chemistry

REFERENCE BOOKS

1. Glasstone and Lewis Elements of Physical Chemistry
2. Neigi and Anand, Physical Chemistry
3. Atkins, P. W. & Paula, J. de Atkin, Physical Chemistry
4. T. Moeller, Inorganic Chemistry: A Modern Introduction
5. R. T. Morrison and R. N. Boyd, Organic Chemistry

WEBSITES & e-LEARNING:

1. www.virtlab.com
2. http://nptel.ac.in
3. MATLAB
4. Mooc.org
5. http://swayam.gov.in

Mapping of CO with PSO:

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	1	0	2	3	2	3
CO2	2	1	3	2	3	2
CO3	0	3	0	2	1	2
CO4	3	1	2	2	3	3
CO5	3	2	0	2	3	1
Average	**1.8**	**1.4**	**1.4**	**2.2**	**2.4**	**2.2**

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**
Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment seminar.

SEMESTER-II

GENERAL CHEMISTRY- III

TOTALHOURS:60 **SUB CODE: 20UCHCT2003**

CREDIT:3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1 .Learn the chemistry of alkenes and alkynes

2. Understand the basic terminology involved in thermodynamics and thermochemistry

3 Gain knowledge in the field of data analysis

COURSE OUTCOMES: on completion of the course the students will be able to…

CO No.	CO Statement
CO1	Examine the basic chemistry of aliphatic hydrocarbons – alkenes
CO2	Recognize the basic chemistry of alkynes
CO3	Explain the concepts of chemical thermodynamics – I
CO4	Calculate types of heat of reactions and calculation using thermochemical datas
CO5	Gain knowledge on data analysis

SYLLABUS

UNIT – I CHEMISTRY OF ALIPHATIC HYDROCARBONS – ALKENES (15 H)

1.1 General methods of preparation – dehydrogenation, dehydrohalogenation, dehydration, Hoffmann and Saytzeff rules, cis and trans eliminations

1.2 Properties of alkenes–electrophilic and free radical addition, addition reactions with hydrogen, halogens, hydrogen halide (Markownikoff's rule) hydrogen bromide (peroxide effect), sulphuric acid, water, hydroboration, Ozonolysis, hydroxylation with $KMnO_4$, allylic substitution by NBS

1.3 Dienes – Stability of dienes, conjugated, isolated and cumulative–stability and chemical reactivity–1,2 and 1,4 additions, Diels–Alder reactions, Synthesis of dienes–1,3 butadiene, isoprene, chloroprene

UNIT – II CHEMISTRY OF ALIPHATIC HYDROCARBONS – ALKYNES (10 h)

2.1 Preparation and properties – acidity of alkynes, formation of acetylides, addition of water with $HgSO_4$ catalyst, addition of hydrogen halides and halogens, oxidation, ozonolysis and hydroboration

2.2 Commercial Importance of Alkynes

UNIT – III CHEMICAL THERMODYNAMICS -I (15 h)

3.1 Definitions of thermodynamic terms – intensive and extensive properties; isolated, closed and open systems; Thermodynamic processes – cyclic processes, reversible and irreversible processes, isothermal and adiabatic processes; Thermodynamic functions and their differentials; Zeroth law of thermodynamics; Concepts of heat and work

3.2 First law of thermodynamics, internal energy (U), enthalpy (H), relation between C_P and C_V, calculations of w, q, dU and dH for expansion of ideal gas under isothermal and adiabatic conditions, for reversible processes including free expansion, P–V, P–T, T–V relationships, Joule's law, Joule–Thomson coefficient and inversion temperature

UNIT – IV THERMOCHEMISTRY (15 h)

4.1 Enthalpy of a reaction, Exothermic and Endothermic reactions, Variation of Enthalpy of reaction with temperature (Kirchhoff's equation)

4.2 Types of heat of reaction – Heat of combustion, Heat of solution, Heat of Neutralization, Heat of fusion, Heat of Vapourisation, Heat of sublimation, Heat of Transition and Heat of formation

4.3 Bond energy, Bond dissociation energy, calculation from thermo chemical data

UNIT – V: DATA ANALYSIS (5 h)

5.1 Accuracy, precision and significant figures

5.2 Error in chemical analysis, Types of error – absolute and relative error, methods of eliminating or minimizing errors, Normal error curve and its importance

5.3 Methods of expressing precision: mean, median, deviation, average deviation and coefficient of variation

TEXT BOOKS

1. Bahl and Arun Bahl, Advanced Organic Chemistry
2. T.S. Tewari, Textbook of organic Chemistry
3. B.R. Puri and Sharma, Principles of Physical Chemistry
4. B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry
5. R. Gopalan, Analytical Chemistry

REFERENCE BOOKS

1. B.K. Sharma, Instrumental methods of Chemical analysis
2. A. Skog and M. West, Fundamentals of analytical chemistry
3. Vogel, A., Test book of Quantitative Inorganic Analysis
4. G.W. Castellan, Physical Chemistry
5. Neigi and Anand, Physical Chemistry

WEBSITES & e-LEARNING:

1. www.virtlab.com

2. http://nptel.ac.in
3. MATLAB
4. Mooc.org
5. http://swayam.gov.in

Mapping of CO with PSO:

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	**1**	**2**	**0**	**3**	**0**	**2**
CO2	**1**	**2**	**0**	**3**	**1**	**2**
CO3	**2**	**0**	**0**	**3**	**2**	**0**
CO4	**2**	**0**	**0**	**3**	**1**	**0**
CO5	**1**	**2**	**0**	**1**	**1**	**1**
Average	**1.4**	**1.2**	**0**	**2.6**	**1**	**1**

KEY:

PEDAGOGY (TEACHING METHODOLOGY**): PEDAGOGY**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

PRACTICAL I

INORGANIC QUALITATIVE ANALYSIS AND PREPARATION

TOTALHOURS:3 **SUB CODE: 20UCHCP2001**

CREDIT:3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1 .Familiarize with the fundamental concepts and its reactions

2. Ability to analyse the anions and cations qualitaively

3. Ability to prepare inorganic salts

COURSE OUTCOMES: on completion of the course the students will be able to…

CO No.	CO Statement
CO1	Examine the basic reactions through semi micro analysis
CO2	Identify the anions and cations through preliminary reactions/test
CO3	Prepare Pure inorganic Crystals

SYLLABUS

1.Analysis of a mixture containing two cations and two anions, one of which will be an interfering ion. Semimicro methods using the conventional scheme may be adopted.

Reactions of the following anions to be studied:

Carbonate,sulphate,fluoride,Chloride,bromide,nitrate,oxalate, phosphate,borate

Reactions of the following cations to be studied :

lead,copper,cadmium,bismuth,aluminium,,iron,manganese,zinc,cobalt,strontium,barium,

magnesium,nickel, calcium and ammonium.

2.Preparation of the following inorganic compounds:

1.Ferrous ammonium sulphate 2.Manganous sulphate 3.Microcosmic salt 4.Tetrammine copper(II)sulphate 5.*Sodium thiosulphate and 6.*Potassium trioxalatochromate(III)

*.not to be given for examination.

Mapping of CO with PSO:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	2	3	1	3
CO2	2	3	2	3	3	3
CO3	3	3	2	3	3	3
AVERAGE	2.7	3	2	3	2.3	3

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar, live demostrations

PRACTICAL I
INORGANIC QUALITATIVE ANALYSIS AND PREPARATION

SUB CODE:13UCHCP2001 **INT MARKS:20**
EXT MARKS:30

(a) Inorganic qualitative analysis with systematic analysis with correct elimination and confirmatory tests. (16marks)

4 Radicals 4 x 4 = 16 marks

Spotting each radical 1mark

Detection of correct group for each basic radical 1 mark

(b) Preparation :

Record : 5 marks

Internal

Attendance : 10 marks

Test : 10 marks (2 tests)

SEMESTER-II

GENERAL CHEMISTRY- IV

TOTALHOURS:60 **SUB CODE: 20UCHCT2004**

CREDIT:3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1.Have a clear idea about gaseous state and liquid state

2. Gain knowledge in the field of stereochemistry

3.Have a thorough study on s-block elements

COURSE OUTCOMES: on completion of the course the students will be able to…

CO No.	CO Statement
CO1	Recognize the basics of stereochemistry
CO2	Explain the concept of gaseous state
CO3	Utilise the techniques of liquid state
CO4	Analyse the comparative study of s-block elements
CO5	Examine the concepts of ionic equilibrium

SYLLABUS

UNIT I STEREOCHEMISTRY (10 h)

Isomerism: Types of isomerism – stereoisomerism – Optical isomerism– optical activity, conditions of optical activity and specific Rotations – chirality – meaning of (+) and (–) and D and L, Achirality – Elements of symmetry – Geometrical isomerism – methods of determining geometrical isomerism

UNIT – II GASEOUS STATE (15 h)

2.1 Characteristics of gases, Gas laws from the Kinetic theory of gases, Transport properties–Viscosity–thermal conductivity–diffusion– (only definition), Maxwell's distribution of molecular velocities, its types and relation between them, Collision properties

2.2 Law of equipartition of energy, Derivation of Van der waal's equation from Ideal gas equation, Limitations of Van der waal's equation, coefficient of compressibility and thermal expansion

2.3 Liquefaction of gases–critical phenomena, Methods of liquefaction of gases

UNIT – III LIQUID STATE (15 h)

3.1 Intermolecular forces in liquids, physical properties – Vapour pressure, Heat of vapourisation – Effect of temperature; Surface tension, determination of Surface tension by Capillary rise method and Stalagmometer method – effect of temperature; Viscosity – Determination using Ostwald Viscometer – effect of temperature and pressure

3.2 Mesomorphic state: Liquid crystals – classification, molecular arrangements and applications

UNIT – IV COMPARATIVE STUDY OF THE PROPERTIES OF S–BLOCK ELEMENTS (10 h)

4.1 Alkali metals: Comparative study of elements: oxides, halides, hydroxides, sulphates and carbonates, Exceptional property of lithium

4.2 Alkaline Earth Metals: Comparative study of the elements oxides, halides, hydroxides, sulphates and carbonates. Exceptional property of Berylium

UNIT – V IONIC EQUILIBRIA (10 h)

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono–, di–and triprotic acids (exact treatment).

