

**GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS)
KUMBAKONAM
DEPARTMENT OF CHEMISTRY**

Programme : B.Sc.,Chemistry

ProgrammeCode : USCH



SYLLABUS

2021 – 2022 ONWARDS

GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS) KUMBAKONAM
(Curriculum – B.Sc., CHEMISTRY – 2021- 2022 ONWARDS)

DEPARTMENT : CHEMISTRY
SEMESTER – I

Programme Code: USCH

Part	Course Type	Course Code	Title of the Course	Hrs/Week	Credits	Exam Hrs	Marks		
							CIA	ES E	Total
I	Ability Enhancement	U211T1	Tamil	6	3	3	25	75	100
II	Ability Enhancement	U211E1	English	6	3	3	25	75	100
III	Core – I	U21CHC101	General Chemistry -I	6	5	3	25	75	100
III	Core – II	U21CHC102 P	Volumetric Analysis Practical	3	2	3	40	60	100
III	Allied - I	U211AM1	MATHS - Calculas fourier series ZOOLOGY -Biology of invertebrates and chordates	5	4	3	25	75	100
		U211AZ1							
III	Allied – II	U211AM2	MATHS - Algebra, ODE & Trigonometry ZOOLOGY - Zoology Practical	2	-	-	-	-	-
		U212AZ2P							
IV	Ability Enhancement	U211VE	Value Education	2	2	3	25	75	100
Total				30	19	-	-	-	600

SEMESTER - II

Part	Course Type	Course Code	Title of the Course	Hrs/Week	Credits	Exam Hrs	Marks		
							CI A	ES E	Total
I	Ability Enhancement	U212T2	Tamil	6	3	3	25	75	100
II	Ability Enhancement	U212E2	English	4	3	3	25	75	100
III	Core - III	U21CHC203	General Chemistry -II	6	5	3	25	75	100
III	Core - IV	U21CHC204P	Inorganic Qualitative Analysis Practical	3	2	3	40	60	100
III	Allied -II	U212AM2	MATHS - Algebra, ODE & Trigonometry ZOOLOGY - Zoology Practical Zoology Practical	2	4	3	25	75	100
		U212AZ2P					40	60	
III	Allied - III	U212AM3	MATHS - Laplace transform, calculus and vector calculus ZOOLOGY - General principles of applied zoology	5	4	3	25	75	100
		U212AZ3							
IV	Ability Enhancement	U212ES	Environmental Studies	2	2	3	25	75	100
IV	Nan Mudhalvan Course	U23NM2LP	Language Proficiency for Employability	2	2	-	-	-	-
Total				30	23				700

SEMESTER - III

Part	Course Type	Course Code	Title of the Course	Hrs / Week	Credits	Exam Hrs	Marks		
							CI A	ES E	Total
I	Ability Enhancement	U213T3	Tamil	6	3	3	25	75	100
II	Ability Enhancement	U213E3	English	6	3	3	25	75	100
III	Core V	U21CHC305	General Chemistry -III	6	5	3	25	75	100
III	Core VI	U21CHC306 P	Organic Chemistry Practical	3	2	3	40	60	100
III	Allied - IV	U213APH1	Physics	5	4	3	25	75	100
III	Allied - V	U214APH2P	Physics Practical	2	-	-	-	-	
IV	Non Major Elective - I	U21CH3NM E1:1	Agricultural Chemistry (NMEC- I A)	2	2	3	25	75	100
		U21CH3NM E1:2	Chemistry of consumer products (NMEC- I B)						
Total				30	19	-	-	-	600
	Self Study Course - I	U213SS1	Mathematical Aptitude for Recruitment Examinations	-	2	2	-	100	100

SEMESTER - IV

Part	Course Type	Course Code	Title of the Course	Hrs/Week	Credits	Exam Hrs	Marks		
							CI A	ES E	Total
I	Ability Enhancement	U214T4	Tamil	6	3	3	25	75	100
II	Ability Enhancement	U214E4	English	6	3	3	25	75	100
III	Core -VII	U21CHC407	General Chemistry –IV	4	4	3	25	75	100
III	Core – VIII	U21CHC408P	Physical Chemistry Practical - I	3	2	3	40	60	100
III	Allied - V	U214APH2P	Physics Practical	2	4	3	40	60	100
III	Allied - VI	U214APH3	Physics	3	3	3	25	75	100
IV	Non Major Elective– II	U21CH4NME2:1	Industrial Chemistry (NMEC- II A)	2	2	3	25	75	100
		U21CH4NME2:2	Basic Clinical Chemistry(NMEC-II B)						
IV	Skill Enhancement – I Theory	U214CHSE1	Hydrochemistry	2	2	2	25	75	100
	Nan Mudhalvan Course	U23NM4DS	Digital Skills For Employability	2	2	-	-	-	-
Total				30	25				800
	Self Study Course – II	U214SS2	Social Studies for Competitive Examinations		2	2	-	100	100

SEMESTER – V

Part	Course Type	Course Code	Title of the Course	Hrs / Week	Credits	Exam Hrs	Marks		
							CI A	ES E	Total
III	Core – IX	U21CHC509	Inorganic Chemistry -I	5	5	3	25	75	100
III	Core – X	U21CHC510	Organic Chemistry –I	5	5	3	25	75	100
III	Core – XI	U21CHC511	Physical Chemistry-I	5	5	3	25	75	100
III	Core – XII	U21CHC512P	Gravimetric Analysis Practical	6	4	6	40	60	100
III	Major Based Elective – I	U21CH5MB E1:1	Analytical Chemistry- (E-IA)	5	5	3	25	75	100
		U21CH5MB E1:2	Water treatment and analysis(E-IB)						
		U21CH5MB E1:3	Organic synthesis- (E-IC)						
IV	Skill Enhancement – II Theory	U215CHSE 2	Domestic Chemistry	2	2	2	25	75	100
IV	Skill Enhancement – III Theory	U215CHSE 3	Impact of Medicinal Plants on Society	2	2	2	25	75	100
Total				30	28				700

SEMESTER – VI

Part	Course Type	Course Code	Title of the Course	Hrs/Week	Credits	Exam Hrs	Marks		
							CI A	ES E	Total
III	Core – XIII	U21CHC613	Organic Chemistry –II	6	5	3	25	75	100
III	Core – XIV	U21CHC614	Physical Chemistry-II	6	5	3	25	75	100
III	Core – XV	U21CHC615P	Physical Chemistry Practical - II	6	4	3	40	60	100
III	Major Based Elective – II	U21CH6M BE2:1	Inorganic Chemistry –II (E-IIA)	6	5	3	25	75	100
		U21CH6M BE2:2	Food chemistry - (E - IIB)						
		U21CH6M BE2:3	Role of chemistry in life - (E -IIC)						
III	Major Based Elective – III	U21CH6M BE3:1	Pharmaceutical Chemistry- (E-III A)	5	5	3	25	75	100
		U21CH6M BE3:2	Bio chemistry- (E-III B)						
		U21CH6M BE3:3	Applied chemistry - (E- III C)						
V	Ability Enhancement	U216GS	Gender Studies	1	1	3	25	75	100
V		U21EA	Extension Activities	-	1	-	-	-	-
Total				30	26				600

Programme Outcomes :

PO 1: Provides a broad foundation of chemistry

PO 2 : Understand the importance of elements in periodic table and its role in daily life and organizing chemical information.

PO 3: Able to Interpret and analyze quantitative data.

PO 4 : This course will equip the students to face the employment challenges and instil confidence to turn into entrepreneur and expand their knowledge, available opportunities related to chemistry in government services through exams particularly in field of food safety, health inspector, pharmacist

PO 5 : Hone their skills of handling of corrosive ,poisonous, explosive and carcinogenic chemicals making themselves employable in any kind of industries.

Programme Specific Outcomes:

PSO 1 : Gain the knowledge of chemistry through theory and practical.

PSO 2 : Understand good laboratory practices and safety and research oriented skills

PSO 3 : Acquires the ability to synthesize, separate and characterize compounds using laboratory and instrumental techniques

PSO 4 : The design and execution of the experiment should demonstrate an understanding of good laboratory and handling of chemical waste streams and also explain the applications of chemistry to the real life

PSO 5 : Competency for competitive exams

SEMESTER I GENERAL CHEMISTRY – I

Theory Hours :6	Course code : U21CHC101
Exam Hours : 3	Credits :5
	Marks : Max marks -100
	Ext - 75
	Int- 25

OBJECTIVE:

Basic concepts regarding Atomic Structure, Periodic Properties, Bonding Concepts, Ionic Bond, VSEPR and MO Theories, Nomenclature of Organic Compounds, Hybridization, Reaction Intermediates, States of Matter, Principle of Volumetric Analysis, Related Problems and Applications wherever necessary area to be taught for I- Semester.

UNIT-I ATOMIC STRUCTURE

1.1 Quantum numbers n, l, m and s – Pauli's exclusion principle – Energy distribution and orbitals - Hund's rule of maximum multiplicity - Aufbau's principle - Electronic Configuration of elements - Stability of Half-filled and completely filled orbitals.

1.2 Classification of elements – General characteristics of s, p, d and f- Block elements – Periodicity of properties- Definition and Periodicity of the following properties – Atomic radii and Ionic radii - Factors affecting the Atomic radii and Ionic radii.

1.3 Ionization potential, Electron affinity and Electronegativity - Factors affecting the Ionisation potential, Electron affinity and Electronegativity – Pauling scale – Mulliken electronegativity scale – Applications of Electronegativity regarding the Bonding nature.

UNIT- II CHEMICAL BONDING

2.1 Ionic bond - Conditions for the formation of ionic bond - General properties – Energetics of formation of NaCl from Na⁺ and Cl⁻ - Hydration energy, Lattice energy and their applications – Born-Haber cycle - Fajan's rule - Characteristics of Electrovalent compounds.

2.2 Valence Bond Theory - Conditions for the formation of covalent bond - General properties - Polarity of bonds - Orbital overlap - Bond lengths and Bond energies - Hybridisation - Sigma and Pi bonds - VSEPR theory - Geometries of BF_3 , NH_3 , H_2O , PCl_5 and SF_6 molecules - Partial ionic character of covalent bond - Percentage of ionic character.

2.3 Molecular Orbital theory – Bonding and Anti-bonding orbitals – Relative order of Energies of molecular orbitals - MO diagram of H_2 , He_2 , O_2 , N_2 , F_2 and CO - Bond Order - Stability and Magnetic properties of the molecules - Comparison of VB and MO theories.

UNIT- III BASIC CONCEPTS OF ORGANIC CHEMISTRY

3.1 Classification of Organic Compounds – Nomenclature of Organic Compounds – Functional Groups - Homologous Series - IUPAC Recommendations for Naming Simple Aliphatic and Alicyclic Compounds.

3.2 Basic concepts of bonding in organic chemistry - Hybridisation – Definition – Geometry of Molecules - Methane, Ethane, Ethylene, Acetylene and Benzene - Electron displacement effects - Inductive - Inductomeric - Electromeric – Mesomeric Effect - Resonance - Hyperconjugation and Steric Effects.

3.3 Cleavage of bonds - Homolytic and Heterolytic fission of carbon-carbon bond – Methods to determine the Reaction Mechanism - Reaction intermediates - Structure and Stability of Carbocations, Carbanions and Free radicals.

UNIT-IV STATES OF MATTER

4.1 Gaseous state - Kinetic gas equation - Derivation - Gas laws from the kinetic gas equation - Kinds of velocities - Mean, RMS, Most Probable Velocities - Calculation of molecular velocities - Maxwell's distribution of Molecular Velocities (No derivation) - Effect of Temperature on velocity distribution - Equipartition of energy - Heat capacity on molecular basis - Virial equation of state - Boyle temperature - Coefficient of Compressibility and Thermal expansion.

4.2 Liquid state - Density – Diffusion - Viscosity – Evaporation - Surface tension - Effect of temperature on surface tension - Parachor - Definition and Applications

only - Coefficient of Viscosity - Effect of Temperature and Pressure - Liquid crystals
- Classification and Molecular arrangements.

4.3 Solid State - Crystal lattices - Laws of Crystallography - Symmetry elements in crystals - Seven crystal systems - Unit cell - Space lattice - Bravais lattices - Law of Rational Indices - Miller indices.

UNIT-V PRINCIPLES OF VOLUMETRIC ANALYSIS

5.1 Definitions of Molarity, Molality, Normality and Mole Fraction - Their Calculations - Definition and Examples for Primary and Secondary standards - Calculation of Equivalent Weight of Acid, Base, Oxidising Agent, Reducing Agent and Salts.

5.2 Principles of Volumetric Analysis - Theories of Acid-Base, Redox, Complexometric Iodometric and Iodimetric titrations.

5.3 Theories of indicators - Acid-base indicators - Choice of indicators - Redox, Metal ion and Adsorption indicators.

REFERENCE BOOKS:

1. Inorganic Chemistry – P. L. Soni - Sultan Chand(2006).
2. Principles of Inorganic Chemistry - B. R. Puri, L. R. Sharma and K. C. Kallia – Milestone Publications(2013).
3. Selected Topics in Inorganic Chemistry-W.U.Malik, G.D.Tuli and R.D. MadanS. Chand Publications (2008).
4. Inorganic Chemistry: Principles of Structure and Reactivity-J.E.Huheey, E.A. Keiter, R.I. Keiter and O. K. Medhi – 2006
5. Organic Chemistry - R. T. Morrison and Boyd – Pearson –2010.
6. Organic Chemistry - I. L. Finar - Volume I and II - Pearson Education.
7. Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons -2007.
8. Advanced Organic Chemistry - Bahl and Arun Bahl - S. Chand and Co. Ltd. –2012.
9. Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishnal Publishing Co., - 2013.
10. Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha and U. N Dash - Sultan Chand & Co., –2006.
11. Physical Chemistry - Negi and Anand – Eastern Wiley Pvt.Ltd..
12. Physical Chemistry - Kundu and Jain - S. Chand & Co.
13. Physical Chemistry - K. L. Kapoor - Macmillan - 4 volumes.
14. Elements of Physical Chemistry - Glasstone and Lewis - Macmillan.
15. Text book of Physical Chemistry - S. Glasstone - Macmillan (India) Ltd

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:

CO 1: State the fundamental assumptions of atomic theory and explain the composition of atoms, including electronic configuration.

CO 2: Describe the arrangements of elements in periodic table based on their electronic configuration, bonding and properties.

CO 3: Explain the formation of ionic and covalent bonds and its physico chemical properties

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓					✓				
CO 2		✓								
CO 3	✓									✓
CO 4										
CO 5										
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – $20 \times 1 = 20$ (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – $5 \times 5 = 25$ (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – $10 \times 3 = 30$ (1 question from each unit, Essay type question)

SEMESTER – I
CORE COURSE – II
VOLUMETRIC ANALYSIS PRACTICAL

Practical Hours : 3	Course code : U21CHC102P
Exam Hours : 3	Credits : 2
	Marks : Max marks -100
	Ext - 60
	Int - 40

OBJECTIVES

- ❖ To learn about titrimetric analysis
- ❖ To predict the concentrations of different solutions

I. Acidimetric And Alkalimetry

II. Permanganometry

1. Estimation of Mohr's salt
2. Estimation of Oxalic acid
3. Estimation of Calcium

III. Dichrometry

4. Estimation of Ferrous Ion

IV. Iodo and Iodimetry

5. Estimation of Copper
6. Estimation of Potassium Dichromate
7. Estimation of Arsenious oxide

COURSE OUTCOMES

At the end of the course students could be able to,

CO1:Apply the principles of titrimetric analysis

CO 2 : Familiarize the concept of dilutions and indicators

CO3 : Determine the concentrations of different solutions

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓						✓				
CO 2								✓			
CO 3									✓		
CO 4											
CO 5											
CO 6											

QUESTION PATTERN

Experiments - 60 MARKS

Internal - 40 MARKS

SEMESTER –I
Allied Course- I
ALLIED CHEMISTRY-I
(For I Maths & I Zoology)

Theory Hours	:5	Course code	: U211ACH1
Exam Hours	: 3	Credits	:4
		Marks	: Max marks -100
			Ext - 75
			Int- 25

OBJECTIVES

To impart knowledge of MOT, fuel gases, VSEPR theory, volumetric analysis, polar effects, halogen containing compounds, carbohydrates, simple organic reactions, colloids and catalysis

UNIT-I

Molecular Orbital Theory

Some important basics concepts of M.O theory – LCAO. Bonding and Anti – bonding Orbitals and bond order. Application of MO theory to Hydrogen, Helium, Nitrogen, Oxygen and Fluorine molecules.

1.1.Industrial Chemistry

Fuel gases-water gas, Producer gas, LPG gas, Gobar gas and Natural gas., Soap and Detergents and elementary idea about preparation and manufacture. Cleaning action of soap and detergents.

UNIT II

2.1. VSEPR Theory

VSEPR theory – Defects of VSEPR theory- Shapes of simple Inorganic Molecules (BeCl₂, , PCl₅, SF₆, IF₅, XeF₆)

2.2. Volumetric Analysis

Basic Principles, Standard solutions-Primary and Secondary standards. Types of titrations – Acid-Base, Redox, Precipitation, Indicators.

UNIT III

3.1. Polar Effects

Inductive effect- relative strength of aliphatic mono carboxylic acids and aliphatic amines. Resonance- conditions for resonance, consequences of resonance- resonance energy. Hyper conjugation- Dipole moment. Steric effect- steric accelerated reaction and steric hindrance reaction.

3.2. Halogen Containing Compounds

Important chloro hydrocarbons used as solvents and pesticides (Dichloro methane, methane, Chloroform, carbon tetra chloride, DDT, BHC) Fluorocarbons (Freons)-preparation, properties and uses.

UNIT IV

4.1. Carbohydrates

Classifications of carbohydrates-preparation, properties , structure and uses of glucose – starch - Properties and uses – cellulose – Properties, structure and uses

4.2. Organic Reactions

Biuret, Decarboxylation, Esterification, Diazo reaction, Resorcinol fusion, Bromination, Ozasone formation.