TEXT BOOKS

1. B.R. Puri and Sharma, Principles of Physical Chemistry
2. B. R. Puri, L. R. Sharma, K. C. Kalia, Principles of Inorganic Chemistry
3. R.D. Madan, Modern inorganic Chemistry
4. Arun Bahl and B. S. Bahl: Advanced Organic Chemistry
5. Kalsi, Stereo chemistry, Conformation and mechanism

REFERENCE BOOKS

1. Atkins, P. W. & Paula, J. de Atkin, Physical Chemistry
2. S. Glasstone, Electrochemistry
3. E. L. Eliel: Stereochemistry of Carbon Compounds
4. R. T. Morrison & R. N. Boyd: Organic Chemistry
5. Arora, Stereo Chemistry in organic compounds

WEBSITES & e-LEARNING:

1. www.virtlab.com
2. http://nptel.ac.in
3. MATLAB
4. Mooc.org
5. http://swayam.gov.in

Mapping of CO with PSO:

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CO2	3	0	0	1	1	0
CO3	3	1	0	1	0	1
CO4	1	1	2	3	1	1
CO5	2	0	2	3	0	0
Average	2	0.8	0.8	2.2	0.6	0.8

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**
Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

SEMESTER-III

GENERAL CHEMISTRY- V

TOTALHOURS:60 **SUB CODE: 18UCHCT3005**

CREDIT:3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

- Gain knowledge in the field of basics of organic chemistry
- Familiarize the concepts involved in Thermodynamics
- To know the ores and extraction of various metals

COURSE OUTCOMES: on completion of the course the students will be able to…

CO No.	CO Statement
CO1	Recognize the basic terminology involved in Alcohols and Phenols
CO2	To study the concept of Thermodynamics
CO3	Explain the free energy relationship and concept of fugacity
CO4	Compare the properties of III and IV group elements
CO5	Know the role of metals and extraction

SYLLABUS

UNIT–I ALCOHOLS AND PHENOLS (15h)

1.1 Alcohols: Preparation – Williamson's synthesis, properties and relative reactivityof1°, 2°, 3° alcohols, Bouvaelt–Blanc Reduction.

1.2 Phenols: Acidic character of phenols – explanation on the basis of resonance stabilization, Ring substitution in phenols, orientation of phenolic groups towards electrophiles, Mechanisms of nitration, sulphonation, halogenation and coupling with diazonium salts, Kolbe's reaction, Riemer – Tiemann reaction, Gattermann, Lederer – Manasse, Houben – Hoesh reactions

UNIT–II CHEMICAL THERMODYNAMICS II (10 h)

2.1 Second law of Thermodynamics – Limitations of I law, Statements of the II law Spontaneous Process – Carnot's cycle–efficiency, Carnot's theorem (statement only)

2.2 Concept of Entropy –definition – entropy of an ideal gas – entropy changes in cyclic, reversible and irreversible process and physical transformations, Trouton's rule and its applications. Calculations of entropy changes with changes in T, V and P.

UNIT–III CHEMICAL THERMODYNAMICS III (15 h)

3.1 Gibb's free energy–Helmholtz free energy–their variation with temperature, pressure and volume. Criteria for spontaneity. Gibb's Helmholtz equation–derivation and applications.

3.2 Partial molar Properties, Gibbs–Duhem equation, chemical potential, effect of temperature and Pressure on chemical potential, change in thermodynamic functions in mixing of ideal gases, Duhem–Margulus equation

3.3. Concept of fugacity, determination of fugacity of gas, Activity and activity Coefficient.

UNIT–IV BORON AND CARBON FAMILY (10 h)

4.1 Electron deficiency behavior of Boron halides preparations, properties, structure and uses of borazole, $NaBH_4$, Boron nitride, $LiAlH_4$ and diborane.

4.2 Comparative study of properties of Carbon and silicon. Classification preparation, properties, structure and uses of Carbides. Classification of Silicates.

UNIT–V: METALLURGY (10 h)

General principles, ores, concentration, extraction of metals, refining methods – electrolytic refining, Zone refining and Van Arkel process. Extraction and uses of Ti,Zr,Pt,Ni,ThandU.Differenttype of steel. Role of Carbon in steel. Steel alloys–heat

treatmentofsteel.Applicationof steel Alloys.

TEXT BOOK

1. R.D. Madan, Modern inorganic Chemistry

2.P.L.Soni, Text book of Inorganic Chemistry

3.B. R. Puri, L. R. Sharma, K. C. Kalia, Principles of Inorganic Chemistry

4.Arun Bahl and B. S. Bahl: Advanced Organic Chemistry

5.B.R. Puri and Sharma, Principles of Physical Chemistry

REFERENCE BOOKS

1.Cotton & Wilkinson, Inorganic Chemistry

2.R. T. Morrison & R. N. Boyd: Organic Chemistry

3.Atkins, P. W. & Paula, J. de Atkin, Physical Chemistry

WEBSITES & e-LEARNING:

1. www.virtlab.com
2. http://nptel.ac.in
3. MATLAB
4. Mooc.org
5. http://swayam.gov.in

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO3	PSO 4	PSO 5	PSO 6
CO1	1	2	0	3	1	1
CO2	2	0	0	3	2	1
CO3	2	1	0	0	2	0
CO4	1	2	3	2	1	2
CO5	1	2	2	3	0	1
VERAGE	1.4		1	2.2	1.2	1

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

SEMESTER III

GENERAL CHEMISTRY- VI

TOTALHOURS:60 **SUBCODE:17UCHCT3006**

CREDIT:3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1.Discuss the preparation, properties and reactions of carboxylic acids,Ethers and Epoxides and organometallic compounds

2.Analyse the Chemistry of Food additives, food beverages

3.To discuss and demonstrate the principles volumetric analysis

COURSE OUTCOMES: on completion of the course the students will be able to…

CO No.	CO Statement
CO1	Explain the fundamentals of Carboxylic acids
CO2	Compare the chemistry of Ethers and Epoxides
CO3	Discuss the preparation, properties and synthetic uses of Organo metallic compounds
CO4	Analyse the adulterants found in the food items
CO5	Outline the principles and apply the concept of volumetric analysis

SYLLABUS

UNIT –I CARBOXYLIC ACIDS (15 h)

1.1 Classification of aliphatic and aromatic carboxylic acids, effect of substituents on acidity and salt formation

1.2 Preparation of dicarboxylic acids: oxalic acid, succinic acid, cinnamic acid

1.3 Mechanism of reduction and substitution in alkyl or aryl group

1.4 Reactions of acid chlorides, acid anhydrides, amides and ester, alkaline hydrolysis of ester, transesterification, Claisen condensation, Dieckmann and Reformatsky reactions and Curtius rearrangement

UNIT–II ETHERS AND EPOXIDES (10 h)

Preparation, properties and reactions with acids, Reactions of epoxides with alcohols, ammonia derivatives and $LiAlH_4$

UNIT–III ORGANOMETALLIC COMPOUNDS (10 h)

Preparation, properties and synthetic uses of Grignard reagent– preparation, properties and uses of Organo lithium compound and Organo lead compound

UNIT IV CHEMISTRY IN EVERYDAY LIFE (10 h)

4.1 Food Adulteration and Testing – Legal aspects of food adulteration and prevention. Common food adulterants – Contamination of wheat, rice, milk, butter, dhal, tea, oil, fruits, turmeric powder, dhania powder, chilli powder, green peas, pepper, sugar, salt, ghee.

4.2 Food additives – Classification – with examples – Preservatives – Colours – Flavouring agents, Emulsifiers – Antioxidants Taste Maker – MSG.

4.3 Beverages – Soft drinks – Soda – Fruit juices – Alcoholic Beverages – Examples – Alcoholism – Related Problems – Physiological, Psychological and Social Aspects.

UNIT–V TITRIMETRIC METHOD OF ANALYSIS (15 h)

5.1 Definitons of molality, normality, molarity and mole fraction–definition and examples for primary and secondary standards. Calculations of equivalent weights

5.2 Principles of volumetric analysis – acid – base, redox, iodometric and iodimetric precipitation and complex formation titration (by EDTA) – theories of indicators – acid–base, redox, adsorption and complexometric indicators

TEXT BOOKS

1. S.P. Shukla and G.L. Trivedi, Modern Organic Chemistry
2. P.L.Soni, Text book of Inorganic Chemistry
3. Lakshmi, Food Chemistry
4. P.L.Soni & H.M.Chawla, Text Book of Organic Chemistry
5. R. Gopalan, Instrumental techniques

REFERENCE BOOKS

1.R. T. Morrison & R. N. Boyd, Organic Chemistry

2.Arun Bahl and B. S. Bahl, Advanced Organic Chemistry

3.Ramani and Alex, Food Chemistry

4.S. Venkataiah, Nutrition Education

5.Vogel's Textbook of Quantitative Analysis

WEBSITES & e-LEARNING:

1. www.virtlab.co
2. http://nptel.ac.in
3. MATLAB
4.. Mooc.org
5. http://swayam.gov.in

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	2	2	1	4	0	2
CO2	2	1	0	3	0	1
CO3	1	0	1	3	2	1
CO4	1	2	1	3	0	1
CO5	2	3	1	3	2	3
AVERAGE	1.6	1.6	0.8	3.2	0.8	1.6

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

SEMESTER IV

GENERAL CHEMISTRY- VII

TOTALHOURS:60 **SUBCODE:17UCHCT4007**

CREDIT:3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1. To study the Aromaticity and mechanism of organic reactions
2. To compare the properties of Oxygen and Nitrogen family
3. To discuss the Inorganic and Bioinorganic polymers

COURSE OUTCOMES: on completion of the course the students will be able to…

CO NO	CO Statement
CO1	Discuss the mechanism of sulphonation, Nitration, Friedal Crafts alkylation and acylation
CO2	Compare the oxides and oxyacids of Nitrogen family
CO3	Compare the oxides and Oxyacids of Oxgen family
CO4	Explain the types and applications of Inorganic polymers
CO5	Study the deficiency and toxicity of some metals

SYLLABUS

UNIT I: AROMATICITY (10 h)

Huckel's (4n+2) rule and its applications, Electrophilic substitution reaction in Benzene. General mechanisms–nitration, halogenations, sulphonation, Friedal Crafts acylation and alkylation. Directive influence–Orientation.