UNIT V

5.1. Colloids

Colloids- Emulsions – gels- Preparation, properties and applications. Importance of pH and Buffer in living system.

5.2. Catalysis

Introduction – Types of catalysis, Mechanism of catalysis, Applications of Catalysis. Importance of Enzyme in Biological system.

REFERENCE BOOKS:

- 1.R.D. Madan, Malik, & Tuli selected topics in inorganic chemistry.
- 2.B.S. Bahl and arun Bahl, “Advance Organic Chemistry”, S. Chand and Co., New Delhi.
- 3.B.R.Puri and sharma, “Principles of physical chemistry”.

COURSE OUTCOMES

Students will gain an understanding of

CO 1:Hybridisation of atomic orbital and bond order

CO 2:Predict the geometry using VSEPR theory

CO 3:Fuel gases, principle of titration, polar effects, uses of halogen containing compounds.

CO 4: Introduction of carbohydrates, simple organic reactions, colloids and catalysis

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓						✓			✓
CO 2						✓				✓
CO 3			✓		✓				✓	✓
CO 4	✓						✓			
CO 5										
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – 20X1= 20 (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – 5X5= 25 (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – 10X3= 30 (1 question from each unit, Essay type question)

SEMESTER –I

ALLIED COURSE II

Allied chemistry practical-II

(For I Maths & I Zoology)

Examination at end semester

Practical Hours : 2	Course code : U212ACH2P
Exam Hours : 3	Credits : 4
	Marks : Max marks -100
	Ext - 60
	Int- 40

OBJECTIVES

- To enable the students acquire the quantitative skills in volumetric analysis
- To enable the analytical skills in organic qualitative skills
- To enable the analytical skills in organic qualitative skills

VOLUMETRIC ANALYSIS:

1. Acidimetry and Alkalimetry

- a. Strong acid Vs Strong base
- b. Weak acid Vs Strong base

2. Permanganometry

- a. Estimation of Ferrous sulphate
- b. Estimation of Oxalic acid

3. Iodometry (demonstration only)

QUALITATIVE ANALYSIS OF ORGANIC SUBSTANCES:

1. Carbohydrate
2. Diamide
3. Aldehyde
4. Ketone
5. Acid
6. Amine (mono carboxylic acid and dicarboxylic acid),

Report the followings :

Aliphatic/ aromatic

Saturation/ unsaturation

Elements presence/ absence

Functional group

COURSE OUTCOMES

Students will be

CO 1: Understand the handling of apparatus

CO 2: Identify the functional group

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓					✓				
CO 2			✓				✓			

QUESTION PATTERN

Experiments - 60 MARKS

Internal - 40 MARKS

VALUE EDUCATION

விழுமியகல்வி

Theory Hours : 2	Course code : U211VE
Exam Hours : 3	Credits : 2
	Marks : Max marks -100
	Ext - 75
	Int - 25

ருவை ஐ

முன்னுரை-விழுமியகல்வி

1. வாழ்வியல்விழுமியங்கள்
2. விழுமியங்களின்வகைகள்
3. வாழ்வியல்விழுமியங்களைபாதிக்கும்காரணிகள்.
4. விழுமியக்கல்வியின்அவசியம்

ருவை ஐஐ

நன்னடத்தைகள்

1. பெற்றோரைமதித்தல்
2. ஆசிரியரைமதித்தல்
3. இறைவழிபாடு
4. சுயமதிப்பு

ருஜேவு ஐஐஐ

சமூகம்சார்ந்தமதிப்புகள்

1. ஒற்றுமை
2. சமத்துவம். சகோதரத்துவம்
3. குடும்பம்
4. குடிமக்களின்கடமைகள். தேசபக்தி

ருஜேவு ஐஏ

உடல்நலம்மனநலம்

1. உணவுஒழுக்கம்
2. தனிமனிதசுகாதாரம்
3. மகளிர்ஆரோக்யம்
4. எண்ணங்களின்வலிமை

ருவை ஏ

சீர்கேடுகளும்சீர்திருத்தங்களும்

சீர்கேடுகளும்

1. வாழ்க்கைவிழுமியங்கள்மற்றும்அறங்களில்உலகமயமாதலின்பாதிப்பு
2. ஊடகங்களின்பாதிப்பு.
3. சீர்திருத்தங்கள்
4. மனக்கட்டுப்பாடுவிருப்பங்களைநெறிப்படுத்துதல்
4. உடற்பயிற்சிதியானம்யோகா

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer All questions – 15X5= 75 (2 questions from each unit, Essay type either or

question)

SEMESTER II
GENERAL CHEMISTRY – II

Theory Hours :6	Course code : U21CHC203
Exam Hours : 3	Credits : 5
	Marks : Max marks -100
	Ext - 75
	Int - 25

OBJECTIVES:

Basic knowledge on s- and p- Block Elements, Group Study, Hydrocarbons, Cycloalkanes, Dienes, Quantum Chemistry, Thermochemistry, First Law of Thermodynamics, Derivation of Equations, Related Problems, Reaction Mechanism and Applications wherever necessary are to be taught for II-Semester.

UNIT-I

S- AND P- BLOCK ELEMENTS

1.1 Alkali metals - Li, Na, K, Rb and Cs - Occurrence - Comparative study of Elements with respect to Oxides, Halides, Hydroxides and Carbonates - Exceptional property of Lithium - Diagonal Relationship of Li with Mg.

1.2 Alkaline earth metals - Be, Mg, Ca, Sr and Ba - Occurrence - Comparative study of the elements with respect to Oxides, Hydroxides, Halides, Sulphates and Carbonates - Exceptional property of Beryllium - Diagonal relationship of Be with Al - Comparison of Alkaline Earth Metals with Alkali Metals - Magnesium acting as bridge element between II A and II B groups - Magnesium resembles Zinc.

1.3 p- Block elements - Boron family - Group discussion - Anomalous behaviour of Boron - Diagonal Relationship between Boron and Silicon - Electron deficiency and Electron acceptor behaviour of Boron trihalides - Bonding in Diborane (Hydrogen-bridge structure) - Preparation, Properties, structure and Uses of Borazine - NaBH_4 - Preparation and Uses.

UNIT-II

HYDROCARBONS

2.1 Alkanes - Methods of preparation of alkanes - Wurtz method, Kolbe's method and Reduction of alkyl halides - Physical and Chemical Properties of alkanes -

mechanism of Free Radical Substitution in alkanes – Halogenation and Reactivity.

2.2 Alkenes - Properties of alkenes – Electrophilic and Free radical addition - Addition reactions of Alkenes with mechanism - Addition of Hydrogen, Halogens, Hydrogen Halide (Markownikoff's rule) - Hydrogen bromide (Peroxide effect) - Sulphuric Acid, Water, BH_3 , Ozonolysis, Hydroxylation with KMnO_4 - Allylic substitution by NBS.

2.3 Alkynes - Acidity of alkynes - Addition of hydrogen - Hydroboration - Hydrohalogenation - Addition of hypohalous acid, Hydration - Addition of water with HgSO_4 catalyst - Oxidation with KMnO_4 – Ozonolysis - Formation of Acetylides.

UNIT-III DIENES AND CYCLOALKANES

3.1 Dienes – Classification - Conjugated, Isolated and Cumulative Dienes - Stability of Dienes - 1, 2- and 1, 4- Addition reactions of H_2 and HX with mechanisms – Synthesis of dienes – 1, 3 - Butadiene, Isoprene and Chloroprene - Diels-Alder reaction.

3.2 Cycloalkanes - Preparation using Wurtz's reaction, Dieckmann's ring closure and Reduction of aromatic hydrocarbons - Substitution and Ring opening reactions.

3.3 Stability of Alkanes, Alkenes and Cycloalkanes - Bayer's strain theory - Theory of Strainless rings.

UNIT-IV QUANTUM CHEMISTRY AND THERMOCHEMISTRY

4.1 Planck's Quantum theory of radiation - Photoelectric Effect - Compton Effect - Wave mechanical concept of the atom - de Broglie's relationship – Davisson and Germer experiment - Wave nature of electron - Heisenberg's Uncertainty Principle.

4.2 Schrodinger wave equation (Without derivation) - Significance of wave functions ψ and ψ^2 - Shapes of s, p and d-orbitals.

4.3 Thermodynamics - Definition and Explanation of terms - System, Boundary, Surroundings - Homogeneous and Heterogeneous systems - Isolated system - Closed system - Open system - Intensive and Extensive properties - State of a system - Independent state variables - Dependent state variables - Thermodynamic functions - State and Path functions.

UNIT-V

THERMODYNAMICS

5.1 Thermodynamic processes - Types of processes - Cyclic - Reversible - Irreversible - Isothermal - Adiabatic Process - Exact and Inexact Differentials - Concept of Heat and Work - Zeroth Law of Thermodynamics.

5.2 First law of Thermodynamics - Statement and Equation - C_p and C_v Relationship - Calculation of W , Q , ΔE and ΔH for the Expansion of Ideal Gases under Reversible, Isothermal and Adiabatic Conditions.

5.3 Thermochemistry - Heat of a reaction - Exothermic and Endothermic reactions - Calculation of ΔH from ΔE and vice versa - Thermochemical equations - Bond dissociation energy - Calculation from thermochemical data - Variation of Heat of a reaction with temperature - Kirchoff's Equation and its significance

REFERENCE BOOKS:

1. Inorganic Chemistry - P. L. Soni - Sultan Chand (2006).
2. Principles of Inorganic Chemistry - B. R. Puri, L. R. Sharma and K. C. Kallia - Milestone Publications (2013).
3. Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
4. Inorganic Chemistry: Principles of Structure and Reactivity - J. E. Huheey, E. A. Keiter, R. I. Keiter and O. K. Medhi - 2006
5. Organic Chemistry - R. T. Morrison and Boyd - Pearson - 2010.
6. Organic Chemistry - I. L. Finar - Volume I and II - Pearson Education.
7. Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons - 2007.
8. Advanced Organic Chemistry - Bahl and Arun Bahl - S. Chand and Co. Ltd. - 2012.
9. Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishnal Publishing Co., - 2013.

10. Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha and U. N Dash - Sultan Chand & Co., –2006.

11. Physical Chemistry - Negi and Anand – Eastern WileyPvt.Ltd..

12. Physical Chemistry - Kundu and Jain - S. Chand &Co.

13. Physical Chemistry - K. L. Kapoor - Macmillan - 4volumes.

14. Elements of Physical Chemistry - Glasstone and Lewis -Macmillan.

Course Outcomes:

CO1: Explain the importance of s,p, block elements and their properties

CO 2: Describe the fundamental concepts of organic chemistry

CO3 : Describe the basic ideas of quantum mechanics and apply them to problems in physical chemistry.

CO 4: Demonstrate that quantum mechanics is needed to describe the world around us, and its relationship with descriptive chemistry.

CO 5 : Synthesize organic compounds.

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1		✓				✓				
CO 2	✓									
CO 3	✓		✓							
CO 4			✓	✓					✓	
CO 5					✓			✓		
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A – Answer all questions – 20X1= 20 (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – 5X5= 25 (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – 10X3= 30 (1 question from each unit, Essay type question)

SEMESTER – II
CORECOURSE -II (practical)

Inorganic Qualitative Analysis Practical

Practical Hours : 3	Course code : U21CHC204P
Exam Hours : 3	Credits : 2
	Marks : Max marks -100
	Ext - 60
	Int - 40

Objectives:

- To enable the students to develop the analytical skills in inorganic qualitative analysis
- To identify acid and basic radicals
- To categorize group separation of basic radicals

Cation to be studied:

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

Anion to be studied:

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

Course Outcomes:

Students will be able to

CO 1 : Predict the acid and basic radicals systematically

CO2 : Explain the group separation techniques.

CO 3 : Analysis of industrial chemicals such as cement, drugs like antacids and calcium tablets.

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓					✓				
CO 2			✓				✓			
CO 3				✓	✓				✓	
CO 4										
CO 5										
CO 6										

QUESTION PATTERN

Experiments - 60 MARKS

Internal - 40 MARKS

SEMESTER –II

ALLIED COURSE II

Allied Chemistry practical-II

(For I Maths & I Zoology)

Examination at end semester

Practical Hours : 2	Course code : U212ACH2P
Exam hours :3	Credits : 4
	Marks : Max marks -100
	Ext - 60
	Int - 40

OBJECTIVES

- To enable the students acquire the quantitative skills in volumetric analysis
- To enable the analytical skills in organic qualitative skills
- To enable the analytical skills in organic qualitative skills

VOLUMETRIC ANALYSIS:

1. Acidimetry and Alkalimetry

- Strong acid Vs Strong base
- Weak acid Vs Strong base

2. Permanganometry

- Estimation of Ferrous sulphate
- Estimation of Oxalic acid

3. Iodometry (demonstration only)

QUALITATIVE ANALYSIS OF ORGANIC SUBSTANCES:

- Carbohydrate
- Diamide
- Aldehyde,
- Ketone,
- Acid
- Amine (mono carboxylic acid and dicarboxylic acid),

Report the followings :

Aliphatic/ aromatic

Saturation/ unsaturation

Elements presence/ absence

Functional group

COURSE OUTCOMES

Students will be

CO 1: Understand the handling of apparatus

CO 2: Identify the functional group

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓					✓				
CO 2			✓				✓			

QUESTION PATTERN

Experiments - 60 MARKS

Internal - 40 MARKS

SEMESTER-II
ALLIED COURSE – III
ALLIED CHEMISTRY-III
(For I Maths and I Zoology) (60 Hours)

Theory Hours :5	Course code : U212ACH3
Exam Hours : 3	Credits :4
	Marks : Max marks -100
	Ex - 75
	Int- 25

OBJECTIVES

- ❖ To know about the various theories and properties of metals
- ❖ Able to recognize the synthetic dyes and polymers
- ❖ To know about laboratory hygiene and safety

UNIT I

12hours

1.1.Metallic Bond

Electron gas, Pauling and Band theories. Semiconductors-intrinsic, n-type and p-type. Applications of Semiconductors.

1.2.Alloys

General methods of Preparations and Properties of Alloys. Role of Carbon in Steel And treatment of Steel. Application of Alloys.

UNIT II

12hours

2.1 Chemotherapy

Chemotherapy – sulpha drugs – structure and uses – sulphadiazine - structure and uses – antibiotics – penicillin – structure, drawbags and uses – chloramphenicol - structure and uses.

2.2. Enzymes

Introduction, Classification of enzymes, Nomenclature, Co-factor, Co-enzymes, Mechanism of enzyme reaction, Specificity.

UNIT III

12hours

3.1 Synthetic Dyes And Polymers

Teflon, Alkyl and Epoxy resins, Poly esters, Bakelite, Nylon, Rayon-general Treatment only.

Dyes- Introduction, Chromophore, Chromogen, Auxochromes, Classification of Dyes on the basis of chemical structure and applications-Preparations of methyl Orange, Phenolphthalein and Bismark brown – their properties and uses.

UNIT IV

12 hours

4.1 Pollution – Definition – classification – pollution of water – cause, detection and prevention- pollution of air - cause, detection and prevention - acid rain – green house effect – evils effect of green house effect – prevention.

UNIT V

12 hours

5.1. laboratory hygiene and safety

Storage and handling of corrosive, flammable, explosive, toxic, carcinogenic and poisonous chemicals.

5.2 Simple First Aid Procedure For Accidents

Acid in eye, alkali in eye, acid burns, bromine burns, poison, inhalation of gases, cut by glasses and heat burns.

REFERENCE BOOKS

- 1.R.D. Madan, Malik, &Tuli selected topics in inorganic chemistry.
- 2.B.S. Bahl and arun Bahl, “Advance Organic Chemistry”, S. Chand and Co., New Delhi.
- 3.B.R.Puri and sharma, “Principles of physical chemistry”.
4. A text book of analytical chemistry R. Gobalan
- 5.A Textbook of Pharmaceutical Chemistry Paperback, Ghosh Jayshree, 3rd Edition, S. Chand publications, 2010

COURSE OUTCOMES:

Students will accomplish

CO1 : The various theories and properties of metallic bond

CO2 : The applications of synthetic dyes and polymers

CO3 : Pollution and its control, laboratory hygiene and safety, simple first aid for accident in chemistry lab.

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓					✓				
CO 2					✓					
CO 3			✓	✓	✓					
CO 4										
CO 5										
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – 20X1= 20 (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – 5X5= 25 (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – 10X3= 30 (1 question from each unit, Essay type question)

PART-IV
ENVIRONMENTAL STUDIES

Theory Hours :2	Course code : U212ES
Exam Hours : 3	Credits :2
	Marks : Max marks -100
	Ex - 75
	Int - 25

UNIT:1 The Multidisciplinary nature of environmental studies

- ❖ Definition ,scope and importance
- ❖ Need for public awareness
- ❖ Natural resources
- ❖ Renewable and non- renewable resources
- ❖ Natural resources and associated problems

Unit –II Biodiversity and its conversation

- ❖ Introduction- definition, genetic , species and ecosystem diversity
- ❖ Biodiversity at global, national and local levels
- ❖ India as mega- diversity nation
- ❖ Hot – spots of biodiversity
- ❖ Conservation of Biodiversity. In-Situ and Ex-situ conservation of biodiversity

Unit- III Environmental problems

- ❖ Definition
- ❖ Causes , effects and control measures of
- ❖ Air pollution
- ❖ Water pollution
- ❖ Soil pollution
- ❖ Marine pollution
- ❖ Noise pollution
- ❖ Thermal pollution
- ❖ Nuclear hazard (Radioactive pollution)
- ❖ Solid waste management: causes effects and control measure of urban and industrial wastes.
- ❖ Role of an individual in prevention of pollution
- ❖ Pollution case studies
- ❖ Disaster management: floods earthquake, cyclone and landslides.