UNIT II: NITROGEN FAMILY (15 h)

2.1 Oxides of group 15 elements: oxides of nitrogen–dinitrogen tetroxide, dinitrogen pentoxide; oxides of phosphorus, arsenic, and bismuth–trioxides, pentoxides.

2.2 Oxoacids of nitrogen: nitrous acid, nitric acid, hyponitrous acid, hydrazoic acid, pernitric acid;

2.3 Oxoacids of phosphorus ortho-phosporus acid, metaphosphorous acid, hypophosphorous acid; orthophosphoric acid, di–, tri–, and tetrapolyphosphoric acids;

2.4 Uses of phosphites and phosphates; phosphate fertilizers and superphosphate of lime

2.5 Role of phosphorous in NPK fertiliser

UNIT–III: OXYGEN FAMILY (15 h)

3.1 Group 16 (oxygen group): structure and allotropy of elements, ozone

3.2 Oxides–normal oxides, peroxides, suboxides, basic oxides, amphoteric oxides, acidic oxides, neutral oxides

3.3 Oxides of sulphur–SO_2, SO_3

3.4 Oxoacids of sulphur–thionic acid series

3.5 Peroxoacid series

3.6 Oxohalides–thionyl compounds

UNIT IV: INORGANIC POLYMERS (10 h)

Types of inorganic polymers, synthesis, structural aspects and applications o silicones and siloxanes, Borazines and phosphazenes.

UNIT V: BIOINORGANIC CHEMISTRY (10 h)

Metal ions present in biological systems, classification of elements according to their action in biological system. Excess and deficiency of some trace metals.

Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity. Iron and its application in bio–systems

TEXT BOOKS

1. B. R. Puri, L. R. Sharma, K. C. Kalia, Principles of Inorganic Chemistry
2. R.D. Madan, Modern inorganic Chemistry
3. P.L.Soni, Text book of Inorganic Chemistry
4. Advanced organic chemistry, B.S. Bahl and Arun Bahl, S.Chand and company ltd.
5. Jerry March, Advanced Organic Chemistry

REFERENCE BOOKS

1.Organic Chemistry, R.T. Morrison and Boyd, Prentice Hall.

2.J.D. Lee, Concise Inorganic Chemistry

3.Cotton, F.A. & Wilkinson, G. Advanced Inorganic Chemistry

4.Purcell, K.F & Kotz, J.C., Inorganic Chemistry

5.Lippard, S.J. & Berg, J.M., Principles of Bioinorganic Chemistry

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO3	PSO4	PSO5	PSO6
CO1	1	0	0	2	1	1
CO2	1	0	0	2	1	2
CO3	1	0	0	2	1	2
CO4	1	2	2	2	1	1
CO5	2	2	2	2	2	1
AVERAGE	1.2	0.4	0.8	2	1.2	1.4

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

SEMESTER IV

GENERAL CHEMISTRY- VIII

TOTALHOURS:60 **SUBCODE:17UCHCT4008**

CREDIT:3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1. Compare the Halogen family and Noble gases
2. To gain knowledge on photochemical reactions
3. Study the principles and characteristics of Gravimetric analysis

COURSE OUTCOMES: on completion of the course the students will be able to…

CO No.	CO Statement
CO1	Compare and study the properties and structure of Halogens and Inter halogen compounds
CO2	Study the inertness of the noble gases
CO3	Study the mechanism of various reactions
CO4	Enable the students to acquire proper knowledge about photochemical reactions with mechanism
CO5	Discuss the principles and theories of Gravimetric analysis

SYLLABUS

UNIT–I HALOGEN FAMILY (15 h)

1.1 Comparative study of F, Cl, Br, I and At; Exceptional properties of fluorine.

1.2 **Interhalogen compounds**: ClF, ICl; ClF_3, BrF_3, IF_3; ClF_5, BrF_5, IF_5 – preparation properties and structure.

1.3 **Psuedohalogens**: cyanide, thiocyanate, and azide – properties and structure.

UNIT II NOBLE GASES (5h)

Occurrence and uses of inertness of noble gases, position of rare gases in Periodic Table; preparation and properties of XeF_2, XeF_4 and XeF_6 & Clathrates;

UNIT III CARBONYL COMPOUNDS (15 h)

Structure, reactivity and preparation; Nucleophilic additions, Nucleophilic addition–elimination reactions with ammonia derivatives with mechanism; Mechanisms of Aldol and Benzoin condensation, Knoevenagel condensation, Claisen–Schmidt, Perkin, Cannizzaro and Wittig reaction

UNIT–IV PHOTOCHEMISTRY (15 h)

4.1 Characteristics of electromagnetic radiation – Laws: Grothus–Draper, Stark–Einstein,Lambert-Beer's law, physical significance of absorption coefficients, examples of photochemical reactions, chlorination of methane, actinometry, quantum yield, examples of low and high quantum yields, photolysis of acetaldehyde and photopolymerisation of polythene, photosensitisation, quenching, fluorescence, phosphorescence (Definition only) and chemiluminescence or Bioluminescence.

4.2 Role of photochemical reactions in biochemical processes

UNIT–V GRAVIMETRIC ANALYSIS (10 h)

Principles of gravimetric analysis – theories of precipitation – precipitation from homogenous medium – coprecipitation and post precipitation. Precipitate– Definition, characteristics of a precipitate, Characteristics of precipitating agents and conditions of precipitation, specific and selective precipitants – DMG, cupferron, salicylaldehyde, oxime, EDTA – Use of sequestering agents.

TEXT BOOKS

1. P.L. Soni, Text book of Inorganic chemistry
2. B. R. Puri, L. R. Sharma, K. C. Kalia, Principles of Inorganic Chemistry
3. R.D. Madan, Modern inorganic Chemistry
4. R. Gopalan, Analytical Chemistry
5. B.S. Bahl and Arun Bahl, Advanced organic chemistry

REFERENCE BOOKS

1.R.T. Morrison and Boyd, Organic Chemistry

2.Puri, Sharma and Pathania, Principles of Physical chemistry

3.Cotton & Wilkinson, Inorganic Chemistry 4. R. T. Morrison & R. N. Boyd: Organic Chemistry

5.Atkins, P. W. & Paula, J. de Atkin, Physical Chemistry

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	1	0	2	3	0	0
CO2	2	0	2	3	1	0
CO3	1	2	1	3	1	2
CO4	1	0	0	3	2	2
CO5	2	3	1	2	1	1
AVERAGE	1.4	1	1.2	2.8	1	1

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

PRACTICAL –II

VOLUMETRIC ANALYSIS

TOTALHOURS:3 **SUBCODE:13UCHCP4002**

CREDIT:3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1 .To familiarize with the fundamental concepts of volumetric analysis

2. Ability to analyze the concentration of the solution quantitatively

3 To examine and also to find out the concentration of the given/estimating solution by different volumetric methods

COURSE OUTCOMES: on completion of the course the students will be able to…

CO No.	CO Statement
CO1	Identify the strength of the solution using volumetric method
CO2	Estimate the amount of substance present in the solution by acidimetry permanganometry, Dichrometry, Iodometry and Complexometry methods
CO3	Demonstrate the iodimetry method

Acidimetry

1.Estimation of Sodium hydroxide using standard Sodium Carbonate and link Hydrochloric acid.

2. Estimation of Sodium carbonate using standard Sodium Carbonate and link Hydrochloric acid

3. Estimation of Borax using standard Sodium Carbonate and link Hydrochloric acid.

Permanganometry

4. Estimation of Oxalic acid using standard Mohr's salt or Ferrous Sulphate solution and link Potassium Permanganate.

5. Estimation of Ferrous Sulphate using standard Oxalic acid solution and link Potassium Permanganate.

Dichrometry

6. Estimation of ferrous ion using diphenylamine as the indicator and link Potassium dichromate

Iodometry

7. Estimation of Copper using standard Potassium dichromate and link Sodium thiosulphate.

Complexometry

8. Estimation of Zinc using EDTA.

Demonstration (Not to be given for the exams) Experiments

Iodimetry

Estimation of arsenious oxide using standard arsenious oxide and link iodine

Mapping of CO with PSO:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	0	2	1	0
CO2	2	3	0	2	2	0
CO3	3	3	2	0	3	0
AVERAGE	2.7	3	0.7	1.3	2	0

KEY:

PEDAGOGY (TEACHING METHODOLOGY**): PEDAGOGY**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar, live demostrations

PRACTICAL –II

VOLUMETRIC ANALYSIS

SUB CODE:13UCHCP4002 **INT MARKS:20**
SEMESTER: IV **EXT MARKS:30**

External

Record	:	5 marks
Accuracy		25 marks
Error upto 1%	:	25 marks
Error upto 2%	:	20marks
Error upto 3%	:	15 marks
Error upto 4%	:	10 marks
Error upto 5% and above 5%	:	5 marks

(i) For errors between the limits proportionate deduction of marks may be made.
(ii) For arithmetical error deduct 2 marks.

SEMESTER V

INORGANIC CHEMISTRY- I

TOTALHOURS:60 **SUB CODE: 17UCHCT5009**

CREDIT:3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1. To enable to understand the basic principles of Nuclear Chemistry with reference to reactors and Models
2. To gain knowledge about the fundamental concepts of UV-Visible, IR and Raman Spectroscopy
3. To familiarize the role of Nano particles in day to day life

COURSE OUTCOMES:

On completion of the course the students will be able to…

CO No.	CO Statement
CO1	Study the fundamental particles and definitions related to Nuclear chemistry and Models
CO2	Examine various Nuclear reactions, radioactive decay and uses of Radio isotopes
CO3	Classify the compounds according to the mode of purification
CO4	Study the instrumentation techniques of UV-Visible,IR and Raman and their applications
CO5	To relate the types of Nano particles and its applications

SYLLABUS

Unit – I NUCLEAR CHEMISTRY–I (10 h)

1.1 Fundamental particles of the nucleus – nucleon terminology, nuclides, isotopes, isobars, isotones, mirror nuclei, nuclear isomerism, nuclear forces operating between nucleons– π–meson theory

1.2 Nuclear stability: Packing fraction, N/P curve and stability belt, Magic numbers, Main features of shell model and liquid drop model.