UNIT- IV

- ❖ From un sustainable to sustainable development
- ❖ Urban problems related to energy
- ❖ Water conservation rain water harvesting watershed management
- ❖ Resettlement and rehabilitation of people , its problems and concerns case studies
- ❖ Environmental ethics: issues and possible solution
- ❖ Climate change , global warming acid rain ozone layer depletion
- ❖ Nuclear accidents and holocaust, case studies.
- ❖ Wasteland reclamation
- ❖ Consumerism and waste products
- ❖ Environment protection act
- ❖ Air (prevention and control pollution)
- ❖ Water (prevention and control pollution)
- ❖ Wildlife protection Act
- ❖ Forest conservation Act
- ❖ Issues involved in enforcement of environmental legislation
- ❖ Public awareness.

UNIT-V Human population and environment

- ❖ Population growth, variations among nations
- ❖ Population explosion – family welfare programme
- ❖ Environment and human health
- ❖ Human rights
- ❖ HIV/ AIDS
- ❖ Women and child welfare
- ❖ Role of information technology in environmental human health
- ❖ Case studies.

EFFECTS OF FIRE WORKS

Man ,Environment and climate change – fire work celebrations- fire works and health hazards- types of fire- types and uses of fire extinguishers- fireworks and safety- creating awareness on reducing the usage of fire works.

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer All questions – $15 \times 5 = 75$ (2 questions from each unit, Essay type either or question)

SEMESTER-III
GENERAL CHEMISTRY -III

Theory Hours :6	Course code : U21CHC305
Exam Hours : 3	Credits :5
	Marks : Max marks -100
	Ext - 75
	Int - 25

OBJECTIVE:

Basic concepts regarding the Principles of Inorganic Analysis and Types of Solvents, p- Block Elements, Group Study, Aromaticity, Electrophilic and Nucleophilic Substitution Reactions, Elimination Reactions, Reaction Mechanism, Thermodynamics, Related Problems and Applications wherever necessary are to be taught for III semester.

UNIT-I

1.1 Semi micro Techniques - Principles of Acid-Base Equilibria - Common ion effect – Solubility Product and its Applications - Inorganic qualitative Analysis-Principles of Analysis.

1.2 Reactions involved in the Separation and Identification of Cations and Anions in Qualitative analysis - Spot test reagents - Aluminon, Cupferon, DMG, Thiourea, Magneson, Alizarin and Nessler's reagent.

1.3 Types of solvents - Protic and Aprotic solvents - Amphiprotic / Amphoteric solvents - Aqueous and Non-aqueous solvents - Liquid Ammonia as a solvent.

UNIT-II

2.1 Carbon family – Group study - Comparative study of Elements with respect to Valency, Oxides, Halides, Hydrides and Oxyacids - Catenation - Comparison of Properties of Carbon and Silicon – Silicates - Classification and Structure - Silicones- Preparation, Properties and Uses.

2.2 Nitrogen family - Group study - Comparative study of N, P, As, Sb and Bi with respect to Oxides, Oxyacids, Halides and Hydrides – Hydrazine and Hydroxylamine - Preparation, Properties, Structure and Uses.

2.3 Oxygen family - Group study - Comparative study of O, S, Se and Te with respect to Catenation, Oxides, Halides, Hydrides and Oxyacids - Anomalous Behaviour of Oxygen - Oxyacids of Sulphur (Structure only) - Peroxides of Sulphur - Preparation, Properties and Structure - Differences Between Permonosulphuric Acid and Perdisulphuric Acid

UNIT-III

3.1 Aromaticity - Modern Theory of Aromaticity - Huckel's ($4n + 2$) Rule and Its Simple Applications to Benzenoid and Non- benzenoid Compounds.

3.2 Electrophilic substitution reactions in Aromatic Compounds - Mechanisms of Nitration, Halogenations, Sulphonation, Friedel-Crafts Acylation and Alkylation.

3.3 Directive influence - Orientation - Ortho/Para ratio - Nuclear and Side chain Halogenation.

UNIT-IV

4.1 Aliphatic Nucleophilic Substitutions - Mechanisms of S_N1 , S_N2 and S_Ni Reactions – Effect of Structure of Substrate, Solvent, Nucleophile and Leaving Group.

4.2 Elimination reactions - Mechanism of E1 and E2 reactions - Hoffmann and Saytzeff's rules - Cis and TransEliminations.

4.3 Aromatic Nucleophilic Substitutions - Unimolecular Nucleophilic Substitution, Bimolecular Nucleophilic Substitution and their Mechanism

UNIT-V

5.1 Second Law of Thermodynamics - Need for the II Law of Thermodynamics - Spontaneous Process – Criteria of Spontaneity - Different Forms of Statements of the Second Law – Cyclic Process – Definition – Heat Engines.

5.2 Carnot's cycle - Efficiency - Carnot's theorem (Statement only) - Concept of Entropy - Definition and Mathematical Statement - Randomness and Entropy – Standard Entropy - Derivation of Entropy from Carnot Cycle.

5.3 Entropy change of an Ideal Gas during Isothermal Process - Entropy changes in Cyclic, Reversible and Irreversible Processes - Entropy Changes in Physical Transformations - Calculation of Entropy Changes with Changes in T, V and P - Entropy of Mixing of Ideal Gases – Physical Significance of Entropy.

REFERENCE BOOKS:

1. Inorganic Chemistry – P. L. Soni - Sultan Chand(2006).
2. Principles of Inorganic Chemistry - B. R. Puri, L. R. Sharma and K. C. Kallia – Milestone Publications(2013).
3. Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
4. Inorganic Chemistry: Principles of Structure and Reactivity - J. E. Huheey, E. A. Keiter, R. I. Keiter and O. K. Medhi – 2006
5. Organic Chemistry - R. T. Morrison and Boyd – Pearson – 2010.
6. Organic Chemistry - I. L. Finar - Volume I and II – Pearson Education.
7. Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons - 2007.
8. Advanced Organic Chemistry - Bahl and Arun Bahl - S. Chand and Co. Ltd. – 2012.
9. Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishnal Publishing Co., - 2013.
10. Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha and U. N Dash - Sultan Chand & Co., – 2006.
11. Physical Chemistry - Negi and Anand – Eastern Wiley Pvt. Ltd..
12. Physical Chemistry - Kundu and Jain - S. Chand & Co.
13. Physical Chemistry - K. L. Kapoor - Macmillan - 4 volumes.
14. Elements of Physical Chemistry - Glasstone and Lewis - Macmillan.
15. Text book of Physical Chemistry - S. Glasstone - Macmillan (India) Ltd

Course outcome:

Students will be able to

CO 1: Explain basic principles of inorganic analysis and its applications

CO 2: Describe the aromaticity and nucleophilic substitution reactions

CO 3: Explain the fundamental concepts of thermodynamics

CO 4: Explain the fundamental concepts of Organic chemistry and its reaction

CO 5: Apply the fundamentals of organic chemistry to future research

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓									
CO 2			✓							✓
CO 3	✓									✓
CO 4				✓					✓	
CO 5				✓				✓		✓
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – 20X1= 20 (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – 5X5= 25 (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – 10X3= 30 (1 question from each unit, Essay type question)

SEMESTER –III

CORE COURSE VIII- PRACTICAL ORGANIC CHEMISTRY -PRACTICAL

Practical Hours : 3	Course code : U21CHC306P
Exam Hours : 3	Credits : 2
	Marks : Max marks -100
	Ext - 60
	Int - 40

OBJECTIVES:

- ❖ To learn systematic analysis organic substances
- ❖ To determine boiling point of organic substances

1.ANALYSIS OF ORGANIC SUBSTANCES

1.Carbohydrate, 2 Amide (Mono and Diamide), 3. Aldehyde, 4. Ketone, 5. Acid (mono carboxylic acid, Dicarboxylic acid),6.Amine,7.Phenol

Report the followings :

Aliphatic/ aromatic

Saturation/ unsaturation

Elements presence/ absence

Funtional group

Derivative

II Organic - Preparation :

1. Oxidation - Benzoic acid from benzaldehyde.
2. Hydrolysis - Salicylic acid from methyl salicylate.
3. Nitration - Nitrobenzene from benzene.
4. Bromination - 2,4,6 tribromo aniline from aniline.
5. Diazotization - Preparation of methyl orange.
6. Qualitative analysis of organic substances.
7. Determination of melting and boiling point of organic compounds

2. DETERMINATION OF PHYSICAL CONSTANTS (BOILING POINT ONLY)

Course outcome:

Students will able to

CO 1 Explain systematic analysis of organic substances

CO 2 Illustrate boiling point of organic substances.

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓					✓		✓		
CO 2			✓				✓			✓

QUESTION PATTERN

Experiments - 60 MARKS
Internal - 40 MARKS

SEMESTER –III
Allied Course- IV
ALLIED CHEMISTRY-I
(For Physics & Botany)

Theory Hours :5	Course code : U213ACH1
Exam Hours : 3	Credits :4
	Marks : Max marks -100
	Ext - 75
	Int- 25

OBJECTIVES

- ❖ To learn about of MO & VSEPR theory and its applications
- ❖ To know about the synthesis of eco-friendly bio-fertilizers and fuel-gases
- ❖ To explain fundamentals of aromatic compounds
- ❖ To understand about chemotherapy
- ❖ To learn about physical equilibria and phase diagram

UNIT-I

(12 Hours)

1.1.Molecular Orbital Theory

Some important basics concepts of M.O theory – LCAO. Bonding and Anti – bonding Orbitals and bond order. Application of MO theory to Hydrogen, Helium, Nitrogen, Oxygen and Fluorine molecules.

1.2.Industrial Chemistry

Fuel gases-water gas, Producer gas, LPG gas, Gobar gas and Natural gas., Soap and Detergents and elementary idea about preparation and manufacture. Cleaning action of soap and detergents.

UNIT II

(12 Hours)

2.1. VSEPR Theory

Introduction VSEPR theory – Defects of VSEPR theory- Shapes of simple Inorganic Molecules (BeCl₂, BF₃, SiCl₄, PCl₅, SF₆, IF₅, IF₇, XeF₆)

2.2. Volumetric Analysis

Basic Principles, Standard solutions-Primary and Secondary standards. Types of titrations – Acid-Base, Redox, Precipitation, Indicators.

UNIT III

(12 Hours)

3.1 Polar Effects

Inductive effect- relative strength of aliphatic mono carboxylic acids and aliphatic amines. Resonance- conditions for resonance, consequences of resonance- resonance energy. Hyper conjugation- Dipole moment. Steric effect- steric accelerated reaction and steric hindrance reaction.

1.2. Chemotherapy

Explanations with two examples each for Analgesics, Antibacterial, Antiinflammatory, Antipyretic, Antibiotic, Antitubercular, Antiviral, Antitussive, Antiallergic, Antidiabetics, Anti-hypertensive, Antiepileptics, Tranquilizers, Antiseptic and Disinfectant, Antimalarial, Anaesthetics (Local and General). Structures not necessary.

UNIT IV

(12 Hours)

4.1. Carbohydrates

Classifications of carbohydrates-preparation, properties , structure and uses of glucose – starch - Properties and uses – cellulose – Properties, structure and uses

4.2. Organic Reactions

Biuret, Decarboxylation, Esterification, Diazo reaction, Resorcinol fusion, Bromination, Ozasone formation.

UNIT V

(12 Hours)

5.1.laboratory hygiene and safety

Storage and handling of corrosive, flammable, explosive, toxic, carcinogenic and poisonous chemicals.

5.2 Simple First Aid Procedure For Accidents

Acid in eye, alkali in eye, acid burns, bromine burns, poison, inhalation of gases, cut by glasses and heat burns.

REFERENCE BOOKS:

1. S.S. Dara-A text book of environment chemistry and pollution control –S Chand and Co.

COURSE OUTCOMES

At the end of the course the students are capable to,

CO 1 :Apply the MO and VSEPR theory to various molecules

CO 2 :Explain the fundamentals of aromatic compounds

CO 3: Gains the knowledge about chemotherapy

CO 4: Handling of chemicals in a safety way

CO 5: Synthesize techniques of Organic reactions

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓					✓				
CO 2	✓									
CO 3				✓	✓					
CO 4				✓						
CO 5								✓		

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – 20X1= 20 (4multiple choice questions from each unit)

SECTION –B –Answer all questions – 5X5= 25 (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – 10X3= 30 (1 question from each unit, Essay type question)

SEMESTER –III
ALLIED COURSE V
Allied Chemistry practical-II
(FOR II PHYSICS & II BOTANY)
Examination at end semester

Practical Hours : 2	Course code : U214ACH2P
Exam Hours : 3	Credits : 4
	Marks : Max marks -100
	Ext - 60
	Int - 40

OBJECTIVES

- To enable the students acquire the quantitative skills in volumetric analysis
- To enable the analytical skills in organic qualitative skills
- To enable the analytical skills in organic qualitative skills

VOLUMETRIC ANALYSIS:

1. Acidimetry and Alkalimetry

- a. Strong acid Vs Strong base
- b. Weak acid Vs Strong base

2. Permanganometry

- a. Estimation of Ferrous sulphate
- b. Estimation of Oxalic acid

3. Iodometry (demonstration only)

QUALITATIVE ANALYSIS OF ORGANIC SUBSTANCES:

1. Carbohydrate
2. Diamide
3. Aldehyde,
4. Ketone,
5. Acid
6. Amine (mono carboxylic acid and dicarboxylic acid) ,

Report the followings :

Aliphatic/ aromatic

Saturation/ unsaturation

Elements presence/ absence

Functional group

COURSE OUTCOMES

Students will be

CO 1: Understand the handling of apparatus

CO 2: Identify the functional group

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓					✓				
CO 2			✓				✓			

QUESTION PATTERN

Experiments - 60 MARKS

Internal - 40 MARKS

SEMESTER –III
AGRICULTURAL CHEMISTRY
(Non - Major Elective Course –I A)

Theory Hours :2	Course code : U21CH3NME1:1
Exam Hours : 3	Credits :2
	Marks : Max marks -100
	Ext - 75
	Int- 25

OBJECTIVES

- ❖ To learn about physical and chemical properties of soils
- ❖ To study about fertilizers ,micro nutrients and bio-fertilizers
- ❖ To create an awareness about organic and green manures
- ❖ To apply the controlling measures of pests

UNIT-I

(6 Hours)

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

1.2. Soil chemical properties- soil colloids-inorganic colloids –clay minerals-amorphous-organic colloids-soil organic matter-decomposition-humus formation-significance on soil fertility, soil reaction-biological properties of soil-nutrient availability.

UNIT II

(6 Hours)

1.1. Fertilizer-definition-fertilizer recommendation based on soil testing-fertility index-nitrogenous fertilizers (preparation and structure is not necessary)-effect of nitrogen on plant growth and development. Phosphate fertilizers (preparation and structure is not necessary)-effect of phosphorous on plant growth and development.

1.2. Secondary and micro nutrient fertilizers-complex fertilizers-complex and mixed fertilizers-sources, manufacture, properties and reactions in soils.

UNIT III

(6 Hours)

1.1. Biofertilizer-nitrogen fixing biofertilizer-rhizobium, azospirillum-phosphate mobilizing biofertilizer-bacteria bacillus, pseudomonas, fungi-aspergillus, pencillium.

1.2. Preparation of slow release fertilizers – compatibility of fertilizers-fertilizer blending-preparation of different fertilizer mixtures-fertilizer prescription for different soils and crops.

UNIT IV

(6 Hours)

4.1. Nutrient potential of different organic manures- agricultural, industrial and urban wastes.

4.2. Green manures-green leaf manure-bulky organic and concentrated organic manures-compost-enriched farm yard manures, composting of coir pith; sugarcane trash, leaf litters and farm wastes-oil cakes, bone meal, guano poultry manures-fertilizers use efficiency-integrated nutrition management.

UNIT V

(6 Hours)

5.1. Pest management and control:

Pesticides-characteristics-uses-fate of pesticides in soil and plants-impact of pesticides on environment-safety measures in the analysis and handling of pesticides.

5.2. Insecticides, Fungicides, Herbicides and Acaricides-definition –examples and uses (preparation and structure is not necessary).

REFERENCE BOOKS:

1. N.C. Brady The nature and properties of soils, Eurasia publishing house, (P) Ltd 9th edition 1984.
2. Biswas, T.D. and Mukerherjee S. K. 1987 The text book of soil science.
3. A.J. Daji (1970) A text book of soil science, Asia publishing house, Madras.
4. Donhue, R.L.Miller 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., Newyork.
6. Tisdale, S.L. Nelson, W.L. and Beaton.J.D, 1990, Soil fertility and fertilizers, Macmillan publishing company, Newyork.
7. Hesse. P.R. 1971 A text book of soil chemical analysis John Murray, Newyork.
8. JAckon. M.L.1958, Soil chemical analysis, Prentice hall of Indian (P) Ltd., NewDelhi.
9. Buchel. K.H 1983, Chemistry of pesticides –John Willey & Sons, Newyork.
10. Melnikov.N.N. 1971, Chemistry of pesticides vol.36 of residue review – springer verlae, Newyork.

11. Sree Ramula, U.S 1971, Chemistry of insecticides and fungicides –Oxford and IBH publishing Co., NewDelhi.

COURSE OUTCOMES

At the end of the course the students will be able to

CO 1 : learn about physical and chemical properties of soils

CO 2: study about fertilizers, micro nutrients and bio-fertilizers

CO 3:create an awareness about the usage of organic and green manures

CO 4:apply the controlling measures of pests.

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓									✓
CO 2				✓	✓				✓	✓
CO 3				✓	✓				✓	✓
CO 4										
CO 5										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer All questions – 15X5= 75 (2 questions from each unit, Essay type either or question)

SEMESTER –III

CHEMISTRY OF CONSUMER PRODUCTS

Non - Major Elective Course –I B)

Theory Hours : 2	Course code : U21CH3NME1:2
Exam Hours : 3	Credits :2
	Marks : Max marks -100
	Ext - 75
	Int- 25

Objectives:

To provides basic knowledge in consumer product Chemistry and modern trends in the industry.
To provide the practical training to the students in consumer product analysis

UNIT I:

SOAPS

Saponification of oils and fats. Manufacture of soaps. Formulation of toilet soaps. Different ingredients used. Their functions. Medicated soaps. Herbal soaps. Mechanism of action of soap. Soft soaps. Shaving soaps and creams. ISI specifications. Testing procedures/limits.