UNIT – II NUCLEAR CHEMISTRY–II (15 h)

2.1 Mass defect, binding energy and binding energy per nucleon – simple calculations

2.1 Natural radioactivity, Properties of α, β, γ rays – radioactive series.

2.2 Detection and measurement of radioactivity – GM counter method. Law of radioactive decay–half life period, Disintegration constant and average life period.

2.3 Group displacement law. Nuclear fission, Explanation of nuclear fission by liquid drop model, nuclear energy.

2.4 Nuclear fusion – energy source of the sun and stars.

UNIT– III Purification Techniques (10 h)

3.1 Purification of solid compounds – extraction – use of immiscible solvents –crystallization – use of miscible solvents – fractional crystallization – sublimation. Purification of liquid mixtures – experimental techniques of distillation – fractional distillation – vacuum distillation – steam distillation – tests for purity

3.2 Separation and purification techniques: solvent extraction and soxhlet extraction.

UNIT – IV INORGANIC SPECTROSCOPY (15 h)

4.1 UV – Visible spectroscopy – Absorption laws – Numerical problems involving Beer – Lambert's law – instrumentation – spectrophotometer – block diagrams with description of components – theory – types of electronic transitions – chromophore and auxochromes – absorption bands and intensity – factors governing absorption maximum and intensity.

4.2 Infrared spectroscopy – principle – types of stretching and bending vibrations – vibrational frequencies – instrumentation – block diagram – source – monochromator – cell sampling techniques – detector and recorders – identification of complex molecules from characteristic absorption bands .

4.3 Raman spectroscopy – Rayleigh and Raman scattering – Stoke's and anti stokes lines – instrumentation block diagram – differences between IR and Raman spectroscopy – mutual exclusion principle – application.

UNIT – V NANOCHEMISTRY (10 h)

Introduction to nanoscience and nanotechnology – Types of nanoparticles, Techniques to synthesize nanoparticles, Physical methods – Physical vapour deposition (evaporation and sputtering) – chemical methods–reduction methods – sol–gel methods – applications of nanochemistry.

TEXT BOOKS

1. R. Gopalan, Analytical Chemistry
2. C.N.R. Rao, Chemistry of Nanomaterials
3. P.L. Soni, Principles of Inorganic Chemistry
4. R.D. Madan, Advanced Inorganic Chemistry
5. Wahid. U. Malik, G.D. Tuli , R.D. Madan, Selected topics in Inorganic Chemistry

REFERENCE BOOKS

1. T. Pradeep, NANO: The Essentials
2. A. Skog and M. West, Fundamentals of Aanalytical Chemistry
3. B.K. Sharma, Instrumental methods of Chemical analysis
4. Willard Merrit and Dean, Instrumental methods of Chemical analysis
5. Arnikar, Nuclear Chemistry

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	1	1	2	2	1	1
CO2	1	0	2	1	2	0
CO3	2	2	1	1	1	3
CO4	1	2	2	2	1	3
CO5	1	1	1	1	1	3
AVERAGE	1.2	1.2	1.6	1.4	1.2	2

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

SEMESTER V

ORGANIC CHEMISTRY- I

TOTALHOURS:60 **SUBCODE:17UCHCT5010**

CREDIT:3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1. To study the mechanisms, synthetic uses and reactions of active methylene group
2. To compare and study the conformational analysis of ethane, butane and cyclo hexane and geometrical and optical isomers
3. To gain knowledge on aromaticity of heterocyclic compounds and to apply the synthetic applications of various compounds

COURSE OUTCOMES:

On completion of the course the students will be able to…

CO No.	CO Statement
CO1	Explain the reduction reactions and mechanisms of various name reactions
CO2	Study the synthetic uses of different esters
CO3	Apply the configuration and conformation to identify the molecules
CO4	Expain the optical activity of symmetrical carbon atoms and geometrical isomers
CO5	Compare the preparation,properties and synthetic uses of heterocyclic compounds

SYLLABUS

UNIT – I **(10 h)**

1.1 Reduction of carbonyl group with sodium borohydride, lithium aluminium hydride – Wolff Kishner and MPV reduction.

1.2 Mechanisms of Aldol, Perkin, and benzoin condensation, Claisen, Wittig, Cannizaro and Reformatsky and Knoevenagal reactions

UNIT– II **(10 h)**

2.1 Malonic and Acetoacetic esters characteristic reactions of active methylene group

2.2 Synthetic uses of malonic ester, acetoacetic ester and cyano acetic ester.

2.3 Tautomerism – definition – ketoenol tautomerism (identification, acid and base catalyzed inter conversion mechanism, preparation and characteristics).

UNIT – III **(15 h)**

3.1 Conformational analysis – introduction of terms conformers, configuration, dihedral angle, torsional strain – conformational analysis of ethane and n–butane including energy diagrams –conformers of cyclohexane (chain, boat and skew boat forms) – axial equatorial bonds – ring flipping showing axial equatorial interconversions conformers of mono and disubstituted hexanes. 1:2 and 1:3 interactions

3.2 Projection formulae – Fischer, flying wedge, sawhorse and newmann projection formula – notation of optical isomers – Cahn– Ingold – Prelog rules – R.S notations for optical isomers with one and two asymmetric carbon atoms – erythro and threo representations.

UNIT – IV **(10 h)**

4.1 Racemisation – methods of racemisation (by substitution and tautomerism) – Resolution – methods of resolution (mechanical, seeding, biochemical and conversion to diastereoisomers) – Asymmetric synthesis (partial and absolute synthesis) – Walden inversion.

4.2 Optical activity in compounds not containing asymmetric carbon atoms, Biphenyls, allenes and spirans.

4.3 Syn– anti and E–Z notations. Geometrical isomerism in maleic and fumaric acids and unsymmetrical ketoximes

UNIT – V **(15 h)**

5.1 Aromaticity of heterocyclic compounds.

5.2 Preparation, properties and uses of furan pyrrole, thiophen and pyridine comparative study of basicity of pyrrole pyridine and piperidine with aliphatic amines.

5.3.Synthesis and reactions of quinoline and isoquinoline.

5.4 Aromatic nitro compounds and amines – reduction in neutral, acidic and alkaline media.

5.5 Diazotisation and its mechanism. Synthetic applications of Diazonium salts.

5.6 Diazomethane and Diazoacetic ester – preparation, properties uses and synthetic uses.

TEXT BOOKS

1. Advanced organic chemistry, B.S. Bahl and Arun Bahl– S.Chand and company ltd.
2. Stereo chemistry, Conformation and mechanism, Kalsi – Newage.
3. Reactions and Reagents, O.P. Agarwal – Goel Publishing House.
4. Jerry March, Advanced Organic Chemistry
5. E. L. Eliel: Stereochemistry of Carbon Compounds

REFERENCE BOOKS:

1.Organic Chemistry, R.T. Morrison and Boyd – Prentice Hall.

2.Stereo Chemistry in organic compounds, – Arora– An mol Publishers.

3.Organic Chemistry for under graduate students, Dr. C.N. Pillai, University Press (India) 2008.

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	1	2	0	3	2	2
CO2	2	1	0	3	1	1
CO3	1	2	1	3	2	2
CO4	1	1	0	3	1	1
CO5	1	2	1	3	1	2
AVERAGE	1.2	1.6	0.4	3	1.4	1.6

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

SEMESTER-V

PHYSICAL CHEMISTRY-I

TOTALHOURS: 60 **SUB CODE: 17UCHCT5011**

CREDIT: 3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1. To gain knowledge on properties of solutions, Phase equilibria and its applications
2. To compare the Kinetics of the reactions and
3. To know about the concepts and applications of adsorption and Catalysis

COURSE OUTCOMES:

On completion of the course the students will be able to…

CO No.	CO Statement
CO1	Identify and analyze the problems in colligative properties and distribution law
CO2	Compare the various curves of one and two component system
CO3	Experience the order of the reactions through experiments and able to calculate the rate constants of various reactions
CO4	Derive the rate constant for bimolecular reactions
CO5	Compare the types of adsorption and catalysis with suitable examples

SYLLABUS

Unit – I **(15 h)**

1.1 Solutions – Henry's law, Raoult's law. Binary liquid mixtures – ideal solutions deviations from ideal behaviour – vapour pressure – composition and vapour pressure – temperature curves – Duhem Margulas equation for binary mixtures, azeotropic distillation.

1.2 Dilute solutions **–** colligative properties **–** Clapeyron – Clausius equation – derivation and uses thermodynamic derivation of elevation of boiling point and depression of freezing point, calculation of molecular weights (problems).

1.3 Distribution law – Thermodynamic derivation and applications.

Unit – II **(15 h)**

Phase equilibria – Gibb's phase rule – statement and definition of terms – Application to one component systems –water and sulphur–reduced phase rule – two component systems – lead – silver system–freezing mixtures–compound formation with congruent melting point–Zn–Mg system, Ferric chloride – water system – incongruent melting point Na–K system.

Unit – III **(10 h)**

Chemical kinetics – Definition of order and molecularity – methods to determine the rate of reactions – derivation of rate constants for I, II and zero order reactions and examples – derivation for time for half change with examples – methods to determine the order of reactions – effect of temperature on the rate of reactions – Arrehenius equation and concept of energy of activation. Numerical problems on calculation of activation energy.

Unit – IV **(10 h)**

Collision theory and derivation of rate constant for bimolecular reactions – theory of absolute reaction rates–thermodynamic derivation for the rate constant for a bimolecular reaction from it – consecutive, parallel and reversible reactions (no derivation only examples).

Unit – V **(10 h)**

5.1 Adsorption – Physisorption and chemisorption – Freundlich adsorption isotherm – Langmuir adsorption isotherm – BET equation (no derivation) – applications of adsorption. Simple Problems on determination of surface area using BET equation.

5.2 Catalysis: – definition– function of a catalyst in terms of Gibb's free energy of activation. Homogeneous & heterogeneous catalysis – kinetics of unimolecular surface reactions.

TEXT BOOKS

1. Elements of Physical Chemistry, Glasstone and Lewis – Macmillan
2. Text book of Physical Chemistry, Glasstone and Macmillan
3. Principles of Physical Chemistry, B.R. Puri and Sharma, Shobanlal Nagin Chand and Co.
4. Atkins, P. W. & Paula, J. de Atkin, Physical Chemistry

REFERENCE BOOKS:

1. Physical Chemistry, G.W. Castellan, Narose Publishing house.
2. Text Book of Physical Chemistry, Atkins

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	2	1	0	2	3	2
CO2	2	1	0	2	3	1
CO3	2	2	2	2	2	3
CO4	1	0	0	2	2	1
CO5	2	2	0	2	3	1
AVERAGE	1.8	1.2	0.4	2	2.6	1.6

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

SEMESTER-V

ANALYTICAL CHEMISTRY

TOTALHOURS: 60 **SUB CODE: 17UCHCT5012**

CREDIT: 3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1. To outline the fundamentals involved Polarography and to demonstrate the polarimetry technique
2. To impart the students in depth knowledge about the basic concepts and theories of microwave NMR and Molecular spectroscopy
3. To study the applications of C ++ language

COURSE OUTCOMES:

On completion of the course the students will be able to…

CO No.	CO Statement
CO1	Discuss pology raphy as an analytical tool in quantitative and qualitative analysis
CO2	Explain, demonstrate the basic principles and uses of Amperometry
CO3	Develop an ability to analyse spectrum and find out the structure of compounds as an application of spectroscopy
CO4	Explain the mass spectrum of simple organic compounds – ethanol, chloro benzene, acetophenone, toluene .
CO5	characteristics and applications of computer in chemistry

SYLLABUS

UNIT I **(10 h)**

Polarography – principle – concentration polarization – dropping mercury electrode – advantages and disadvantages – convection, migration and diffusion currents – Ilkovic equation (derivation not required) and significance – experimental assembly – electrodes – capillary solutions – current voltage curve – oxygen wave – influence of temperature and agitation on diffusion layer – polography as an analytical tool in quantitative and qualitative analysis. Amperometry – basic principles and uses.

UNIT II **(10 h)**

2.1 Polarimetry – principle – instrumentation – Estimation of glucose and sucrose, calculation of optical purity, comparison of acids by hydrolysis.

2.2 Thermal analytical methods – Principle involved in thermo gravimetric analysis and differential thermal analysis – discussion of various components with block diagram – characteristics of TGA and DTA – factors affecting TGA and DTA curves – thermometric titrations.

Unit– III **(15 h)**

NMR spectroscopy – principle of nuclear magnetic resonance – basic instrumentation –shielding mechanism – chemical shift – number of signals – spin – spin coupling and coupling constants – splitting of signals – Proton NMR spectrum of simple organic compounds – ethanol, choloro benzene, acetophenone, toluene.

Unit–IV **(10 h)**

Mass spectrometry – Basic principles of mass spectrum – molecular peak base peak isotopic peak metastable peak their uses fragmentation – Nitrogen rule – instrumentation mass spectrum of simple organic compounds – ethanol, choloro benzene, acetophenone, toluene.

Unit – V **(15 h)**

5.1 Introduction to computers – characteristics of a computer – types of computers – block

diagram of a digital computer.

5.2 Introduction to structure of a C program key terms – the art of programming – general features of a programming language – Algorithm flow chart – the character set of C – types – identifiers –reserved words – variables –constants – keywords – escape – sequence – C operations (basic aspects only)

5.3 Applications of computer in chemistry – (only selected programs) determination of molarity, normality and molality of solutions – calculation of pH.

TEXT BOOKS

1. Analytical Chemistry, R. Gopalan, Sultan Chand.
2. Computers in chemistry, K.V. Raman
3. Instrumental methods of Chemical analysis, Shrivastava and Jain

REFERENCE BOOKS:

1. Fundamentals of analytical chemistry, A. Skoog and M. West.
2. Instrumental methods of Chemical analysis, B.K. Sharma, Goel Publications.
3. Programming with C, Venugopal and prasad.
4. Programming in C (II Edition), E Balguruswamy.
5. Programming language C with practicals, Ananthi Seshasayee – Margam.

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	1	3	1	3	2	2
CO2	2	0	0	2	2	2
CO3	2	2	0	2	3	3
CO4	1	0	0	2	2	2
CO5	2	0	2	2	3	1
AVERAGE	1.6	1	0.6	2.2	2.4	2

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**
Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

SEMESTER-V

PHARMACEUTICAL CHEMISTRY

TOTALHOURS: 60 **SUB CODE: 17UCHCE6001**

CREDIT: 5 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1. To enable the students to understand the basic concepts of Chemistry and routes of drug administration
2. To acquire the knowledge about medicinally important compounds
3. To know the role of synthetic drugs and organic pharmaceutical aids

COURSE OUTCOMES:

On completion of the course the students will be able to…

CO No.	CO Statement
CO1	Identify the chemistry of drug molecules
CO2	Illustrate the routes of drug administration
CO3	Appraise the different types of antiseptics and disinfectants and analgesics
CO4	Analyse the action of drugs and anaesthetics in local and general mode
CO5	Study the chemical nature of hormones and their importance, composition and grouping of blood

SYLLABUS

Unit – I **(10 h)**

1.1 Definition of the following terms – drug, pharmacophore, pharmacology, pharmacopeia, pharmacognosy – pharmacodynamics, pharmacokinetics, bacteria, virus and vaccine.

1.2 Common diseases – types – Air Borne diseases- Diphtheria, Whooping cough, Influenza, Measles, Mumps, Tuberculosis. symptoms and drugs. Water Borne diseases-Cholera, Typhoid, Malaria, Filaria,causes, symptoms and drugs, Digestive system disorder- jaundice,Respiratory system disorder-Asthma, Nervous system-Epilepsy.

Unit – II **(10 h)**

2.1 Indian medicinal plants and uses – Tulasi, neem, Phyllanthus niruri, mango, mint, coriander, Hibiscus, Justicia adhathoda, and Solanium triobatum.

2.2 Antibacterials – Sulpha drugs – examples and actions – prontosil, sulphathiazole, sulphafurazole – Antibiotics – definition and uses of penicillin, streptomycin, chloramphenicol, tetracylines–Erythromycin .

Unit – III **(10 h)**

3.1 Antiseptics and disinfectants – definition and distinction – phenolic compounds, chloro compounds.

3.2 Analgesics – Definition and actions – narcotic and non narcotic – morphine and its derivatives, pethidine and methodone – disadvantages and uses, Antipyretic analgesics – salicylic derivatives, paracetomal, ibuprofen.

Unit – IV **(15 h)**

4.1 Drugs affecting CNS – Definition, distinction and examples for – transqualisers, sedatives, hypnotics, psychedelic drugs – LSD, hashish – their effects.

4.2 Anesthetics – Definition – local and general – volatile nitrous oxide, ether, uses and disadvantages – non volatile –uses and disadvantages, thiopental sodium, methohexitone.

Unit – V **(15 h)**

5.1 Hormones – Introduction; Properties and Functions of hormones – Chemical Nature of Hormones – Structure and physiological functions of thyroxin, oxytocin, adrenaline, insulin, sex hormones.

5.2 Blood – Grouping, composition, Rh factor, blood pressure, hypertension and hypotension – causes and remedies – Diabetes – causes and treatment – hypoglycemic drugs (any two) – lipid profile – HDL, LDL, Lipid lowering drugs.

TEXT BOOK

1. A text book of pharmaceutical chemistry, Jayashree Ghosh – S. Chand.
2. Pharmaceutical chemistry, S. Lakshmi Sultan Chand.
3. Medicinal chemistry, Asutosh Kar – New Age.
4. A text book of biochemistry, Ambika. S.

REFERENCE BOOKS:

1. Biochemistry, A.L. Lehinger.
2. Essentials of biological chemistry, James Fanley – East West press.
3. Experimental pharmaceutical chemistry, Annes Ahmed Siddiqui and Seemi Siddiqui, B.S. Publishers New Delhi.

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	2	3	2	2	2	3
CO2	1	2	1	0	2	2
CO3	2	1	2	2	2	3
CO4	2	2	1	1	2	3
CO5	1	1	0	0	1	2
AVERAGE	1.6	1.8	1.2	1	1.8	2.6

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

SEMESTER-VI

INORGANIC CHEMISTRY-II

TOTALHOURS: 60 **SUB CODE: 17UCHCT6013**

CREDIT: 3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1. To learn about coordination compounds
2. To recognize CFT with reference to complexes
3. To familiarize the types of Chromatographic techniques

COURSE OUTCOMES:

On completion of the course the students will be able to…

CO No.	CO Statement
CO1	Identify, classify and name the coordination compounds
CO2	Learn the types of Metallic carbonyls and their structures
CO3	Classify the splitting of CFT in square planar ,tetrahedral and Octahedral complexes and the study of Spectro chemical series
CO4	Classify SN1,SN2 reactions and the study of trans effect in coordination compounds
CO5	Types of Chromatography and their role of application in separation of compounds

SYLLABUS

Unit – I Coordination Chemistry (10 h)

1.1 Coordination number, types of ligands, chelation and its effects. IUPAC nomenclature.

1.2 Isomerism – Structural isomerism, ionization, hydrate, linkage, ligand and coordination Isomerism

1.3 Stereoisomerism – Geometrical and optical isomerism in 4 and 6 coordinated complexes.

1.4 Werner's theory, Sidgwick's EAN rule, Valence bond theory – postulates, hybridization, geometry and magnetic properties of $[Ni(CN)_4]^{2}$–, $[NiCl_4]^{2}$–, $[Fe(CN)_6]^{3}$–, $[Co(NH_3)_6]^{3+}$ and $[CoF_6]^{3}$–. Limitations of VBT.

Unit – II **(15 h)**

Metallic carbonyls – 18–electron rule, Bonding, hybridization and structures of carbonyls of Ni, Cr, Fe, Co and Mn.

Unit – III **(15 h)**

3.1 Crystal field theory – Postulates, splitting of d–orbitals in octahedral, tetrahedral and square planar complexes. CFSE calculations in octahedral complexes. Factors affecting crystal field splitting.

3.2 Spectrochemical series – low spin and high spin complexes – Explanation of magnetic properties and colour using CFT. Limitations of CFT. Comparison of VBT and CFT.