UNIT II:

DETERGENTS

a. Anionic detergents: Manufacture of LAB (linear alkyl benzene). Sulphonation of LAB – preparation of acid slurry. Different ingredients in the formulation of detergent powders and soaps. Liquid detergents. Foam boosters. AOS (alpha olefin sulphonates. b. cationic detergents: examples. Manufacture and applications. c. Non-ionic detergents: examples. Manufacture of ethylene oxide condensater. d. Mechanism of action of detergents. Comparison of soaps and detergents. Biodegradation – environmental effects. ISI specifications / limits.

UNIT III:

SHAMPOOS

Manufacture of SLS and SLES. Ingredients. Functions. Different kinds of shampoos – anti-dandruff, anti-lice, herbal and baby shampoos. Hair dye. Manufacture of conditioners. Coco betaines or coco diethanolamides – ISI specifications. Testing procedures and limits.

UNIT IV:

SKIN PREPARATIONS

Face and skin powders. Ingredients, functions. Different types. Snows and face creams. Chemical ingredients used. Anti perspirants. Sun screen preparations. UV absorbers. Skin bleaching agents. Depilatories. Turmeric and Neem preparations. Vitamin oil. Nail polishes: nail polish preparation, nail polish removers. Article removers. Lipsticks, roughes, eyebrow pencils. Ingredients and functions – hazards. ISI specifications.

UNIT V:

Leading firms, brand names, choosing the right product. Packing regulations. Marketing. Licensing – drug license – legal aspects. GMP – ISO 9000/12000 – consumer education. Evaluation of the product – advertisements.

REFERENCE BOOKS

1. Gobala Rao.S , Outlines of chemical technology, Affiliated East West press,1998
2. Kafaro, Wasteless chemical processing, Mir publishers, 1995.
3. Sawyer.W, Experimental cosmetics, Dover publishers, Newyork, 2000.

COURSE OUTCOMES

At the end of the course students will be able to

CO 1: Able to prepare the soaps, detergents , shampoos, and cosmetics

CO 2: knowledge about the chemistry of consumer products

CO 3:Understanding Packing regulations. Marketing. Licensing – drug license – legal aspects. GMP – ISO 9000/12000

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1				✓	✓	✓	✓	✓		
CO 2							✓			✓
CO 3					✓		✓		✓	
CO 4					✓		✓			✓
CO 5										
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer All questions – 15X5= 75 (2 questions from each unit, Essay type either or question)

SEMESTER – IV

GENERAL CHEMISTRY – IV

Theory Hours : 5	Course code : U21CHC407
Exam Hours : 3	Credits : 5
	Marks : Max marks -100
	Ext - 75
	Int - 25

OBJECTIVES:

Noble gases, Carboxylic Acids, Amines, Alcohols, Phenols, Naphthols, Important Name Reactions, Mechanism, Thermodynamics, Derivation of Equations, Partial Molar Properties, Chemical Potential, Related Problems and Applications are to be taught for IV semester.

UNIT-I

1.1 Noble gases - Electronic Configurations – Position of Noble Gases in the Periodic Table - Chemical inertness of Noble gases –Reason.

1.2 Compounds of Xenon - Hybridization and Geometry of XeF₂, XeF₄, XeF₆ and XeOF₄ (Preparation, Properties – Not necessary).

1.3 Clathrates - Definition and Applications - Uses of Noble gases.

UNIT-II

2.1 Monocarboxylic acids – Acetic acid and Benzoic acid – Preparation by Grignard method – Conversion of Acids to their derivatives – Amide, Ester, Anhydride and Acid Chloride – Strength of Carboxylic Acids – Effect of Substituents on the Strength of Acids.

2.2 Dicarboxylic acids – Oxalic acid, Malonic acid, Succinic acid, Glutaric acid and Adipic acid - Preparation – Properties – Action of Heat on Dicarboxylic acids.

2.3 Amines – Ethylamine and Aniline – Preparation – Basicity of Amines – Effect of Substituents on Basicity - Reactivity of Amines – Distinction between Primary, Secondary and Tertiary Amines.

UNIT-III

3.1 Alcohols – Preparation by Grignard method – Oxidation of alcohols – Difference between Primary, Secondary and Tertiary alcohols – Preparation and Properties of Allyl alcohol.

3.2 Phenols - Acidic character of phenols - Kolbe's reaction, Reimer-Tiemann reaction, Gattermann, Lederer-Manasse, Houben-Hoesh, Friedel-Crafts, Schotten-Baumann and Liebermann's Nitroso Reaction.

3.3 Preparation, Properties and Uses of Alpha- and Beta-Naphthols.

UNIT-IV

4.1 Free energy and Work function - Gibbs free energy – Helmholtz free energy – Relationship between Gibbs free energy and Helmholtz free energy – Their variations with Temperature, Pressure and Volume – Free energy change as criteria for Equilibrium and Spontaneity.

4.2 Maxwell's Relations – Thermodynamic Equation of State.

4.3 Gibbs-Helmholtz equation - Derivation and Applications -Clausius-Clapeyron equation - Derivation and Applications.

UNIT-V

5.1 Third Law of Thermodynamics - Entropy at Absolute Zero - Nernst Heat Theorem – Statement of III law of thermodynamics – Planck's formulation of III law of thermodynamics.

5.2 Evaluation of Absolute Entropy from Heat Capacity Measurements - Exceptions to III law – Applications of III law. Partial molar properties - Chemical Potential – Definition– Effect of Temperature and Pressure on Chemical Potential - Gibbs-Duhem equation

REFERENCE BOOKS:

1. Inorganic Chemistry – P. L. Soni - Sultan Chand(2006).
2. Principles of Inorganic Chemistry - B. R. Puri, L. R. Sharma and K. C. Kallia – Milestone Publications(2013).
3. Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
4. Inorganic Chemistry: Principles of Structure and Reactivity - J. E. Huheey, E. A. Keiter, R. I. Keiter and O. K. Medhi – 2006
5. Organic Chemistry - R. T. Morrison and Boyd – Pearson – 2010.
6. Organic Chemistry - I. L. Finar - Volume I and II - Pearson Education.
7. Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons - 2007.
8. Advanced Organic Chemistry - Bahl and Arun Bahl - S. Chand and Co. Ltd. – 2012.
9. Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishnal Publishing Co., - 2013.
10. Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha and U. N Dash - Sultan Chand & Co., – 2006.
11. Physical Chemistry - Negi and Anand – Eastern Wiley Pvt. Ltd..
12. Physical Chemistry - Kundu and Jain - S. Chand & Co.
13. Physical Chemistry - K. L. Kapoor - Macmillan - 4 volumes.
14. Elements of Physical Chemistry - Glasstone and Lewis - Macmillan.
Text book of Physical Chemistry - S. Glasstone - Macmillan (India) Ltd

COURSE OUTCOMES

At the end of the course the students will be able to

CO 1 : learn about nobel gases and its electronic configuration

CO 2: Explain the reactions of mono carboxylic acid and dicarboxylic acid

CO 3: The application of thermodynamics third law

CO 4: Explain the importance of free energy and work function

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓									✓
CO 2										✓
CO 3			✓							✓
CO 4			✓							
CO 5										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – 20X1= 20 (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – 5X5= 25 (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – 10X3= 30 (1 question from each unit, Essay type question)

CORE COURSE-XV
PHYSICAL CHEMISTRY PRACTICAL - I

Practical Hours : 3	Course code : U21CHC408P
Exam Hours : 3	Credits : 2
	Marks : Max marks -100
	Ext - 60
	Int - 40

OBJECTIVES

- ❖ To learn about effect of hydrolysis of ester
- ❖ Determine the molecular weight by RAST's method
- ❖ Find out the CST of phenol-water system and effect of impurity
- ❖ Determining Transition temperature of some compounds

1.Kinetics:

Acid catalysed hydrolysis of an ester (methyl acetate or ethyl acetate)

2.Molecular Weight:

Rast's method: Naphthalene, m-dinitrobenzene and biphenyl as solvents.

3.Heterogeneous Equilibrium:

Determination of transition temperature: Sodium Acetate, Water sodium thio sulphate $5\text{H}_2\text{O}$ $\text{SrCl}_2 \cdot 6\text{H}_2\text{O}$ and $\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$.

4.Distribution law :

- a. Partition coefficient of iodine between carbon tetra chloride and water.

COURSE OUTCOMES

At the end of the course the students will be able to

CO 1: Able to find out transition temperature and determine the molecular weight of organic molecules by Rast's method.

CO 2: Determine the critical solution temperature and Identify the effect of impurity on CST.

CO 3: To draw Phase diagram for two component system

CO 4: Able to perform acid hydrolysis of an ester

CO 5: Determine activation energy, rate constant, and dissociation constant ,

CO 6: Knowledge in basics of adsorption

CO 7: It gives basic ideas and motivate to research.

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓					✓				
CO 2			✓				✓	✓		
CO 3			✓				✓	✓		✓
CO 4										✓
CO 5										✓
CO 6										

QUESTION PATTERN

Experiments - 60 MARKS

Internal - 40 MARKS

SEMESTER- IV
ALLIED COURSE V
Allied Chemistry Practical-II
(FOR II PHYSICS & II BOTANY)
(Examination at the end semester)

Practical Hours : 2	Course code : U214ACH2P
Exam Hours : 3	Credits : 4
	Marks : Max marks -100
	Ext - 60
	Int - 40

OBJECTIVES

- To enable the students acquire the quantitative skills in volumetric analysis
- To enable the analytical skills in organic qualitative skills
- To enable the analytical skills in organic qualitative skills

VOLUMETRIC ANALYSIS:

1. Acidimetry and Alkalimetry

- a. Strong acid Vs Strong base
- b. Weak acid Vs Strong base

2. Permanganometry

- a. Estimation of Ferrous sulphate
- b. Estimation of Oxalic acid

3. Iodometry (demonstration only)

QUALITATIVE ANALYSIS OF ORGANIC SUBSTANCES:

1. Carbohydrate 2. Diamide 3. Aldehyde, 4. Ketone, 5. Acid 6. Amine (mono carboxylic acid and dicarboxylic acid) ,

Report the followings :

Aliphatic/ aromatic

Saturation/ unsaturation

Elements presence/ absence

Functional group

COURSE OUTCOMES

Students will be

CO 1: Understand the handling of apparatus

CO 2: Identify the functional group

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓					✓				
CO 2			✓				✓			

QUESTION PATTERN

Experiments - 60 MARKS

Internal - 40 MARKS

SEMESTER-IV
ALLIED COURSE-VI
ALLIED CHEMISTRY-III

(FOR II PHYSICS & II BOTANY)

Theory Hours : 5	Course code : U214ACH3
Exam Hours : 3	Credits : 4
	Marks : Max marks -100
	Ext - 75
	Int - 25

OBJECTIVES

- To know about the various theories of Co-ordination compounds
- To learn about aromatic compounds
- To understand about amino acids ,proteins
- Able to recognize the synthetic polymers and nature of heterocyclic compounds
- To know the fundamentals of photochemistry and surface chemistry

UNIT-I

12HOURS

1.1 Coordination Chemistry

Nomenclature of mononuclear complexes-Werner, Sidwick and Pauling's theories. Chelation and its industrial importance of EDTA. Biological role of heamoglobin and Cholorophyll. Applications of complexes in qualitative and quantitative analysis.

1.2 Metallic Bond

Electron gas, Pauling and Band theories. Semiconductors-intrinsic, n-type and p-type
Applications of semi conductors.

UNIT-II

(12 HOURS)

2.1 Aromatic Compounds

Structure, Stability, rersonance and aromaticity of Benzene. Typical substitution reaction- Nitration, Halogenation, Alkylation. Naphthalene-synthesis, Properties and uses.

2.2 Aminoacids and Proteins

Aminoacids – Classification based on physical properties and biological functions. Structures of Proteins- Primary and Secondary (Elementary treatment).

UNIT-III

(12 HOURS)

3.1 Synthetic Polymers

Teflon, Alkyl and Epoxy resins, Poly esters – general treatment only.

3.2 Heterocyclic Compounds

Furan, thiophen, Pyrrole and Pyridine - preparation and Properties - basic properties of pyridine and pyrrole.

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 and Applications.

UNIT – V

5.1 Electrochemistry

Specific and Equivalent conductivities – their determination – effect of dilution on conductivity. An elementary idea about ionic theory – Ostwald's dilution law, Kohlrausch law, Conductometric titration.

5.2 P^H and Buffer

Importance of P^H and Buffers in living systems – P^H determination by Colorimetric

5.3 Catalysis

Catalyst – Introduction, Types and Applications. Mechanism of catalysis Importance of Enzyme in Biological systems.

REFERENCE BOOKS :

1. I.L.Finar, "Organic Chemistry, Volume-I" E.L.B.S. London.
2. B.R.Puri, L.R.Sharma and Madan, S.Pathma, "Principles of physical Chemistry"
3. R.D.Madan, "Modern Inorganic Chemistry", 1987, S.Chand and Company (Private limited), New Delhi.

COURSE OUT COME :

CO 1: To know about the various theories of Co-ordination compounds

CO 2 : To learn about aromatic compounds

CO 3 : To understand about amino acids ,proteins

CO 4:Able to recognize the synthetic polymers and nature of heterocyclic compounds

CO 5 :To know the fundamentals of photochemistry and surface chemistry

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓					✓				
CO 2			✓				✓	✓		
CO 3			✓				✓	✓		✓
CO 4										✓
CO 5										✓
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – 20X1= 20 (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – 5X5= 25 (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – 10X3= 30 (1 question from each unit, Essay type question)

SEMESTER IV
INDUSTRIAL CHEMISTRY
(Non Major Elective Course – IIA)

Theory Hours :2	Course code : U21CH4NME2:1
Exam Hours : 3	Credits :2
	Marks : Max marks -100
	Ext - 75
	Int - 25

OBJECTIVES

- ❖ To learn about manufacturing of cement , glass, paints, sugar and chemical explosive
- ❖ Acquire the knowledge about petroleum, fuel gases ,coal and importance of fertilizers

UNIT – I

- 1.1 **Cement** : Manufacture – Wet process and dry process, types, Analysis of major constituents, setting of cement, Reinforced concrete. Cement industries in India.
- 1.2 **Glass** : types, composition, manufacture of optical glass, coloured glasses and lead glass.

UNIT – II

- 2.1 **Sugar** : Cane Sugar manufacture, recovery of sugar from molasses, sugar estimation, sugar industries in India.
- 2.2 **Paints and varnishes** : Primary Constituents of paints, Dispersion medium (Solvent), binder pigments.

UNIT – III

- 3.1 **Chemical explosives** : Origin of explosive, Preparation and chemistry of TNT, Dynamite, Cordite, Picric acid and gun power.
- 3.2 **WaterIndustry** : Pollution of Water by fertilizers, detergents, pesticides and industrial wastes, BOD, COD thermal pollution, Water treatment – Ion exchange electro dialysis, reverse osmosis, softening of hard water.

UNIT – IV

- 4.1 **Coal** : Origin and economic importance of coal, types analysis and composition, coal gasification, coal – tar.
- 4.2 **Petroleum** : Origin, refining, cracking, reforming, knocking, and octane number.

UNIT-V

5.1 **Fuel gas:** Large scale production, Storage, hazards and uses of coal gas, water gas, Producer gas.

5.2 **Fertilizers:** Fertilizer industries in India, manufacture of ammonia, ammonium salts, urea, super phosphate, triple super phosphate and nitrate salts.

REFERENCE BOOKS:

1. B.N.Chakravarty, Industrial Chemistry, Oxford & IBH Publishing Co., New Delhi, 1981.

2. B.K.Harma, Industrial Chemistry, Goel Publishing House, Meerut.

3. P.P.Singh, T.M.Joseph, R.G.Dhavale, College Industrial Chemistry, Himalaya Publishing House, Bombay, 4th Edition 1983.

COURSE OUTCOMES

At the end of the course students will be able to

CO 1: Know the techniques adopted in manufacturing of cement , glass, paints, sugar and chemical explosive

CO 2: Apply the knowledge about petroleum, fuel gases ,coal and importance of fertilizers

CO 3: Understand about the water pollution

CO 4 : Works with industries like cement, petroleum industry and fertilizers production

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1				✓	✓	✓	✓	✓		
CO 2							✓			✓
CO 3					✓		✓		✓	
CO 4					✓		✓			✓
CO 5										
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer All questions – 15X5= 75 (2 questions from each unit, Essay type either or question)

SEMESTER IV
BASIC CLINICAL CHEMISTRY
(Non Major Elective Course – IIB)

Theory Hours	:2	Course code : U21CH4NME2:2
Exam Hours	: 3	Credits :2
		Marks : Max marks -100
		Ext - 75
		Int - 25

OBJECTIVES:

After going through the course the student is expected to learn about

1. The disinfectants and antiseptics.
2. The important drugs and the mode of actions.
3. Enzymes
4. Body fluids

UNIT-I:

CLINICAL HYGIENE AND BIOCHEMICAL ANALYSIS

Definition of health. Ryde of WHO. Sterilization of surgical instruments. Disinfectants, antiseptics, sanitation. Biochemical analysis of urine, serum and fecal matter. Treatment for specific poisons-acids, alkalis, arsenic and mercury compounds.

UNIT-II:

COMMON DRUGS

Manufacture of drugs –quinine, reserpine, atopside and d – tubocurarine from Indian medicinal plants. Narcotic analgesics (only morphine compds). Antipyretic analgesics (acetyl salicyclic acid, p – amino – phenol derivatives).

Muscle relaxants. i. Acting at neuromuscular junction (d – tubocurarine chloride). ii. Acting at spinal cord alone (glyceryl guaiacolate, diazepam).