Unit – IV

4.1 Nucleophilic substitution reactions in octahedral complexes – SN^1, SN^2

4.2 Trans effect in square planar complexes and its explanation by electrostatic polarization theory and π–bonding theory.

Unit – V Chromatography (10 h)

5.1 Chromatography techniques – column chromatography – Principles – adsorption, adsorbents – preparation of column elution, recovery of substance and applications– Thin layer Chromatography (TLC) – choice of adsorbent and solvent – preparation of chromatogram and application – Rf value.

5.2 Partition and paper chromatography – Solvents used and principles – factors affecting Rf value – separation of amino acid mixtures.

5.3 Ion exchange chromatography – Principle – resins – action of resins – experimental techniques – applications – separation of Zn–Mg,Co–Ni, Chloride – bromide.

5.4 Gas chromatography and High Pressure Liquid Chromatography – Principles – experimental techniques – instrumentation and applications. Electrophoresis

TEXT BOOKS

1. Text book of Inorganic Chemistry, P.L. Soni.
2. Advanced Inorganic Chemistry, R.D. Madan.
3. Selected topics in Inorganic Chemistry, Wahid. U. Malik, G.D. Tuli , R.D. Madan.
4. Analytical Chemistry, R. Gopalan – Sultan Chand.
5. Concise coordination chemistry, Gopalan.

REFERENCE BOOKS:

1. Advanced Inorganic Chemistry, Sarkar.
2. Fundamentals of analytical chemistry, A. Skog and M. West.
3. Instrumental methods of Chemical analysis, B.K. Sharma, Goel Publications.
4. Instrumental methods of Chemical analysis, Shrivastava and Jain.
5. Advanced Inorganic Chemistry, J.E. Huheey.

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	2	1	2	2	2	0
CO2	1	1	1	2	1	0
CO3	1	0	2	2	1	0
CO4	1	0	0	2	0	0
CO5	1	2	1	2	1	2
AVERAGE	1.2	0.8	1.2	2	1	0.4

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

SEMESTER-VI

ORGANIC CHEMISTRY-II

TOTALHOURS: 60 **SUB CODE: 17UCHCT6014**

CREDIT: 3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1. To study the preparation and properties of aldehydes and ketones
2. Classification of amino acids, proteins,Carbohydrates and Alkaloids
3. To understand the mechanism of molecular rearrangement

COURSE OUTCOMES:

On completion of the course the students will be able to…

CO No.	CO Statement
CO1	Compare the preparation and properties of Aldehydes and Ketones
CO2	Classify the amino acids and synthesis of polypeptides
CO3	Study the classification, reaction and properties of Carbohydrates
CO4	Compare the structural Elucidation of Terpenes,Vitamins and Alkaloids
CO5	Discuss the different Molecular arrangements

SYLLABUS

UNIT – I **(10 h)**

1.1 Aldehydes: aliphatic and aromatic aldehydes– methanal, ethanal, propanal, benzaldehyde, salicylaldehyde, unsaturated aldehydes–preparation and reactions.

1.2 Ketones–aliphatic and aromatic ketones – propanone–butanone – acetophenone and benzophenone, quinones, unsaturated ketones–preparation and properties

UNIT – II **(10 h)**

2.1 Amino acids–classification of amino acids, Essential and Non–essential amino acids, Preparation of α–amino acids, Zwitter ions, iso–electric points. Peptides– synthesis–Merrifield's method for the synthesis of polypeptide on a solid support, determination of structure of polypeptides, end group analysis

2.2 Protiens: –Classification based on physical and chemical properties and on physiological functions. Primary and secondary structure of proteins. Helical and sheet structures (elementary treatment only) Denaturation of proteins. Nucleic acids. Types of nucleic acids – DNA and RNA, polynucleotide chain components – biological functions.

UNIT III **(15 h)**

3.1 Carbohydrates: Classifications – Reactions of glucose and fructose – osazone formation. Mutarotation and its mechanism – Constitution of glucose and fructose. Cyclic structure. Determination of ring size. Haworth projection formula, configuration of monosaccharides. Epimerisation, chain lengthening and chain shortening of aldoses, inter conversion of aldoses and ketoses.

3.2 Disaccharides: Reactions and structure of sucrose.

3.3 Polysaccharides: Properties and structure of starch and cellulose.

UNIT IV **(15h)**

4.1 Alkaloids –General methods of isolation and general methods of structural elucidation. Structure elucidation of coniine and piperine .

4.2 Terpenes – isoprene rule. Structure elucidation of Citral and alpha terpineol.

4.3 Vitamins – Classification – structure elucidation of ascorbic acid.

UNIT V **(10h)**

Molecular rearrangements – Classification as anionotropic, cationotropic, sigmatropic and intramolecular. Pinacol – pinacolone rearrangement, Beckmann, Hoffmann, Benzilic acid rearrangement – mechanism only.

TEXT BOOKS

1. Text book of Organic Chemistry, K.S.Tewari, S.N. Mehrotra and N.K. Vishno – Vikas Publishing house private limited.
2. Chemistry of Organic Natural Products, O.P. Agarwal – Goel Publishing house.
3. Reactions and Reagents, O.P. Agarwal – Goel Publishing House.

REFERENCE BOOKS:

1. Organic Chemistry, R.T. Morrison and Boyd – Prentice Hall.
2. Synthetic dyes, Gurdeep R. Chatwal – Himalaya Publishing House.
3. Organic Chemistry, I.L. Finar, Vol I & II, Longman Group Limited.

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	1	2	0	3	2	2
CO2	1	2	0	3	1	2
CO3	1	3	0	3	1	2
CO4	1	2	0	3	1	1
CO5	1	0	0	3	1	1
AVERAGE	1	1.8	0	3	1.4	1.6

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

SEMESTER-VI

PHYSICAL CHEMISTRY-II

TOTALHOURS: 60 **SUB CODE: 17UCHCT6015**

CREDIT: 3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1. To study the conductance and its measurements
2. To discuss the Electrochemical cell and its applications
3. To identify the symmetry operations and point group

COURSE OUTCOMES:

On completion of the course the students will be able to…

CO No.	CO Statement
CO1	Study the Transport number and the conductance
CO2	Discuss the salt Hydrolysis and theory of strong electrolytes
CO3	Identify the electrode reactions and the concentration of the electrode-electrolyte
CO4	Applications of emf measurements and Concentration cells
CO5	products of symmetry operations and construction of multiplication table

SYLLABUS

Unit – I **(15 h)**

Metallic and electrolytic conductors – specific, equivalent and molar conductance –measurement of conductance – variation of conductance with dilution for strong and weak electrolytes (qualitative explanation) – Transport number and its determination by Hittorff's and moving boundary method – effect of temperature and concentration – ionic mobility and ionic conductance – Kohlrausch's law and its applications.

Unit – II **(15 h)**

2.1 Salt hydrolysis and pH of a salt solution, buffer action and explanation – buffers in human systems – Phosphate buffer and bicarbonate – carbonate buffer. Theory of strong electrolytes – and Debye – Huckel – Onsager theory – verification of Onsager equation – Wein effect and Debye – Falkenhagen effect – ionic strength. Activity and activity coefficients of strong electrolytes.

2.2 Applications of conductivity measurements – degree of hydrolysis, solubility product and conductometric titrations.

Unit – III **(10 h)**

3.1 Galvanic cells – reversible and irreversible electrodes and cells – standard cell – emf and its measurement – types of electrodes – electrode reactions – electrode potentials – reference electrodes – standard electrode potentials.

3.2 Derivation of Nernst equation for electrode potential and cell emf – sign conventions – electrochemical series and its applications – formation of cells – electrode and cell reactions – cell emf – chemical cells and concentration cells with and without transference – examples – liquid junction potential.

Unit – IV **(10 h)**

4.1 Applications of emf measurements – calculation of ΔG. ΔH, ΔS and equilibrium constants – determination of pH using quinhydrone and glass electrodes – potentiometric titrations.

4.2 Applications of Concentration cells – determination of valency of ions – transport number – solubility product.

Unit – V **(10 h)**

5.1 Group theory – Symmetry operations – products of symmetry operations – classes and subgroups – group multiplication table – properties of a group – point groups – C_2v, C_3v, C_2h, (any one example for each).

TEXT BOOKS

1. Electro Chemistry, S. Glasstone – Macmillan.
2. Principles of Physical Chemistry, B.R. Puri and Sharma, Shobanlal Nagin Chand and Co.
3. An introduction to Green Chemistry, V. Kumar.
4. Environmental Chemistry, A.K. De.
5. Group Theory in Chemistry, V. Ramakrishnan and M.S. Gopinathan, Vishal Publications.

REFERENCE BOOKS:

1. New Trend in Green Chemistry, V.K. Ahluwalia and M. Kidwai.
2. Fundamentals of Electro Chemical Methods, Allan Bard.
3. Modern Electro Chemical Methods, Crow
4. Physical Chemistry Through Problems, S.G. Dogra. New Age International.
5. Environmental Chemistry for Sanitary Engineering, Sawyer abd Mecrty.

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	2	2	0	3	3	2
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CO3	1	1	0	3	2	1
CO4	1	1	0	3	3	2
CO5	1	1	1	3	2	1
AVERAGE	1.2	1.6	0.4	3	2.6	1.6

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

SEMESTER-VI

INDUSTRIAL CHEMISTRY

TOTALHOURS: 60 **SUB CODE: 17UCHCE6002**

CREDIT: 5 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1. To familiarize the theories of color and constitution/classification of dyes
2. To acquire knowledge about the process of dyeing
3. To gain vivid insight into the types of dyes, their synthesis, characteristics/applications

COURSE OUTCOMES:

On completion of the course the students will be able to…

CO No.	CO Statement
CO1	Relate the types of theories Onto colour and constitution, classification of dyes and their applications in different areas
CO2	Types of fuels and their application –types of fuel cells with current application in different commodities
CO3	Study about the treatment of water, COD, BOD methods and purification of potable water
CO4	Identify and determine the significant parameters of fats,oils,classify the types of soap and detergents and their applications
CO5	Study the industrial mode and manufacture of metals in the field of engineering and Industries

SYLLABUS

UNIT –I Dyes (10 h)

Dyes –Classification–according to structure and method of application. Definition and examples of Auxochrome and Chromophor. Preparation and uses of 1) Azo dye– methyl orange, 2) Triphenyl methane dye–Malachite green, 3) Phthalein dye – fluorescein 4) Vat dye – indigo, 5) Anthraquinone dye –alizarin, Natural dyes

UNIT–II Fuel cells (15 h)

2.1 Fuel Cells– Definition, Efficieny of fuel cells, Types of Fuel cells–Primary cells–Zinc–Air Fuel cells, Molten Carbonate Cell, Proton Exchange membrane cell, Secondary cells–Zinc–Silveroxidecells, Iron–Nickel oxide cells, Advantages and Disadvantages of cells, Applications of Fuel cells.