Antibiotics -pencillin, Cardiovascular drugs-nitrates, beta blockers (propranalol and atinelol) and calcium channel blockers.

UNIT-III:

ENZYMES

Classification, specificity. Coenzymes, Cofactor, ATP, Mechanism of enzyme action and Immobilisation of enzymes.

Specific action of enzymes, factors affecting enzyme activity

UNIT-IV:

BODY FLUID

Blood volume, blood groups, coagulation of blood. Plasma lipo protiens. Blood pressure. Arteriosclerosis, diseases affecting red cells: Hyperchromic and hypochromic anaemia.

Blood tranfusion. Blood sugar and diabetes.

Knowledge of measuring blood pressure, influence of blood pressure, blood sugar control levels and medicine used to control blood pressure and blood sugars

UNIT-V:

BIOTECHNOLOGY

Heredity, recombinant DNA, Genetic engineering and its possible hazards, Gene splicing, manufacture of interferon and human insulin(Humulin),

Drug manufacture based on fermentation(only antibiotics)

TEXT BOOKS :

Jayashree Ghosh, A text book of Pharmaceutical Chemistry, S.Chand and Co. Ltd, 1999.

S.C. Rastogi, Biochemistry, Tata McGraw Hill Publishing Co., 1993 Ashutosh Kar, Medicinal Chemistry, Wiley Eastern Limited, New Delhi, 1993.

REFERENCE BOOKS:

1. O.Le Roy, Natural and synthetic organic medicinal compounds, Ealemi., 1976.
2. B.L. Oser, Hawk's physiological chemistry, 14th edition, Tata-McGraw - Hill Publishing Co.Ltd, 1965
3. O. Kleiner and J. Martin, Bio-Chemistry, Prentice-Hall of India(P) Ltd, New Delhi,

COURSE OUTCOMES

At the end of the course students will be able to

CO 1: Know the clinical hygiene and bio chemical analysis

CO 2: Know the Manufacture of drugs

CO 3: Understand the chemistry of analgesics, Muscle relaxants, Antibiotics, enzymes and body fluids

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1				✓	✓	✓	✓	✓		
CO 2							✓			
CO 3					✓		✓		✓	
CO 4					✓		✓			
CO 5										
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer All questions – 15X5= 75 (2 questions from each unit, Essay type either or question)

SEMESTER- IV
SKILL ENHANCEMENT – I Theory
HydroChemistry

Theory Hours :2	Course code : U214CHSE1
Exam Hours :3	Credits :2
	Marks : Max marks -100
	Ext - 75
	Int- 25

OBJECTIVES

- ❖ To learn about the quality of water and water pollution
- ❖ To know about of toxicity of metals in water and its treatment
- ❖ To understand the various separation and purification techniques

Unit-I

Water: Source of water - impurities in water - hardness of water – types of hardness - unit of hardness – important specifications of drinking water(WHO).

UNIT -II

Water pollution: Various water pollutants (sewage 7 other oxygen demanding wastes, infectious agents, exotic organic chemicals, inorganic minerals & chemical compounds, sediments, radioactive substances, heat, oil and detergents)

UNIT –III

Source and toxicity of Cr, Mn, Cu, Se, Mo, Cd, I, Hg, Pb, Fe and Zn - treatment of domestic water (primary ,secondary treatments and tertiary treatments by ion exchange process and R.O. Process.

Unit-IV

Separation and Purification techniques: Principles and techniques of crystallization, fractional crystallization, sublimation, simple distillation, fractional distillation and steam distillation, distillation under reduced pressure and solvent extraction (using soxhlet extraction) .

UNIT - V

Chromatographic techniques: Mobile phase and stationary phase- TLC and paper Chromatographic techniques (sampling, development, Rf values, identification)

REFERENCE BOOKS:

1. Balasubramanian M.R., Krishnamoorthy S., Murugesan V., Engineering Chemistry – A text book, Allied publishers Ltd., NewDelhi.
2. Puri B.R. Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, Milestone Publishers, Delhi (2008)
3. Usharani S., Analytical Chemistry, Macmillian India Ltd., NewDelhi(2000)
4. Gopalan. R., Subramaniam P.S. and Rengarajan K., Elements of Analytical Chemistry, Sultan Chand and Sons, NewDelhi (2000).

COURSE OUTCOMES

CO 1: To learn about the quality of water and water pollution

CO 2: To Know about toxicity of metals in water and its treatment

CO 3: To understand the various separation technique

CO4: To understand purification technique

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓					✓				✓
CO 2				✓	✓				✓	✓
CO 3					✓			✓		
CO 4					✓			✓	✓	
CO 5										
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer All questions – 15X5= 75 (2 questions from each unit, Essay type either or question)

SEMESTER – V
INORGANIC CHEMISTRY – I

Theory Hours : 5	Course code : U21CHC509
Exam Hours : 3	Credits : 5
	Marks : Max marks -100
	Ext - 75
	Int- 25

Objectives:

- To study about the Halogens and Related compounds.
- To give students a firm grounding in Co-ordination chemistry and Solid state Chemistry.

UNIT-I

1.1 Halogens – Group discussion - Comparative study of F, Cl, Br, I and At - Reactivities– Comparison of Fluorine with Oxygen.

1.2 Classification of Halides - Exceptional properties of Fluorine - Oxyacids of Halogens (Structure only).

1.3 Inter halogen compounds - Preparation, Properties and Geometry of AX, AX₃, AX₅ and AX₇ type of Compounds – Pseudohalogens - Cyanogen and Thiocyanogen – Comparison of Pseudohalogens and Halogens - Basic Properties of Iodine -Evidences.

UNIT-II

2.1 Coordination compounds - Definition of terms used - Classification of Ligands - Chelation and Effect of Chelation - Applications of Complexes - Coordination Number and Stereochemistry of Complexes.

2.2 IUPAC Nomenclature of Complexes - Isomerism in Complexes - Ionisation isomerism, Hydrate Isomerism, Linkage Iomerism, Ligand Isomerism, Coordination Isomerism and Polymerisation Isomerism.

2.3 Geometrical and Optical Isomerism in 4- and 6- Coordinated Complexes – Werner’s theory of Coordination Compounds.

UNIT-III

3.1 Sidgwick's Theory - EAN rule - Theory of Bonding - Valence Bond Theory – Postulates of VBT – Hybridisation, Geometry and Magnetic properties - Failure of VBT.

3.2 Crystal field theory - Spectrochemical series - Splitting of d - orbitals in Octahedral, Tetrahedral and Square Planar Complexes - Crystal Field Stabilisation Energy - Calculation of CFSE In Octahedral and Tetrahedral Complexes.

3.3 Low Spin and High Spin Complexes – Explanation of Magnetic Properties, Colour and Geometry Using CFT.

UNIT-IV

4.1 Comparison of VBT and CFT.

4.2 Applications of Coordination Compounds in Qualitative and Quantitative Analysis - Estimation of Nickel using DMG and Aluminium using Oxine – Detection of Potassium ion – Separation of Copper and Cadmium ions.

4.3 Bonding, Hybridization and Structure of Carbonyls of Ni, Cr, Fe, Co, Mn, W and V.

UNIT-V

5.1 The nature of the Solid State – Amorphous and Crystalline – Differences - Close Packing in Crystals – Examples for Cubic, BCC and FCC Lattices - Bragg's law – Application of XRD to Crystal studies – Structure of NaCl, CsCl, CaF₂ and ZnS.

5.2 Band theory of Solids, Metals, Semiconductors and Insulators.

5.3 Defects in solids – Schottky Defect and Frenkel Defect – Metal Excess and Metal Deficiency Defects - Conductors in Ionic Solids – Electrical and Magnetic properties.

REFERENCE BOOKS

1. Inorganic Chemistry – P. L. Soni - Sultan Chand(2006).
2. Principles of Inorganic Chemistry - B. R. Puri, L. R. Sharma and K. C. Kallia – Milestone Publications(2013).
3. Selected Topics in Inorganic Chemistry-W.U.Malik,G.D.Tuliand R.D.Madan-S. Chand Publications (2008).
4. Inorganic Chemistry: Principles of Structure and Reactivity-J.E.Huheey,E.A.Keiter, R. I. Keiter and O. K. Medhi – 2006.
5. Concise Inorganic Chemistry - J. D. Lee - III edition - VonNostrand.
6. Industrial Chemistry - B. K. Sharma - Goel Publications(1983).
7. Industrial Chemistry R. K. Das - Kalyani Publications, New Delhi(1982).
8. Coordination Chemistry - S. F. A. Kettle - ELBS(1973).
9. Coordination Chemistry - K. Burger - Butterworthy(1973).
10. Vogel's Handbook of Quantitative Inorganic Analysis -Longman.
11. Text Book of Qualitative Inorganic Analysis - A. I. Vogel - III edition(1976).
12. Source Book on Atomic Energy – S. Glasstone- East-West Press Pvt. Ltd.(1967).
13. Nuclear and Radiochemistry - John Wiley and Sons(1964).
14. Nuclear Chemistry - H. J. Arnikar - Wiley Eastern Co., - II edition(1987).
15. Advanced Inorganic Chemistry - Cotton and Wilkinson - V Edition - Wiley and Sons (1988).
16. Text Book of Inorganic Chemistry – R. Gopalan – Universities Press –2012.
17. Modern Inorganic Chemistry – R. D. Madan - S. Chand Publications, Reprint,2014.

COURSE OUTCOMES

At the end of the course, the learners should be able to,

CO 1: Explain the bonding in co-ordination chemistry using Molecular orbital theory and the combination of atomic orbitals. Identify the principles, structure and reactivity of selected co-ordination complexes.

CO 2: Explain the nomenclature of co-ordination complexes

CO 3: Interpret their electronic spectra And magnetic properties

CO 4: Describe the reaction mechanisms of co-ordination compounds.

CO 5: Graduate students will learn the unique properties organic and inorganic solids have with respect to compounds in solution or in the gas phase, and understand the breadth of compositions and structure solids can have.

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓									✓
CO 2	✓									✓
CO 3			✓							✓
CO 4									✓	✓
CO 5	✓					✓				
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – 20X1= 20 (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – 5X5= 25 (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – 10X3= 30 (1 question from each unit, Essay type question)

SEMESTER – V

ORGANIC CHEMISTRY – I

Theory Hours :5	Course code : U21CHC510
Exam Hours : 3	Credits :5
	Marks : Max marks -100
	Ext - 75
	Int- 25

Objectives:

- To effectively impart knowledge about Carbohydrates, Stereochemistry, Conformational Analysis, Nitroalkanes and Heterocyclic chemistry.
- To make the students more inquisitive in learning the Mechanistic details in Organic Chemistry through the teaching of the name reactions.

UNIT- I

1.1 Carbohydrates - Classification – Aldoses and Ketoses, Reducing and Non-reducing Sugars - Reactions of Glucose and Fructose - Osazone formation, Mutarotation and their Mechanism - Structural elucidation of Glucose and Fructose - Pyranose and Furanose forms – Haworth’s method.

1.2 Determination of Ring Size- Haworth Projection Formula - Configuration of Glucose and Fructose - Epimerization - Chain lengthening and chain shortening of Aldoses - Inter conversion of Aldoses and Ketoses – Uses of Glucose.

1.3 Disaccharides and Polysaccharides - Reactions and Structural elucidation of Sucrose and Maltose - Properties, Structure and Uses of Starch and Cellulose.

UNIT- II

2.1 Stereoisomerism – Definition - Classification into Optical and Geometrical isomerism. Conditions for Optical Activity – Asymmetric centre – Chirality – Achiral molecules - Meaning of (+) and (-) and D- and L- notations – Elements of symmetry - Projection formulae- Fischer, Flying Wedge, Sawhorse and Newmann projection formulae- Notation of optical isomers - Cahn - Ingold - Prelog rules - R, S notation of Optical isomers with one Asymmetric carbon atoms – Erythro and Threo representations.

2.2 Optical activities in Compounds not containing Asymmetric Carbon Atoms - Biphenyl, Allenes and Spiranes - Racemisation - Methods of Racemisation (By substitution and Tautomerism) – Resolution - Methods of Resolution (Mechanical, Biochemical and Conversion To Diastereomers) - Asymmetric Synthesis (Partial and Absolute Synthesis) – Walden inversion.

2.3 Geometrical isomerism - Cis - Trans, Syn - Anti and E-Z Notations - Geometrical Isomerism In Maleic and Fumaric Acids and Unsymmetrical Ketoximes - Methods of Distinguishing Geometrical Isomers using Melting Points, Dipole Moment, Dehydration, Cyclisation, Heat of Hydrogenation and Combustion.

UNIT- III

3.1 Conformational analysis - Introduction of terms - Conformations, Configuration, Dihedral Angle, Torsional Strain - Differences between Conformational isomers and Configurational isomers.

3.2 Conformational analysis of Ethane and n-Butane including energy diagrams.

3.3 Conformations of Cyclohexane (Chair, Boat and Twist-Boat forms) - Axial and Equatorial bonds - Ring flipping showing Axial and Equatorial bonds Interconversions – Conformations of Methyl Cyclohexane, Dimethyl Cyclohexane and their stability - 1,2 and 1,3 -Interactions.

UNIT- IV

4.1 Nitroalkanes – Preparation – Properties – Structure – Nitro-Acinitro Tautomerism – Uses of Nitroalkanes – Differences between Primary, Secondary and Tertiary Nitroalkanes.

4.2 Reagents and their Applications in Organic Chemistry – Anhydrous AlCl_3 , P_2O_5 , H_2 / Pd- BaSO_4 , Zn/ Hg- HCl and Ag_2O .

4.3 Mechanism of Aldol, Perkin and Benzoin condensations - Knoevenagel, Claisen, Wittig, Cannizzaro, Reformatsky and Michael addition reactions.

UNIT- V

5.1 Heterocyclic compounds - Huckel's rule – Aromaticity of Heterocyclic compounds - Preparation, Properties, Structure and Uses of Furan, Pyrrole and Thiophene.

5.2 Preparation and properties of Pyridine and Piperidine - Comparative study of Basicity of Pyrrole, Pyridine and Piperidine with Amines – Nucleophilic and Electrophilic substitution reactions of Pyridine. Condensed Five and Six Membered Heterocyclic Compounds - Preparation of Indole, Quinoline and Isoquinoline – Fischer-Indole synthesis, Skraup Quinoline synthesis and Bischler-Napieralski synthesis - Electrophilic substitution reactions.

REFERENCE BOOKS:

1. Organic Chemistry - R. T. Morrison and Boyd – Pearson –2010.
2. Organic Chemistry - I. L. Finar - Volume I and II – Pearson Education.
3. Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons -2007.
4. Advanced Organic Chemistry - Bahl and Arun Bahl - S. Chand and Co. Ltd. –2012.
5. Stereochemistry, Conformations and Mechanisms - Kalsi – 2nd Edition, Wiley Eastern Ltd., Chennai –1993.
6. Organic Chemistry of Natural Products - Volume I and II - O. P. Agarwal - Goel Publishing House
7. A Guide Book to Mechanisms in Organic Chemistry - Peter Sykes - Pearson Education - 2006.
8. Stereochemistry of Organic Compounds - D. Nasipuri - New Age International Publishers..
9. Chemistry of Natural Products - Gurdeep Chatwal- Himalaya Publishing House.
10. Reactions and Reagents - O. P. Agarwal- Goel Publishing House.
11. Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.
12. A Text Book of Organic Chemistry, K.S.Tewari, N.K.Vishnoi, S.N.Mehrotra - Vikas Publishing House - 2011.
13. Modern Organic Chemistry- M. K. Jain and S. C. Sharma- Vishnoi Publications, 2014.
14. Reaction, Mechanism and Structure - Jerry March - John Wiley and Sons, NY-1992.
15. Organic Chemistry - Bruice - PearsonEducation.
16. Text Book of Organic Chemistry – C. N. Pillai – Universities Press –2009.
17. Organic Reaction Mechanisms - Parmar and Chawla – S. Chand &Co.
18. Organic Chemistry – I. L. Finar - 6th Edition, Pearson Education,2008.
19. A Guide Book to Mechanisms in Organic Chemistry – Peter Sykes - Pearson Education, 2006
20. Stereochemistry of Carbon Compounds- E. I. Eliel – Tata Mcgrow Hill Education – 2000.
21. Organic Chemistry - T. W. Graham Solomon, C. B. Fryhle – S. A. Dnyder – John Wiley & Sons –2014.
22. Advanced Organic Reaction Mechanism (Problems and Solutions) – N. Tewari – Books and Allied (P) Ltd –2005.
23. Advanced Organic Stereochemistry (Problems and Solutions) – N Tewari - Books and Allied (P) Ltd –2010.

COURSE OUTCOMES

At the end of the course, the learners should be able to,

CO 1: Distinguish between different kinds of isomers and differentiate between mirror images that are superimposable and mirror images that are not superimposable

CO 2 :Assign cis/trans or E/Z configuration for alkanes

CO 3: Explain the fundamentals of Heterocyclic compounds

CO 4: Familiarize with structure of heterocyclic compounds

CO 5: Understand the Application of reagents in Organic Synthesis

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓					✓				✓
CO 2	✓									✓
CO 3	✓									✓
CO 4										✓
CO 5						✓		✓		✓
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – 20X1= 20 (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – 5X5= 25 (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – 10X3= 30 (1 question from each unit, Essay type question)

SEMESTER – V

PHYSICAL CHEMISTRY – I

Theory Hours :5	Course code : U21CHC511
Exam Hours : 3	Credits :5
	Marks : Max marks -100
	Ext - 75
	Int- 25

Objectives:

- To impart knowledge about the Solutions, Phase Rule and its Applications, Colligative properties, Chemical Equilibrium, Phase Rule and its Applications, Electrochemistry and its Applications.

Unit-I Solutions

1.1 Solutions of liquids in liquids - Raoult's law – Vapour pressure of ideal solutions – Activity of a component in an ideal solution – Gibbs-Duhem-Margules equation – Thermodynamics of Ideal Solutions.

1.2 Vapour pressure of Non-ideal solutions – Fractional distillation of Binary liquid solutions – Azeotropic mixtures - Distillation of immiscible liquids - Partially miscible liquids - Phenol - Water, Triethylamine – Water and Nicotine – Watersystems.

1.3 Nernst distribution law – Definition - Thermodynamic derivation –Applications.

Unit-II Phase rule

2.1 Definition of the terms - Phase, Components and Degrees of freedom – Derivation of Gibbs phaserule

2.2 Applications of phase rule - One component system - Water and Sulphur system – Reduced phase rule - Two components system - Simple eutectic system – Lead-silver system, KI-water system - Freezingmixtures.

2.3 Thermal analysis and cooling curves, Compound formation with congruent melting point – Zn-Mg, FeCl₃- Water system - Compound formation with incongruent melting point - Na-KSystem.

Unit-III Colligative properties and Chemical Equilibrium

3.1 Colligative properties - Lowering of vapour pressure - Osmosis and osmotic pressure - Thermodynamic Derivation of Elevation of boiling point and Depression of freezing point – Determination of molar mass – Van't Hoff factor.

3.2 Chemical Equilibrium - Law of Chemical Equilibrium - Thermodynamic derivation of Law of Chemical Equilibrium.

3.3 Van't Hoff Reaction Isotherm - Temperature Dependence of Equilibrium Constant – Van't Hoff Isochore - Le Chatelier's Principle and Its Applications.

UNIT-IV Electrochemistry - I

4.1 Specific conductance and Equivalent conductance - Measurement of equivalent conductance - Variation of Equivalent Conductance and Specific Conductance with Dilution – Ostwald's Dilution Law and Its Limitations.

4.2 Debye-Huckel's theory of Strong Electrolytes - Onsager equation (No derivation) - Verification and Limitations - Kohlrausch law and its Applications.

4.3 Migration of ions - Ionic Mobility - Ionic Conductance - Transport Number and its determination – Hittorf's method and Moving Boundary method.

UNIT- V Electrochemistry - II

5.1 Applications of Conductometric Measurements - Determination of Degree of Dissociation of Weak Electrolytes, Ionic Product of water - Solubility Product of sparingly soluble salt - Conductometric Titrations.

5.2 Concept of pH - Buffer solutions, Buffer action - Henderson equation - Applications of Buffer Solutions.

5.3 Hydrolysis of Salts - Expressions for Hydrolysis Constant, Degree of Hydrolysis and pH of aqueous salt solutions.

REFERENCE BOOKS

1. Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishnal Publishing Co., - 2013.
2. Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha and U. N Dash - Sultan Chand & Co., -2006.
3. Physical Chemistry - Negi and Anand – Eastern WileyPvt.Ltd..
4. Physical Chemistry - Kundu and Jain - S. Chand &Co.
5. Physical Chemistry - K. L. Kapoor - Macmillan - 4volumes.
6. Elements of Physical Chemistry - Glasstone and Lewis -Macmillan.
7. Text book of Physical Chemistry - S. Glasstone - Macmillan (India)Ltd.
8. Fundamentals of Physical Chemistry - Maron and Landor - Colier -Macmillan.
9. Physical Chemistry - G. W. Castellan - Narosa publishing house -2004.
10. Physical Chemistry - Walter J. Moore - Orient Longman –1972.
11. Numerical Problems on Physical Chemistry, Gashal - Books and Allied (P)Ltd.,
12. Universal General Chemistry, C.N.R. Rao,Macmillan.
13. Group Theory and its Chemical Applications - P. K. Bhattacharya - Himalaya PublishingHouse.
14. Text book of Physical Chemistry – M. V. Sangaranarayanan, V.Mahadevan, Universities Press - 2011.
15. General andPhysical Chemistry – Dr. A. Arunabhasan, Books of Allied (P) Ltd., - Ghosal –2009.

COURSE OUTCOMES

At the end of the course, the learners should be able to,

CO 1: To learn about concept of phase and derivation of phase

CO 2 :Define the importance of phase diagrams in the field of material science and engineering.

CO 3: Students should be able to interpret the phase diagram of pure substance and recognize conditions here phases exist in equilibrium.

CO 4: Explain the fundamentals of electrochemistry.

CO 5: Evaluate the electrodes and cells

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓									
CO 2										✓
CO 3			✓							✓
CO 4	✓									✓
CO 5								✓		✓
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – 20X1= 20 (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – 5X5= 25 (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – 10X3= 30 (1 question from each unit, Essay type question)

SEMESTER V
CORE COURSE – XII - PRACTICAL
GRAVIMETRIC ANALYSIS -PRACTICAL

Practical Hours : 6	Course code : U21CHC512P
Exam Hours : 6	Credits : 4
	Marks : Max marks -100
	Ext - 60
	Int - 40

OBJECTIVES

- ❖ To estimate Ca Mg,Ba,Pb and Ni as Chromate and sulphate by gravimetric method

Gravimetric Analysis :

1. Estimation of calcium as calcium oxalate.
2. Estimation of barium as barium sulphate.
3. Estimation of barium as barium chromate.
4. Estimation of lead as lead sulphate.
5. Estimation of lead as lead chromate.
6. Estimation of nickel dimethylglyoxime.

COURSE OUTCOMES

At the end of the course the students will able to

CO 1 : Gravimetrically estimate the inorganic salts

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓							✓		✓
CO 2										
CO 3										
CO 4										
CO 5										
CO 6										

QUESTION PATTERN

Experiments - 60 MARKS

Internal - 40 MARKS

SEMESTER – V
MAJOR BASED ELECTIVE COURSE – I(A)
ANALYTICAL CHEMISTRY

Theory Hours :5	Course code : U21CH5MBE1:1
Exam Hours : 3	Credits :5
	Marks : Max marks -100
	Ext - 75
	Int- 25

Objective:

- To impart knowledge about Data Analysis, Purification of organic compounds, Different Spectroscopic Techniques and their Application.

UNIT – I

1.1. Data analysis – Types of errors – Correction of determinate errors - Idea of Significant Figures and their Importance with examples – Precision and Accuracy – Methods of expressing Accuracy.

1.2. Error analysis – Minimising errors – Methods of expressing Precision – Average deviation – Standard Deviation and Confidence Limit.

1.3. Purification of Solid Organic Compounds – Solvent extraction – Recrystallisation - Use of immiscible solvents – Soxhlet extraction – Crystallisation – Use of miscible solvents – Fractional Crystallisation and Sublimation.

UNIT – II

2.1 Purification of liquids – Experimental Techniques of Distillation – Fractional Distillation – Vacuum Distillation – Steam Distillation – Tests of Purity.

2.2 Gravimetric Analysis – Characteristics of Precipitating Agents – Condition of Precipitation – Types of Precipitants – Purity of Precipitate – Co-precipitation and Post precipitation – Precipitation from Homogeneous Solution – Digestion and Washing of precipitate – Ignition of precipitate – Uses of Sequestering Agents.

2.3 Definition of spectrum – Electromagnetic radiation – Quantization of different forms of energies in molecules (Translational, Rotational, Vibrational and Electronic) – Born- Oppenheimer approximation – Condition of energy of absorption of various types of spectra.

.UNIT – III

3.1 Microwave Spectroscopy – Theory of Microwave Spectroscopy – Selection Rule – Calculation of Moment of Inertia and Bond Lengths of Diatomic molecules – Effect of Isotopic Substitution.

3.2 UV – Visible Spectroscopy – Absorption laws - Calculations involving Beer- Lambert's law – Instrumentation – Photocalorimeter and Spectrophotometer – Block diagrams with description of components – Theory of Electronic Spectroscopy.

3.3 Types of Electronic Transitions – Chromophore and Auxochromes – Absorption bands and Intensity – Factors influencing Position and Intensity of Absorption Bands - Frank- Condon Principle – Applications.

UNIT – IV

4.1 IR Spectroscopy – Principle – Theory of IR spectra – Vibrational Degrees of Freedom - Modes of Vibration of Diatomic Molecules –Triatomic linear (CO_2) and Non-linear Molecules (H_2O) - Stretching and Bending vibrations – Symmetric and Asymmetric Stretching vibrations - Selectionrules.

4.2 Expression for Vibrational Frequency (Derivation not needed) – Calculation of Force constant – Factors influencing Vibrational Frequencies - IR Spectrophotometer - Instrumentation – Source, Monochromator, Cell, Detectors, Recorders and Sampling Techniques.

4.3 Applications of IR Spectroscopy – Identification of Functional Groups - Interpretation of the spectra of Alcohols, Aldehydes, Ketones and Esters (Aliphatic and Aromatic) - Hydrogenbonding.

UNIT – V

5.1 Raman Spectroscopy - Rayleigh and Raman scattering – Selection rule – Raman shift - Stokes and Anti-stokes lines - Differences between Raman and IR Spectroscopy.

5.2 Raman Spectrophotometer - Instrumentation – Block diagram – Components and their Functions – Advantages of using Laser in Raman Spectroscopy – Applications – Structural elucidation in the study of Inorganic and Organic Compounds.

5.3 Rotational-Raman spectra of Non - Centrosymmetric molecules - Mutual exclusion principle (CO_2 and N_2O) - Applications – Structural diagnosis.

REFERENCE BOOKS:

- Elements of Analytical Chemistry – R. Gopalan, P. S. Subramanian, K. Rengarajan– S. Chand and sons (1997).
- Fundamentals of Analytical Chemistry – D. A. Skoog and D. M. West, HoltReinhard and Winstor Publications – IV Edition(1982).
- Principles of Instrumental Methods of Analysis – D. A. Skoog and Saunders,College Publications, III Edition(1985).
- Analytical Chemistry – S. M. Khopkar – New age InsternationalPublishers.
- Instrumental Methods of Chemical Analysis – Chatwal - Anand, HimalayaPublishing House(2000).
- Analytical Chemistry – R. Gopalan, SultanChand.
- Analytical Chemistry – S. Usharani,Macmillan.
- Instrumental Methods of Analysis – 7th Edition – H. H. Willard, L. L. Merit. J. Dean and F. A. Settle –Wadsworth Publishing Company Limited, Belmont, California, USA,1988.
- Physico- Chemical Techniques of Analysis – P. B. Janarthanan – Vol. I & II –Asian Publishing.
- Instrumental Methods of Chemical Analysis – B. K. Sharma – GoelPublications.
- Applications of Absorption Spectroscopy of Organic Compounds - Prentice Hall,John R. Dyer.
- Spectroscopic Identification of Organic Compounds – R. M. Silverstein, G. C.Bassler and T. C. Morill – John Wiley andSons.

COURSE OUTCOMES

At the end of the course, the learners should be able to,

CO 1: Evaluate the analytical data in terms of statics

CO 2 :To understand the concept of gravimetric analysis

CO 3: Explain the fundamentals and interpretation method of IR, Raman, UV spectra

	PO 1	PO 2	PO 3	PO 4	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓		✓			✓				✓
CO 2		✓	✓			✓	✓			✓
CO 3	✓		✓			✓				✓
CO 4										
CO 5										
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – $20 \times 1 = 20$ (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – $5 \times 5 = 25$ (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – $10 \times 3 = 30$ (1 question from each unit, Essay type question)

SEMESTER- V
MAJOR-BASED ELECTIVE COURSE – I(B)
WATER TREATMENT AND ANALYSIS

Theory Hours	:5	Course code : U21CH5MBE1:2
Exam Hours	: 3	Credits :5
		Marks : Max marks -100
		Ext - 75
		Int - 25

Objective: To impart knowledge about the various methods of Water Analysis and Treatment of Water.

UNIT-I

1.1 Introduction - Characteristics of water - Alkalinity - Hardness - Unit of hardness – Total solids - Oxidation - Transparency - Silica content.

1.2 Purification of Water for drinking purpose - Potability of water – Clarification - Coagulation - Contact and Electrochemical Coagulation.

1.3 Sterilisation and Disinfection of water - Precipitation - Aeration - Ozonisation - Chlorination.

UNIT-II

2.1 Water Softening Methods - Clark’s process - Lime soda process - Modified lime soda process - Permutit or Zeolite process - Ion exchange process - Demineralisation of water.

2.2 Determination of Hardness of water - Titration method - Complexometric method using EDTA - Expressing Hardness.

2.3 Equivalents of Calcium Carbonate - Problems to determine Temporary and Permanent Hardness.

UNIT-III

3.1 Hard water and Industries - Industrial water treatment - Boiler feed water method of Softening - Prevention of plumbo solvency - Scales in boilers - Consequences - Internal conditioning methods.

3.2 Desalination of Brackish water - Electrodialysis - Reverse osmosis - Removal of Fe, Mn and Silicic acid.

3.3 Effluent Treatment of Water from Paper Industry, Petrochemicals, Fertilizer industry and Power station.

UNIT-IV

4.1 Water analysis - Sampling of Water for analysis - Chemical Substances affecting Potability - Colour, Turbidity, Odour, Taste, Temperature, pH and Electrical Conductivity.

4.2 Analysis of Solids present in water - Suspended Solids - Dissolved Solids - Total Acidity - Alkalinity - Free CO₂ - Free Chlorine - Ca, Mg, Fe, Mn, Ag and Zn.

4.3 Water in Industry – Pollution of Water by Fertilisers, Detergents, Pesticides and Industrial wastes.

UNIT-V

5.1 Analysis of Chemical Substances Affecting Health - NH₃, Nitrate, Nitrite, Cyanide, Sulphate, Sulphide, Chloride and Fluoride.

5.2 Measurement of Toxic Chemical Substances - Analysis of Chemical Substances indicative of Pollution - Dissolved oxygen - Biochemical Oxygen Demand (BOD) - Chemical Oxygen Demand (COD)

5.3 Bacteriological Examination of Water - Total Count Test - E. coli test - E. coli index - Most Probable Number method - Biological Examination of Water - Physical Examination of Water - Radioactivity of Water - Methods of removing Radioactivity from Water.

REFERENCE BOOKS :

1. Industrial Chemistry (Including Chemical - Engineering) - B. K. Sharma - Goel Publishing House, Meerut (1987).
2. Pollution Control in Process Industries - S. P. Mahajan - Tata McGraw Hill Publishing Company Ltd., New Delhi (1991).
3. Water Pollution and Management - C. K. Varashney - Wiley Eastern Ltd., Chennai -20 (1991)

COURSE OUTCOMES

At the end of the course, the learners should be able to,

CO 1: Evaluate the quality of water

CO 2 :To understand the concept of water analysis

CO 3: Explain about BOD,COD

	PO 1	PO 2	PO 3	PO 4	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓		✓			✓				✓
CO 2		✓	✓			✓	✓			✓
CO 3	✓		✓			✓				✓
CO 4										
CO 5										
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – 20X1= 20 (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – 5X5= 25 (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – 10X3= 30 (1 question from each unit, Essay type question)

SEMESTER- V
MAJOR BASED ELECTIVE COURSE- I(C)
ORGANIC SYNTHESIS

Theory Hours :5	Course code : U21CH5MBE1:3
Exam Hours : 3	
	Credits :5
	Marks : Max marks -100
	Ext - 75
	Int - 25

OBJECTIVES

- To know the Basics of Retrosynthesis.
- To impart knowledge about the Ring Synthesis.

UNIT-I
DISCONNECTION APPROACH

- 1.1 An introduction to Synthons and Synthetic Equivalent.
- 1.2 Disconnection Approach - Functional Group Inter-conversions.
- 1.3 The importance of the Order of Events in Organic Synthesis - One group C-X and Two group ,C-X disconnections – Chemoselectivity - Reversal of Polarity.

UNIT-II

PROTECTING GROUPS

- 2.1 Principle of Protection of Alcoholic group and Amino group.
- 2.2 Principle of Protection of Carbonyl group and Carboxyl group.
- 2.3 Activation of Functional Groups.

UNIT-III

ONE GROUP C-C DISCONNECTIONS

- 3.1 Alcohols and Carbonyl Compounds.
- 3.2 Regioselectivity and Alkene Synthesis.
- 3.3 Uses of Acetylenes and Aliphatic Nitro Compounds in Organic Synthesis.

UNIT-IV

TWO GROUP C-C DISCONNECTIONS

- 4.1 Diels-Alder Reaction - 1, 3 - Difunctionalised Compounds.
- 4.2 α , β - Unsaturated Carbonyl Compounds - Control in Carbonyl Condensations.
- 4.3.1, 5 - Difunctionalised Compounds - Michael Addition and Robinson Annulation reactions.

UNIT-V

RING SYNTHESIS

5.1 Saturated Heterocyclic Compounds.

5.2 Synthesis of 3-, 4- and 6- Membered Rings Aromatic Heterocycles in Organic Synthesis. 5.3

Application of the above in the Synthesis of Camphor, Longifoline, Cortisone and Reserpine.

REFERENCE BOOKS

1. Some Modern Methods of Organic Synthesis, W. Carruthers, Cambridge University Press, UK.
2. Advanced Organic Chemistry, F. A. Carey and R. J. Sundberg, Part- B, Plenum Press.
3. Modern Synthetic Reactions. H. O. House and W. A. Benjamin

COURSE OUTCOMES

At the end of the course, the learners should be able to,

CO 1: Explain the concept of Regio selectivity

CO 2 :To understand the concept of Protecting groups

CO 3: Explain the synthesis method of Hetero cyclic compounds

	PO 1	PO 2	PO 3	PO 4	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓		✓			✓				✓
CO 2		✓	✓			✓	✓			✓
CO 3	✓		✓			✓				✓
CO 4										
CO 5										
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – 20X1= 20 (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – 5X5= 25 (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – 10X3= 30 (1 question from each unit, Essay type question)

SEMESTER- V
SKILL ENHANCEMENT COURSE – II - THEORY
DOMESTIC CHEMISTRY

Theory Hours : 2 Exam Hours : 3	Course code : U215CHSE2 Credits :2 Marks : Max marks -100 Ext - 75 Int- 25
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OBJECTIVES

- ❖ To learn the classification of food
- ❖ To know the preparation method of soap
- ❖ To learn the classification of polymers and constituents of paint
- ❖ To learn the method of preparation of domestic products

Unit-I

Food: Nutritional classification of food (carbohydrate, proteins and amino acids, lipids, vitamins, minerals and water) and their functions in the body – examples for each class -rancidity of oil – anti oxidants.