2.2 Individual members: solid fuel – coal– analysis of coal. High and low temperatures carbonisation of coals. Manufacture of coal gas. Fractional distillation of coal tar.

2.3 Liquid fuel: Petroleum, occurrence, mining of petroleum. Distillation of crude petroleum. Knocking – Antiknock compounds – octane number and cetane number. Cracking – liquid phase, cracking –Aviation gasoline.

2.4 Gaseous fuel: Natural and artificial gaseous fuels, water gas, carburetted water gas, producer gas, semi water gas. Advantages of gaseous fuels, gas analysis

UNIT – III Water (10 h)

Treatment of water for municipal purposes, Sewage and its composition, Purpose of sewage treatment– methods of sewage treatment. Sterilisation and disinfection of water – chemical methods of sterilisation – precipitation method, aeration, ozonolysis – analysis of water – BOD, COD, TDS

UNIT– IV Fats and Soaps (10 h)

4.1 Fats and oils – Extraction, refining, structure, composition and analysis – Saponification number, iodine number, acid number and RM number; determination of iodine value and saponification value

4.2 Soaps and detergents – raw materials and manufacture, classification, synthesis and applications, mechanism of cleaning action, superiority of detergents over soaps

UNIT – V Electrochemical industries (15 h)

Introduction, Aluminium, Raw materials, Quantitiative requirements, carbon electrodes, Manufacture of Al, Physico–chemical techniques involved. Magnesium–raw materials, preparation of anhydrous $MgCl_2$ from carnallite, preparation of MgO from dolomite, $KMnO_4$ preparation uses. Hydroxylamine – preparation by electrolytic method – uses

TEXT BOOKS

1. Analytical Chemistry, R. Gopalan, Sultan Chand.
2. Industrial Chemistry, B.K. Sharma
3. Instrumental methods of Chemical Analysis, B.K. Sharma – Goel Publications
4. Electro Chemistry, S. Glasstone – Macmillan
5. Principles of Physical Chemistry, B.R. Puri and Sharma, Shobanlal Nagin Chand and Co.

REFERENCE BOOKS:

1. Fundamentals of analytical chemistry, A. Skog and M. West.
2. Handbook of Industrial Chemistry, Riegel (ed)
3. Instrumental methods of Chemical Analysis, Willard Merrit and Dean.
4. Chemical Process Industries (4_{th} Edition), R. Norris Shreve Joseph A.Brink,Jr.
5. Perfumes, Cosmetics and Soaps, W.A.Poucher (Vol.3)

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	2	2	1	2	2	2
CO2	1	2	0	1	1	1
CO3	2	2	1	1	1	1
CO4	2	2	1	1	1	3
CO5	1	1	0	1	1	0
AVERAGE	1.6	1.8	0.6	1.2	1.2	1.4

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

SEMESTER-VI

RESEARCH BASED PROJECT

TOTALHOURS: 4 **SUB CODE: 14UCHER6001**

CREDIT: 5 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1. To familiarize the theories, reactions and mechanisms of Organic chemistry
2. To acquire knowledge on the mechanism of name reactions
3. To apply and analyse the synthesized compounds using spectroscopic methods

COURSE OUTCOMES:

On completion of the course the students will be able to…

CO No.	CO Statement
CO1	Identify the organic compounds and to study the fundamentals of the compounds
CO2	Synthesize /prepare the simple organic compounds
CO3	Express their innovative ideas
CO4	Develop an aptitude for doing research and preliminary ideas for writing a thesis
CO5	Analyze and interpret the data

Study of Simple Organic compounds by Spectroscopic techniques

Mapping of CO with PSO

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CO1	2	2	0	2	2	3
CO2	2	2	0	1	1	1
CO3	2	2	1	2	2	3
CO4	3	2	1	2	2	3
CO5	1	1	0	2	3	1
AVERAGE	2	1.8	0.4	1.8	1.2	2.2

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz,

seminar.

PRACTICAL III

PHYSICAL CHEMISTRY PRACTICALS

TOTALHOURS: 3 **SUB CODE: 13UCHCP6003**

CREDIT: 3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1. To compare the organic and aqueous layer to determine the distribution coefficient
2. To compare the Kinetics of the reactions and molecular weight of an unknown solute
3. To determine the equivalent conductance's ,strength of solution using conductometric and potentiometric method

COURSE OUTCOMES: on completion of the course the students will be able to…

CO No.	CO Statement
CO1	Determine the partition coefficient Iodine in carbon tetrachloride and Iodine in water and molecularity of the unknown solute
CO2	Determine the effect of impurity and the transition temperature of the salt hydrate
CO3	Experience the rate constant of the reactions
CO4	Determine the cell constant and equivalent conductance's of the given solution
CO5	Compare the titration of acid-base using conductometric and potentiometric methods

SYLLABUS

1. Distribution Law

1.1 Determination of partition coefficient of iodine between carbon tetra chloride and water

2. Kinetics

2.1 Determination of the rate constant of the following reactions:

2.2 Acid catalyzed hydrolysis of an ester (methyl or ethyl acetate)

2.3 Iodination of acetone

3. **Molecular weight of a solute** – Rast's method using naphthalene, para dichlorobenzene and diphenyl as solvents

4. Heterogeneous equilibria:

4.1 Phenol – water system – CST

4.2 Effect of impurity – 2% NaCl solutions on phenol – determination of the concentration of the given solution

4.3 Determination of the transition temperature of the given salt hydrate $Na_2S_2O_3 \cdot 5H_2O$, $CH_3COONa \cdot 3H_2O$, $SrCl_2 \cdot 6H_2O$, $MnCl_2 \cdot 4H_2O$

5. Electrochemistry:

5.1 Determination of cell constant and equivalent conductivities of solutions of two different concentrations.

5.2 Conductometric titration of a strong acid against a strong base.

5.3 Potentiometric titration of strong acid and strong base

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	2	1	2	2	2	3
CO2	2	1	0	2	3	2
CO3	1	2	1	2	2	3
CO4	2	2	1	2	2	3
CO5	2	2	2	2	2	3
AVERAGE	1.8	1.6	1.2	2	2.2	2.8

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

PRACTICAL III

PHYSICAL CHEMISTRY PRACTICALS

Test - 30 marks
Attendance – 10 marks

External – 60 marks
Record - 10 marks
Accuracy - 30 marks
Experimental
Skill and presentation
of data - 20 marks

(1) Kinetics
Graph - 6 marks
Below a factor of 10- 24 marks
By a factor of 10 - 18 marks
More than the above-10 marks

(2) Distribution co-efficient
Error upto 10% - 30 marks
Error upto 12% - 27 marks
Error upto 14% - 24 marks
Error upto 16% - 18 marks
Error upto and
Above 20% - 10 marks

(**3) Molecular weight**
Error upto 10% - 30 marks
Error upto 20% - 20 marks (1 mark to be reduced for each percent)
Error upto 30% - 10 marks (1 mark to be reduced for each percent)
Error above 30% - 6 marks

(4) Effect of electrolyte (Concentration of electrolyte)
Error upto 10% - 30 marks
Error upto 20% - 20 marks (1 mark to be reduced for each percent)
Error upto 30% - 10 marks (1 mark to be reduced for each percent)
Error above 30% - 6 marks

(5) Transition temperature

Error upto 2°c difference - 30 marks
Error upto 7°c difference - 15 marks (reduce 3 marks for each degree)
Error above 7°c - 10 marks

(6) Conductometric titration

Error upto 10% - 30 marks
Error upto 15% - 27 marks
Error upto 20% - 21 marks
Error above 20% - 10 marks

(**7) Conductance - Cell constant**

Error upto 10% - 20 marks
Error upto 15% - 15 marks
Error above 15% - 10 marks

(8) Conductance for solutions

Error upto 10% - 10 marks
Error upto 15% - 5 marks
Error above 15% - 2 marks (* 5 marks for each solutions)

(9 Poteniometric titration

Error upto 10% - 30 marks
Error upto 15% - 27 marks
Error upto 20% - 21 marks
Error above 20% - 10 marks

PRACTICAL IV

GRAVIMETRIC ANALYSIS

TOTALHOURS: 3 **SUB CODE: 13UCHCP6004**

CREDIT: 3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1. To estimate the amount of barium and sulphate precipitating as Barium sulphate using Silica crucible
2.To estimate Lead and barium precipitating as chromate using sintered Crucible

COURSE OUTCOMES:

On completion of the course the students will be able to…

CO No.	CO Statement
CO1	Analyze gravimetrically precipitating Barium as Barium sulphate using silica Crucible
CO2	Estimate the amount of Barium as barium Chromate using Sintered Crucible
CO3	Analyze the amount of Lead as Lead Chromate
CO4	Demonstrate the estimation of chloride and Nickel

SYLLABUS

1. Estimation of sulphate as barium sulphate.
2. Estimation of barium as barium sulphate.
3. Estimation of barium as barium chromate.
4. Estimation of Lead as Lead chromate.

*5. Estimation of chloride as silver chloride.

*6. Estimation of Calcium as Calcium oxalate monohydrate.

* 7. Estimation of Nickel as DMG complex.

*Not to be given for examination.