Milk: composition– some commercial milk products

Unit -II

Soap: Definition, Preparation of soap by cold process and hot process - properties of soap.

Detergent: Types, preparation, comparison of the properties of detergent with soap.

Preparation of some food products: Tooth paste, Jam & Jelly, Garam masala powder, Tomato paste, tomato sauce and tomato soup

Unit-III

Polymers: Classification (based on physical property, composition & reaction mode of polymerization).

Properties of polymers: The crystalline melting point. The glassy state and the glass transition temperature. Solubility of polymers. Thermal analysis of polymers. Polymer degradation – thermal, mechanical, high energy radiation, oxidative and hydrolytic.

Unit- IV

Paint: Requirements of good paint, constituents of paint and their functions – varnish - lacquer & enamel – emulsion paints - special paints (fire retardant, water repellent, heat resistant paint, anti fouling, luminous paints)

Unit- V

Preparation of some domestic products: Nail polish, hand cream, perfumes, rose water, sandal wood powder, shampoo, Mosquito coil, candle, chalk, ink, Phenyle, incense stick and Liquid blue (Formulation and Procedure).

REFERENCE BOOKS:

1. Chemical Process Industries, R. Norris Shreve and Joseph A.Brink,Jr.,4th Edition, McGraw Hill, 1977
2. Perfumes, Cosmetics and Soaps, W.A.Poucher (Vol.3), 9th Ed, Springer Science Business Media, 1993
3. Environmental Chemistry, A.K.De, 6th Edition, New Age International, New Delhi, 200
- 4.,Applied Chemistry, Bagavathi Sundari KMJP publishers, Chennai (2006).
- 5..Polymer chemistry, Gowarikar
- 6.. Fundamental Concepts of Applied Chemistry, Jayashree Ghosh S.Chand & Company Ltd., New Delhi 2008.

COURSE OUTCOMES

At the end of the course the students are capable to

CO 1: Explain the classification of foods, and nutritive value of food

CO2: Make domestic products like soap, shampoo, nail polish, mosquito coil, chalk, incense stick and other products.

CO3: Analyze the quality of food and food products

CO4 : Analyze the nutrients present in food.

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓			✓						✓
CO 2				✓	✓		✓			✓
CO 3				✓	✓		✓			✓
CO 4	✓				✓				✓	✓
CO 5										
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer All questions – $15 \times 5 = 75$ (2 questions from each unit, Essay type either or question)

SEMESTER- V
SKILL ENHANCEMENT COURSE – III - THEORY
IMPACT OF MEDICINAL PLANTS ON SOCIETY

Theory Hours : 2	Course code : U215CHSE3
Exam Hours : 3	Credits :2
	Marks : Max marks -100
	Ext - 75
	Int- 25

OBJECTIVES:

- ❖ To learn about medicinal plants and its extraction
- ❖ To know the domestic uses of herbs
- ❖ To learn classification of primary and secondary metabolites

UNIT –I

Medicinal plants- Importance and scope, cultivation of medicinal plants- processing and utilization. Chemical nature of crude drugs- Extraction, preparation and preservation of crude drugs.

UNIT –II

Traditional herbal teas. Herbs for woman, Babies and children. Concepts of herbal garden- Home, School Herbal gardens.

UNIT-III

Classification and estimation of primary metabolites – Carbohydrates, fatty acids, amino acids and proteins. Secondary Metabolites- Classification, General characters, Chemical nature, Extraction, and estimation methods for glycosides, Tannins, Volatile oils, Resinous substances, Terpenoids- phenolic compounds and alkaloids.

UNIT-IV

Antioxidants –Role of antioxidants- Estimation of antioxidants- Ascorbic acid, α –Tocopherol

UNIT-V

Post-harvest technology in medicinal plants: scope and importance. Importance of herbal marketing- Future prospects and constraints of the herbal drug industry-Regulatory status of herbal medicine in India.

REFERENCES:

1. Farooqi, A.A. and B. S. Sreeramu, 2004. Cultivation of medicinal and aromatic crops. Revised edition, Universities Press (India) Private Limited, Hyderabad
2. Godte V.M. 2000. Ayurvedic pharmacology and therapeutic uses of medicinal plants, Bharathiya Vidya Bhavan, Mumbai
3. Grewal, R.C. 2000. Medicinal Plants, Campus Books International, New Delhi
4. Harbone, J.B. 1998. Phytochemical Methods A guide to modern techniques of plant analysis,
5. Majumdar, A. 2000. Home remedies in Ayurveda, Amar Granth Publications, New Delhi.

Course outcomes

After completion of the course the students able to

CO 1 :Gain knowledge on the various chemical components present in the plants

CO 2: Explain the classification and estimation of metabolites

CO 3 : Explain the importance of terpenoids and metabolites

CO4 :Understand the drug Extraction methods

CO5: Able to work in pharmaceutical companies .

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓					✓				✓
CO 2			✓			✓	✓	✓		✓
CO 3			✓							✓
CO 4										✓
CO 5					✓				✓	
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer All questions – 15X5= 75 (2 questions from each unit, Essay type either or question)

SEMESTER VI
CORE COURSE - XIII
ORGANIC CHEMISTRY – II

Theory Hours :6	Course code : U21CHC613
Exam Hours : 3	Credits :5
	Marks : Max marks -100
	Ext - 75
	Int- 25

OBJECTIVES:

- To kindle interest in students in learning Bio-organic chemistry through the introduction of topics such as Proteins, Nucleic acids, Terpenes, Alkaloids etc.
- To generate Keen Interest and Thinking in Understanding the Mechanisms of Molecular Rearrangements and Synthetic Applications of Acetoacetic Ester, Benzene Diazonium Chloride, Grignard Reagents and Diazomethane.

UNIT- I Molecular rearrangements

1.1 Rearrangements - Classification – Anionotropic, Cationotropic and Free Radical Rearrangements - Intermolecular and Intramolecular Rearrangements – Examples – Cross over experiment – Differences between Intermolecular and Intramolecular rearrangements.

1.2 Mechanisms, Evidences, Migratory Aptitude, Intermolecular or Intramolecular nature of the following rearrangements - Pinacol-Pinacolone, Benzil-Benzilic acid and Beckmann rearrangement.

1.3 Mechanism of Hoffmann, Curtius, Baeyer-Villiger, Claisen (Sigmatropic), Fries rearrangement, Cope and Oxy-Coperearrangements.

UNIT-II Amino acids and Polypeptides

2.1 Amino acids – Classification - Essential and Non- Essential amino acids – Acidic, Basic and Neutral Amino Acids – Alpha, Beta and Gamma- Amino acids - Preparation of alpha amino acids – Gabriel's Phthalimide synthesis, Strecker synthesis and Erlenmeyer Azlactone synthesis - Glycine, Alanine and Tryptophan.

2.2 General properties of Amino acids - Reactions of Amino acids due to Amino group and Carboxyl group - Zwitterions - Isoelectric point.

2.3 Peptides - Synthesis - Bergmann Method - Structural Determination of Polypeptides - End Group Analysis – N-Terminal and C-Terminal Amino Acids Determination.

UNIT- III Proteins and Nucleic Acids

3.1 Proteins - Definition - Classification based on Physical Properties, Chemical Properties and Physiological Functions - Primary and Secondary Structure of Proteins - Helical and Beta Sheet Structures (Elementary Treatment Only) – Denaturation of Proteins.

3.2 Nucleic acids – Nucleoproteins - Definition - Types of Nucleic Acids – RNA and DNA - Nucleoside, Nucleotide, Degradation of Nucleotide Chain - Components of RNA and DNA.

3.3 Differences between DNA and RNA - Structures of Ribose and 2- Deoxyribose – Double Helical Structure of DNA - Biological functions of Nucleic Acids - Elementary ideas on Replication and Protein Synthesis.

UNIT-IV Chemistry of Natural Products

4.1 Antibiotics – Definition – Structural elucidation of Penicillin and Chloramphenicol – Uses of Penicillin and Chloramphenicol.

4.2 Alkaloids – Classification – Isolation of alkaloids – General methods of Determination of structure of Alkaloids - Synthesis and Structural Elucidation of Piperine, Coniine and Nicotine.

4.3 Terpenoids – Definition - Classification - Isoprene rule - Synthesis and Structural elucidation of Citral, Menthol and Alpha-pinene.

UNIT- V Organo-Synthetic Reagents

5.1 Acetoacetic ester – Preparation by Claisen ester condensation – Reactions – Synthetic Applications.

5.2 Benzene diazonium chloride – Preparation from aniline – Synthetic Applications – Coupling reactions.

5.3 Grignard Reagents – Preparation – Synthetic Applications – Diazomethane – Preparation by Von-Pechmann method – Synthetic Applications.

REFERENCE BOOKS:

1. Organic Chemistry - R. T. Morrison and Boyd – Pearson –2010.
2. Organic Chemistry - I. L. Finar - Volume I and II – Pearson Education.
3. Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons -2007.
4. Advanced Organic Chemistry - Bahl and Arun Bahl - S. Chand and Co. Ltd. –2012.
5. Stereochemistry, Conformations and Mechanisms - Kalsi – 2nd Edition, Wiley Eastern Ltd., Chennai –1993.
6. Organic Chemistry of Natural Products - Volume I and II - O. P. Agarwal - Goel Publishing House
7. A Guide Book to Mechanisms in Organic Chemistry - Peter Sykes - Pearson Education - 2006.
8. Stereochemistry of Organic Compounds - D. Nasipuri - New Age International Publishers..
9. Chemistry of Natural Products - Gurdeep Chatwal- Himalaya Publishing House.
10. Reactions and Reagents - O. P. Agarwal- Goel Publishing House.
11. Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.
12. A Text Book of Organic Chemistry, K.S.Tewari, N.K.Vishnoi, S.N.Mehrotra - Vikas Publishing House - 2011.
13. Modern Organic Chemistry- M. K. Jain and S. C. Sharma- Vishnoi Publications, 2014.
14. Reaction, Mechanism and Structure - Jerry March - John Wiley and Sons, NY-1992.
15. Organic Chemistry - Bruice - PearsonEducation.
16. Text Book of Organic Chemistry – C. N. Pillai – Universities Press –2009.
17. Organic Reaction Mechanisms - Parmar and Chawla – S. Chand &Co.
18. Organic Chemistry – I. L. Finar - 6th Edition, Pearson Education,2008.
19. A Guide Book to Mechanisms in Organic Chemistry – Peter Sykes - Pearson Education, 2006
20. Stereochemistry of Carbon Compounds- E. I. Eliel – Tata Mcgrow Hill Education – 2000.
21. Organic Chemistry - T. W. Graham Solomon, C. B. Fryhle – S. A. Dnyder – John Wiley & Sons –2014.
22. Advanced Organic Reaction Mechanism (Problems and Solutions) – N. Tewari – Books and Allied (P) Ltd –2005.
23. Advanced Organic Stereochemistry (Problems and Solutions) – N Tewari - Books and Allied (P) Ltd –2010.

Course outcomes

After completion of the course the students able to

CO 1 :Gained knowledge about amino acids and proteins

CO 2: Understand the rearrangements in chemical reactions

CO 3 : Know about the classification and properties of proteins and nucleic acids

CO4 : Explain the importance of antibiotics

CO5 : Understand the procedures of organic synthesis

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓					✓				✓
CO 2			✓						✓	✓
CO 3									✓	✓
CO 4									✓	✓
CO 5			✓					✓		✓
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – 20X1= 20 (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – 5X5= 25 (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – 10X3= 30 (1 question from each unit, Essay type question)

SEMESTER - VI
CORE COURSE - XIV
PHYSICAL CHEMISTRY – II

Theory Hours :6	Course code : U21CHC614
Exam Hours : 3	Credits :5
	Marks : Max marks -100
	Ext - 75
	Int- 25

Objectives:

- To impart Knowledge about Electrochemistry, Surface Chemistry, Photochemistry, Chemical Kinetics and Theories of reaction rates.

UNIT- I Electrochemistry - III

1.1 Galvanic cells - Daniel cell - Reversible and Irreversible Cells – EMF of a Cell and its Measurement - Standard Weston Cadmium Cell – Evaluation of Thermodynamic Quantities.

1.2 Derivation of Nernst equation for Electrode Potential and Cell emf –Types of reversible electrodes - Electrode reactions – Electrode potentials.

1.3 Reference electrodes - Standard Hydrogen Electrode - Standard Electrode Potential - Sign conventions - Electrochemical Series and its Applications.

UNIT- II Electrochemistry - IV

2.1 Liquid Junction Potential - Concentration cells With Transference and Without Transference.

2.2 Applications of Concentration cells - Valency of ions, Solubility and Solubility Product - Activity Coefficient of electrolytes - Determination of pH using Hydrogen, Quinhydrone and Glass electrodes – Potentiometric titrations.

2.3 Polarisation - Overvoltage – Storage Cells - Decomposition potential - Lead Storage Battery - Fuel Cells (H₂-O₂ Cell) - Mechanism of Discharging and Recharging Fuel Cells.

UNIT- III Chemical Kinetics

3.1 Definitions of the terms – Order and Molecularity – Rate of the reaction - Derivations of expressions for Zero, First, Second and Third order rate equations - Study of kinetics by Volumetric, Polarimetric and Spectrophotometric methods - Methods of Determination of Order of reaction.

3.2 Effect of Temperature on reaction rate - Arrhenius equation - Theories of reaction rates – Bimolecular Collision Theory – Lindmann's theory of Unimolecular Reactions.

3.3 ARRT - Thermodynamic treatment of ARRT – Eyring equation - Comparison of Collision Theory and ARRT.

UNIT- IV Surface Chemistry

4.1 Adsorption – Characteristics of adsorption – Physisorption and Chemisorption – Differences between Physical and Chemical Adsorption - Applications of Adsorption – Adsorption of Gases by Solids – Different Types of Isotherms - Freundlich adsorption isotherm - Langmuir theory of adsorption –Derivation.

4.2 Catalysis – Definition - General Characteristics of Catalytic Reactions –Acid-Base catalysis – Enzyme catalysis – Michaelis-Menton Equation – Effect of Temperature and pH on Enzyme Catalysis.

4.3 Homogeneous catalysis – Function of a catalyst in terms of Gibb's free energy of activation - Heterogeneous catalysis - Kinetics of Unicellular Surface Reactions.

UNIT- V Photochemistry

5.1 Laws of photochemistry - Grothus-Draper law, Stark-Einstein's law – Primary and Secondary processes – Quantum yield and its determination.

5.2 Qualitative description of Fluorescence, Phosphorescence, Luminescence, Chemiluminescence, Bioluminescence and photosensitized Reactions.

5.3 Kinetics of Photochemical Reactions - H_2-Cl_2 and H_2-Br_2 reactions – Photodimerisation of Anthracene

REFERENCE BOOKS:

1. Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishnal Publishing Co., - 2013.
2. Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha and U. N Dash - Sultan Chand & Co., -2006.
3. Physical Chemistry - Negi and Anand – Eastern WileyPvt.Ltd..
4. Physical Chemistry - Kundu and Jain - S. Chand &Co.
5. Physical Chemistry - K. L. Kapoor - Macmillan - 4volumes.
6. Elements of Physical Chemistry - Glasstone and Lewis -Macmillan.
7. Text book of Physical Chemistry - S. Glasstone - Macmillan (India)Ltd.
8. Fundamentals of Physical Chemistry - Maron and Landor - Colier -Macmillan.
9. Physical Chemistry - G. W. Castellan - Narosa publishing house -2004.
10. Physical Chemistry - Walter J. Moore - Orient Longman –1972.
11. Numerical Problems on Physical Chemistry, Gashal - Books and Allied (P)Ltd.,
12. Universal General Chemistry, C.N.R. Rao, Macmillan.
13. Group Theory and its Chemical Applications - P. K. Bhattacharya - Himalaya Publishing House.
14. Text book of Physical Chemistry – M. V. Sangaranarayanan, V.Mahadevan, Universities Press - 2011.
15. General and Physical Chemistry – Dr. A. Arunabhasan, Books of Allied (P) Ltd., - Ghosal –2009.

COURSE OUTCOMES

At the end of the course, the learners should be able to,

CO 1: Determine the rate law, order of reaction with respect to each reactant, the overall order of the reaction, rate constant and units.

CO 2 :To understand the concept of surface chemistry

CO 3: Apply the concept of adsorption in the field of pollution control.

CO4 :Explain the fundamentals of photochemistry and its applications .

CO5 : Understand the basic concepts of chemical kinetics on reactions.

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓						✓		✓	✓
CO 2	✓									✓
CO 3				✓	✓					✓
CO 4	✓									✓
CO 5	✓						✓		✓	✓
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – $20 \times 1 = 20$ (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – $5 \times 5 = 25$ (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – $10 \times 3 = 30$ (1 question from each unit, Essay type question)

SEMESTER- VI
CORE COURSE-XV
PHYSICAL CHEMISTRY PRACTICAL - II

Practical Hours : 6	Course code : U21CHC615P
Exam Hours : 6	Credits : 4
	Marks : Max marks -100
	Ext - 60
	Int - 40

OBJECTIVES

To learn about the conductometric and potentiometric titrations and its principles

ELECTRICAL EXPERINMENTS:

a. Conductometry :

1. Cell Constant
2. Equivalent Conductivity
3. Conductometric titrations – Acid –Base Titrations

b. Potentiometry:

1. Potentiometric Titration

COURSE OUTCOMES

Students will be able to

CO 1: Explain the conductometric titration principles

CO 2: Do the conductometric experiment

CO 3: Do the Potentiometric experiment

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓		✓				✓		✓	✓
CO 2	✓							✓		✓
CO 3				✓	✓				✓	✓

QUESTION PATTERN

Experiments - 60 MARKS

Internal - 40 MARKS

SEMESTER – VI
MAJOR BASED ELECTIVE COURSE
INORGANIC CHEMISTRY – II (E-IIA)

Theory Hours : 6	Course code : U21CH6MBE2:1
Exam Hours : 3	Credits : 5
	Marks : Max marks -100
	Ext - 75
	Int - 25

Objectives:

- To impart knowledge about Nuclear chemistry, Radioactivity, Metallurgy, Chemistry of f- Block Elements, Organometallic Compounds and Bio-inorganic Chemistry.