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	2	3	0	2	2	1
CO2	2	3	0	2	2	2
CO3	2	3	0	2	2	1
CO4	2	2	1	2	2	1
AVERAGE	2	2.8	0.25	2	2	1.25

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

PRACTICAL IV

GRAVIMETRIC ANALYSIS

TOTALHOURS: 3 **SUB CODE: 13UCHCP6004**

CREDIT: 3 **L-T-P: 4-0-0**

Gravimetric Analysis – 75 marks
Internal - 30 marks
External - 45 marks

Internal – 20 marks
Attendance - 10 marks
Test - 20 marks

External – 45 marks

Accuracy	-	35 marks
Record	-	10 marks

Error upto	2%	-	35 marks
Error upto	3%	-	30 marks
Error upto	4%	-	25 marks
Error >4%		-	15 marks

PRACTICAL V

ORGANIC ANALYSIS

TOTALHOURS: 3 **SUB CODE: 13UCHCP6005**

CREDIT: 3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1. To analyze the organic compounds using microscale analysis
2. To identify the functional groups also to prepare their derivatives present in the organic compounds
3. To prepare the organic compounds by one stage method and also recrystallize them with alcohol or water and to determine the boiling point for the given liquids

COURSE OUTCOMES:

On completion of the course the students will be able to…

CO No.	CO Statement
CO1	Prepare organic substances by oxidation, Nitration, Halogenation and recrystallize them using water/alcohol
CO2	Determine the boiling point of the given liquids
CO3	Identify the functional group and elements present in organic substance
CO4	Prepare the derivative of the analyzed organic substance
CO5	Utilize the minimum amount of reagents to analyze the organic substances

I Organic preparations:

a) Oxidation (benzaldehyde to benzoic acid)

b) Hydrolysis (methyl salicylate or ethyl benzoate to the acid)

c) Nitration (Nitrobenzene to m- dinitrobenzene)

d) Halogenation (Acetanilide to p-bromo acetanilide)

e) Acylation (β - Naphthol to β - Naphthyl benzoate)

II) Determination of the boiling point of the given liquid.

III) **Organic analysis:**

Analysis of organic compounds containing one functional group and characterization with a derivative.

Aldehyde, ketone, carboxylic acid (mono and di) , ester, carbohydrate (reducing) phenol, aromatic primary amine, amide nitro compound, diamide and anilide.

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	2	3	0	2	1	3
CO2	2	3	0	2	2	2
CO3	2	3	3	2	2	2
CO4	2	2	2	2	2	3
CO5	1	2	2	2	1	1
AVERAGE	1.8	2.6	1.8	2	1.6	2.2

KEY:

PEDAGOGY (TEACHING METHODOLOGY**):**

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

PRACTICAL V

ORGANIC ANALYSIS

SUB CODE:13UCHCP6005 **INT MARKS:40**
SEMESTER: VI **EXT MARKS:60**

Organic Analysis - 100 marks
Internal - 40 marks
External - 60 marks

Internal

Attendance - 10 marks
Test - 30 marks

External – 60 marks

Record	-10 marks	
Preparation / Boiling point	- 15 marks	(Preparation- Crude-10 samples Recrystallized- 5 samples)
Organic Analysis	- 35 marks	
Detection of elements	- 6 marks	
Saturated/unsaturated	- 3 marks	
Aliphatic/Aromatic	- 2 marks	
Preliminary tests	- 10 marks	
Tests for functional group	- 10 marks	
Derivative	- 4 marks	
	35 marks	

Determination of the Boiling point

Error upto $\pm$ 1°c	-15 marks
Error upto $\pm$ 2°c	-13 marks
Error upto $\pm$ 3°c	-11 marks
Error > $\pm$ 3°c	- 09 marks

ALLIED CHEMISTRY-I

TOTALHOURS: 3 **SUB CODE: 20UPHAT1001**
CREDIT: 3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1. To gain knowledge about the theories of chemical bonding
2. To enable the students to learn the concepts involved in metallurgy, energetics and chromatography
3. To understand the different terms involved in covalent bonding and stereoisomerism

COURSE OUTCOMES:

On completion of the course the students will be able to…

CO No.	CO Statement
CO1	Know the fundamentals of chemical bonding and to compare the MO configuration and hybridization of Interhalogen compounds
CO2	Familiarize the methods of extraction and uses of alloys and steel
CO3	Study the fundamentals of energetics and need for the second law of thermodynamic and also its importance
CO4	Explain the basic principles involved in chromatography
CO5	Study the nature of covalent bond, stereoisomerism and aromatic compounds with reference to naphthalene

SYLLABUS

UNIT 1 **(15h)**

1.1 Chemical bonding: Molecular Orbital theory – bonding, anti-bonding, non-bonding orbitals, Bond order, M.O. configuration of H_2, N_2, O_2.

1.2 Interhalogen compounds: ICl, BrF_3, IF_5 and IF_7. Preparation, properties, hybridization and shapes.

UNIT 2 **(10h)**

Metals: General methods of extraction of metals. Types of ores- methods of ore dressing, reduction methods- types of refining- electrolytic, Van Arkel and Zone refining. Role of carbon in the properties of steel, Heat treatment of steel, Alloy steel and their uses.

UNIT 3 **(15h)**

Energetics: Types of systems, intensive and extensive properties, reversible and irreversible processes, isothermal and adiabatic processes and spontaneous processes- Statements of First law. Need for the II law of thermodynamics and statements. Carnot's cycle and efficiency of a heat engine. Entropy and its significance.

UNIT 4 **(5h)**

Chromatography: Principles and applications of column, paper and thin layer chromatography.

UNIT 5 **(15h)**

5.1 Covalent Bond: Orbital overlap hybridization and geometry of CH_4, C_2H_4, C_2H_2 and C_6H_6 molecules.

5.2 Stereoisomerism: Elements of symmetry-symmetry and asymmetry – cause of optical activity. Isomerism of Lactic acid - racemisation and resolution. Geometrical isomerism of Maleic and Fumaric acids.

5.3 Aromatic compounds: Properties, uses and structural elucidation of naphthalene- Haworth's synthesis.

Text books:

1. Text book of Inorganic chemistry by P.L. Soni.
2. Text book of Organic chemistry by P.L. Soni.
3. Ancillary chemistry by A. Ramachandra Sastri.
4. Fundamentals of chemistry by R. Gopalan and S. Sundaram
5. Principles of Physical chemistry by Puri, Sharma and Pathania

Reference books:

1. Advanced Inorganic Chemistry Wiley Interscience 1999, 6th Edition.F. Albert Cotton and Geoffrey Wilkinson
2. Concise Inorganic Chemistry Wiley India 2010 Reprint, . J.D. Lee

WEBSITES & e-LEARNING:

1. www.virtlab.com
2. http://nptel.ac.in
3. MATLAB
4. Mooc.org
5. http://swayam.gov.in

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
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CO2	2	1	1	2	2	1
CO3	3	1	0	2	2	0
CO4	2	2	0	2	2	3
CO5	2	2	2	2	1	0
AVERAGE	2.2	1.2	1	2	2	1

PEDAGOGY

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar

ALLIED CHEMISTRY-II

TOTALHOURS: 3 **SUB CODE: 20UPHAT2002**
CREDIT: 3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

1. To gain knowledge in the field of carbohydrates, Amino acids
2. To understand the concepts involved in industrial chemistry
3. To learn the concepts involved in electrochemistry

COURSE OUTCOMES:

On completion of the course the students will be able to…

CO No.	CO Statement
CO1	Define and summarise carbohydrates and amino acids
CO2	Examine the basic concepts of analgesics, antipyretics and anaesthetics
CO3	Analyze the fuel gases and fertilisers
CO4	Relate photochemistry with phosphorescence and fluorescence
CO5	Recognize the basic concepts of electrochemistry

SYLLABUS

UNIT-I **(15h)**

1.1 Carbohydrates: Classification – properties of glucose and fructose- discussion about open-chain structure of glucose and fructose. Properties and Structures of sucrose. (No Structural Elucidation)

1.2 Aminoacids: Classification, preparation and properties of alpha amino acids, Peptide synthesis, classification of proteins by physical Properties and biological functions, elementary ideas about RNA, DNA.

UNIT-II **(10h)**

Definition and one example each- analgesics, antipyretics, tranquilisers, sedatives, hypnotics, local anesthetics and general anesthetics. Cause and treatment of –Diabetes, cancer and AIDS.

UNIT-III **(10h)**

3.1 Industrial chemistry: Fuel gases- Natural gas, water gas, semi-water gas, Carburetted water gas, producer gas, oil gas (composition and uses only).

3.2 Synthesis, properties and uses of silicones.

3.3 Fertilisers: Preparation and uses of urea, ammonium sulphate, superphosphate, triple superphosphate and NPK fertilizer.

UNIT-IV **(10h)**

Photochemistry: Grotthus-Draper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield, Examples for photochemical reactions, Phosphorescence, Fluorescence, Chemi luminescence and photosensitization – definitions with examples.

UNIT-V **(15h)**

5.1 Electrochemistry-I: Strong and weak electrolytes, common ion effect, pH, buffer solutions, Henderson equation and buffer action in biological systems.

5.2 Electrochemistry-II: Galvanic cells: EMF, standard electrode potentials, reference electrodes (NHE and Calomel).

Text books:

1. Text book of Inorganic chemistry by P.L. Soni.
2. Text book of Organic chemistry by P.L. Soni.
3. Ancillary chemistry by A. Ramachandra Sastri.
4. Fundamentals of chemistry by R. Gopalan and S. Sundaram
5. Principles of Physical chemistry by Puri, Sharma and Pathania

Reference Books:

1. Pharmacology and pharmacotheapeutics by R.S. Satoskar and S.D. Bhandarkar.
2. Advanced Organic chemistry by B.S. Bahl and Arun Bahl.
3. Text book of Inorganic chemistry by P.L. Soni.
4. Principles of Physical chemistry by Puri, Sharma and Pathania.
5. Ancillary chemistry by Ramachandra Sastri.
6. Fundamentals of chemistry by R. Gopalan

Mapping of CO with PSO

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CO2	2	1	1	2	2	1
CO3	3	1	0	2	2	0
CO4	2	2	0	2	2	3
CO5	2	2	2	2	1	0
AVERAGE	2.2	1.2	1	2	2	1

PEDAGOGY

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

WEBSITES & e-LEARNING:

1. www.virtlab.com
2. http://nptel.ac.in
3. MATLAB
4. Mooc.org
5. http://swayam.gov.in