UNIT-I NUCLEAR CHEMISTRY

1.1 Introduction - Composition of Nucleus – Fundamental Particles of Nucleus - Nuclear Forces operating between the Nucleons - N/P ratio – Nuclear Stability - The whole number rule and Packing fraction.

1.2 Isotopes, Isobars and Isotones – Detection and Separation of isotopes

1.3 Nuclear Binding Energy - Mass defect - Simple calculations involving Mass Defect and Binding Energy per Nucleon - Magic Numbers – Liquid drop model - Shellmodel.

UNIT-II RADIOACTIVITY

2.1 Natural Radioactivity – Properties of Alpha, Beta and Gamma rays - Detection and measurement of Radioactivity - Radioactive series including Neptunium series – Soddy's Group Displacement Law.

2.2 Rate of disintegration and Half - Life period – Derivation - Average life period - Artificial Radioactivity - Induced Radioactivity - Uses of Radioisotopes - Hazards of radiations.

2.3 Nuclear fission - Nuclear energy - Nuclear reactors - Nuclear fusion - Thermonuclear reactions - Energy source of the Sun and Stars – Comparison of Nuclear Fission and Nuclear Fusion.

UNIT-III METALLURGY

3.1 General metallurgy and Metallurgical processes – Methods of Concentration – Gravity separation, Froth floatation process, Magnetic separation – Reduction methods – Smelting, Calcination, Goldschmidt Aluminothermic process - Purification methods – Zone refining, Van Arkel method and Electrolytic refining.

3.2 Comparative study of Ti, V, Cr, Mn and Fe group elements with special reference to Occurrence, Oxidation States, Magnetic Properties and Colour.

3.3 Occurrence and Extraction of Ti, Mo, W and Co - Preparation and Uses of Ammonium Molybdate and V_2O_5 .

UNIT-IV INNER TRANSITION ELEMENTS

4.1 General Characteristics of f- Block elements – Position of Lanthanides in the periodic table – Separation of Lanthanides (Ion exchange method).

4.2 Comparative study of Lanthanides and Actinides - Occurrence, Oxidation states, Magnetic properties, Colour and Spectra.

4.3 Lanthanide Contraction – Causes and Consequences - Comparison between Lanthanides and Actinides – Position of Actinides in the periodic table – Extraction of Thorium and Uranium

UNIT-V ORGANOMETALLIC COMPOUNDS AND BIOINORGANIC CHEMISTRY

5.1 Organometallic Compounds - Definition - Nomenclature – Classification – Organo - Lithium and Organo-Boron Compounds - Preparation, Properties, Structure and Uses.

5.2 Biological Functions of Iron, Copper and Zinc – Biologically Important Compounds – Myoglobin, Cytochrome, Haemoglobin and Ferritin.

5.3 Binary Metallic Compounds – Hydrides, Borides, Carbides and Nitrides – Classification - Preparation, Properties, Structure and Uses.

REFERENCE BOOKS

1. Inorganic Chemistry – P. L. Soni - Sultan Chand(2006).
2. Principles of Inorganic Chemistry - B. R. Puri, L. R. Sharma and K. C. Kallia – Milestone Publications(2013).
3. Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
4. Inorganic Chemistry: Principles of Structure and Reactivity - J. E. Huheey, E. A. Keiter, R. I. Keiter and O. K. Medhi – 2006.
5. Concise Inorganic Chemistry - J. D. Lee - III edition - Von Nostrand.
6. Industrial Chemistry - B. K. Sharma - Goel Publications(1983).
7. Industrial Chemistry R. K. Das - Kalyani Publications, New Delhi(1982).
8. Coordination Chemistry - S. F. A. Kettle - ELBS(1973).
9. Coordination Chemistry - K. Burger - Butterworth(1973).
10. Vogel's Handbook of Quantitative Inorganic Analysis - Longman.
11. Text Book of Qualitative Inorganic Analysis - A. I. Vogel - III edition(1976).
12. Source Book on Atomic Energy – S. Glasstone- East-West Press Pvt. Ltd.(1967).
13. Nuclear and Radiochemistry - John Wiley and Sons(1964).
14. Nuclear Chemistry - H. J. Arnikar - Wiley Eastern Co., - II edition(1987).
15. Advanced Inorganic Chemistry - Cotton and Wilkinson - V Edition - Wiley and Sons (1988).
16. Text Book of Inorganic Chemistry – R. Gopalan – Universities Press –2012.
17. Modern Inorganic Chemistry – R. D. Madan - S. Chand Publications, Reprint

COURSE OUTCOMES

At the end of the course, the learners should be able to,

CO 1: Aware about the penetrating power of α, β, γ radiation

CO 2 :Calculate the age of an object

CO 3: How nuclear chemistry and radiation chemistry can be used to make issues more visible and solve problems, particularly in relation to environmental problems and metal production.

CO 4: Understand the role of metals in biological systems

CO 5: Chemistry of f block elements

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1		✓			✓					✓
CO 2										✓
CO 3				✓	✓				✓	✓
CO 4										✓
CO 5		✓								
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – 20X1= 20 (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – 5X5= 25 (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – 10X3= 30 (1 question from each unit, Essay type question)

SEMESTER – VI
MAJOR BASED ELECTIVE COURSE- (E -II B)
FOOD CHEMISTRY

Theory Hours :6	Course code : U21CH6MBE2:2
Exam Hours : 3	Credits : 5
	Marks : Max marks -100
	Ext - 75
	Int - 25

Objective :

To obtain knowledge about different foods, their nutritive values and food preservation.

UNIT-I

1.1 Cereals definition - Classification, Processing - Structure of Cereals - Composition and nutritive value. Pulses definition - Classification - Processing - Structure of Pulses - Composition and nutritive value - Toxic Constituents in pulses - medicinal value of cereals and pulses.

1.2 Sugar and related products. Sugar Structure and Properties. Nutritive value - Sugar composition in different food items. Sugar related product - Classification & nutritive value. Artificial sweeteners - example - advantages and disadvantages.

UNIT-II

2.1 Vegetables - classification - composition & nutritive values - Fruits- Classification - Composition & nutritive values.

2.2 Fungi and algae as food - enzymatic browning and non enzymatic browning - Nutritive value of some common foods - milk, egg., soyabeans

UNIT-III

3.1 Beverages - definition and examples - Classification of beverages

Fruit beverages - Milk based beverages - malted beverages - examples.

Alcoholic and non alcoholic beverages - examples.

3.2 Appetizers - definition - classification - examples - Water - functions and deficiency.

UNIT-IV

4.1 Food Preservatives - definition - classification - Food Spoilage - definition - Prevention.

4.2 Methods of preservation - classification - Low and high temperature - preservatives examples - Dehydration - osmotic pressure - food irradiation.

UNIT-V

5.1 Food additives - Definition – classification - their functions - chemical substance.

5.2 Packaging of foods - classification-Materials used for packaging.

REFERENCE BOOKS:

1. Food Science - III Edition - B. Sri Lakshmi. New Age International Publisher, 2005.
2. Food Chemistry - Lilian Hoagland Meyer CBS Publishers & Distributors, 2004.
3. Food Science, Nutrition and Health - Brian.A.Fox, Allan G.Cameron Edward Arnold, London.
4. Fundamentals of Foods and Nutrition - Mudambi. R.Sumathi, and Raja gopal, M.V. - Wiley Eastern Ltd., Madras.
5. Handbook of Food and Nutrition - M. Swaminathan - Bangalore Printing and Publishing Co. Ltd., Bangalore.

COURSE OUTCOMES

At the end of the course the students are capable to

CO 1: Explain the classification of foods, and nutritive value of food

CO2: Explain the classification of vegetables

CO3: Analyze the quality of food and food products

CO4 : Analyze the nutrients present in food.

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓			✓						✓
CO 2				✓	✓		✓			✓
CO 3				✓	✓		✓			✓
CO 4	✓				✓				✓	✓
CO 5										
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – 20X1= 20 (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – 5X5= 25 (2 questions from each unit, either or type)

SECTION –C Answer all -3 X10 =30(1 question from each unit, Essay type question)

SEMESTER – VI
MAJOR BASED ELECTIVE COURSE – (E-II C)
ROLE OF CHEMISTRY IN LIFE

Theory Hours : 6	Course code : U21CH6MBE2:3
Exam Hours : 3	Credits : 5
	Marks : Max marks -100
	Ext - 75
	Int - 25

OBJECTIVES

1. To know the essentials of health and drugs.
2. To learn the functions of enzymes, hormones and body fluids
3. To know common diseases and their treatment

UNIT I : HEALTH

Definition: Food, Food Pyramid - Health-Hygiene- mal, under and over nutrition, their causes and remedies, sanitation.

UNIT II : DRUGS

Drugs - Types of drugs-depressant, anticonvulsant, narcotics, antipyretics, antibiotics, antiseptics, analgesics, muscle relaxants and cardiovascular and vaso depressants, steroids (Only Applications).

UNIT III : BODY FLUIDS

Blood volume, groups, coagulation, blood pressure, anaemia, blood sugar, Haemoglobin, Chemistry of urine.

UNIT IV : ENZYMES AND HORMONES

Types of enzymes and enzyme action, Characters of hormones action, examples of essential hormones.

UNIT V COMMON DISEASES

Common diseases - Jaundice, vomiting, fever, night blindness, ulcer, and diabetes.

REFERENCE BOOKS

1. Alex V Ramani, Food Chemistry, MJP Publishers, Chennai, 2009
2. Deb A C, Fundamentals of Biochemistry, New Central Book Agency, Calcutta, 1994.
3. Satake M and Mido Y, Chemistry for Health Science, Discovery Publishing House, NewDelhi, 2003.
4. Jayashree Ghosh, A Text book of Pharmaceutical Chemistry, S. Chand and Co.Ltd,1999.
5. Ashutosh Kar, Medicinal Chemistry, Wiley Easterns Limited, New Delhi, 1993.

COURSE OUTCOMES

At the end of the course the students are capable to

CO 1: Explain about Health & Hygiene

CO2: Explain the classification of drugs

CO3: Explain about blood-fluids

CO4 : Explain enzymes ,Hormones and common diseases.

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓			✓						✓
CO 2				✓	✓		✓			✓
CO 3				✓	✓		✓			✓
CO 4	✓				✓				✓	✓
CO 5										
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – 20X1= 20 (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – 5X5= 25 (2questions from each unit, either or type)

SECTION –C Answer all -3 X10 =30(1 question from each unit, Essay type question)

SEMESTER – VI
MAJOR BASED ELECTIVE COURSE- (E-III A)
PHARMACEUTICAL CHEMISTRY

Theory Hours : 5	Course code : U21CH6MBE3:1
Exam Hours : 3	Credits : 5
	Marks : Max marks -100
	Ext - 75
	Int - 25

Objective:

To effectively impart knowledge about Various Diseases and Their Treatment, Importance of Indian Medicinal Plants and Different Types of Drugs. Preparation, Synthesis and Structural Determination are not required for the Compounds mentioned.

UNIT-I

1.1 Definition of the following terms - Drug, Pharmacophore, Pharmacology, Pharmacopoeia, Bacteria, Virus, Chemotherapy and Vaccine.

1.2 Causes, Symptoms and Treatment for Jaundice, Cholera, Malaria and Filaria - First Aid for Accidents - Antidotes for Poisoning.

1.3 Organic Pharmaceutical Aids - Their Role as Preservatives, Antioxidants, Colouring, Flavouring and Sweetening agents –Examples.

UNIT-II

2.1 Causes, Detection and Control of Anaemia and Diabetes - Diagnostic tests for Sugar, Salt and Cholesterol in Serum and Urine.

2.2 Blood - Composition of Blood and Blood Plasma – RBC – Structure and Functions - Functions of Haemoglobin – WBC - Structure and Functions - Rh Factor – Blood Coagulation – Identification and Estimation of Cholesterol in Blood - Blood Pressure – Hypertension and Hypotension - Normal, High and Low to Control.

2.3 Indian Medicinal Plants and Their Uses - Tulasi, Neem, Kizhanelli, Mango, Semparuthi, Adadodai and Thoothuvelai.

UNIT-III

3.1 Antibacterials - Sulpha drugs – Sulphanilamide Derivatives – Mode of action of Sulpha drugs - Examples - Prontosil, Sulphathiazole and Sulphafurazole – Uses - Antibiotics - Definition – Gram positive and Gram negative bacteria - Uses of Ampicillin, Streptomycin and Tetracyclines.

3.2 Antiseptics and Disinfectants - Definition and Distinction - Phenolic compounds, Chloro compounds and Cationic surfactants.

3.3 Vitamins – Definition – Classification of Vitamins – Sources and Uses – Deficiency Diseases caused by Vitamins.

UNIT-IV

4.1 Analgesics – Definition - Classification - Narcotic and Non- narcotic – Antipyretic analgesics – Mechanism of action - Morphine and its derivatives - Pethedine and Methadone - Salicylic acid derivatives – Antipyretics and Antiinflammatory Agents - Definition and Actions – Aspirin, Paracetamol, Ibuprofen - Disadvantages and Uses.

4.2 Anaesthetics – Definition – Classification - Local and General – Volatile – Uses of volatile liquids as Inhalation Anaesthetics – Chloroform - Gaseous Anaesthetics - Nitrous Oxide, Ether and Cyclopropane - Uses and Disadvantages – Intravenous Anaesthetic Agents – Thiopental sodium, Methohexitol and Propanidid.

4.3 Drugs affecting CNS - Definition, Distinction and Examples for Tranquilizers, Sedatives (Phenobarbital, Diazepam) - Hypnotics, Psychedelic Drugs – LSD, Hashish- Their effects.

UNIT-V

5.1 Antineoplastic Drugs - Causes and Types of Cancer - Treatment of Cancer – Antineoplastic Agents – Antimetabolites - AIDS - AZT,DDC.

5.2 Hormones – Definition - Classification – Physiological Functions of Insulin, Adrenaline, Thyroxin and Oxytocin.

5.3 Sex hormones – Androsterone, Testosterone, Progesterone and Estrogen -
Biological functions – Disorders of Hyposecretion and Hypersecretion
of Hormones.

REFERENCE BOOKS

1. A Text Book of Pharmaceutical Chemistry - Jayashree Ghosh - S. Chand Company Ltd, 2015.
2. Pharmaceutical Chemistry - S. Lakshmi - Sultan Chand, 2011.
3. Pharmacology and Pharmatherapeutics - R. S. Satoskar - Popular Prakashan - Vol.I and Vol.II.
4. Medicinal Chemistry - Asuthosh Kar - New Age International Publishers, 2007.
5. A Text Book of Synthetic Drugs - O. D. Tyagi - Ammol Publications.
6. Introduction to Biological Chemistry - J. Awapara, Prentice Hall.
7. A Text Book of Biochemistry - Ambika.S.
8. Biochemistry - A. L. Leninger, II Edition, Kalyani Publishers, Ludhiana, 1998.
9. Essentials of Biological Chemistry - James Fanley - East West Press.
10. Medicinal Chemistry - Gurdeep Chatwal – Himalaya Publishers House, 2012.
11. Medicinal Chemistry - Ahluwalia – Ane Books, 2008.
12. A Text Book of Pharmaceutical Chemistry – Viva Books Private Ltd., New Delhi, 2009.
13. Medicinal Plants of India – Rasheeduz Zafar – CBS Publishers and Distributors, 2000.

COURSE OUTCOMES

At the end of the course, the learners should be able to,

CO 1: Explain the fundamental concepts of pharmaceutical chemistry

CO 2 : Explain the different types of drugs and its applications.

CO 3: Describe the symptoms and remedies of some types of diseases.

CO 4: Understand the importance of indian medicinal plants.

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓	✓		✓	✓	✓				✓
CO 2				✓	✓			✓		✓
CO 3				✓						✓
CO 4				✓						✓
CO 5										
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – 20X1= 20 (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – 5X5= 25 (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – 10X3= 30 (1 question from each unit, Essay type question)

SEMESTER –VI
MAJOR BASED ELECTIVE COURSE- III(B)
BIO CHEMISTRY

Theory Hours :5	Course code : U21CH6MBE3:2
Exam Hours : 3	Credits :5
	Marks : Max marks -100
	Ext - 75
	Int - 25

OBJECTIVES:

To effectively impart knowledge chemistry of Carbohydrates, amino acids, Proteins, Lipids, and Nucleic acids.

UNIT-I: Chemistry of Carbohydrates

Definition and Classification of carbohydrate. Monosaccharides - occurrence, structure; physical and chemical properties, linear and ring forms (Haworth formula) for glucose and fructose.

Disaccharides - occurrence, structure; physical and chemical properties of sucrose and lactose.

Polysaccharides - occurrence, structure, physical and chemical properties of starch.

UNIT-II: Chemistry of amino acids

Definition and classification of amino acids. Reaction with ninhydrin, common properties of amino acids, amphoteric nature, isoelectric point, isoelectric pH and Zwitter ion.

UNIT-III: Chemistry of Proteins

Classification based on solubility, shape and size. Physical properties: salting in and salting out, denaturation, peptide bond. Structure of protein: primary, secondary, tertiary and quaternary structure.

UNIT-IV: Chemistry of Lipids

Definition, classification and functions of lipids. Occurrence, chemistry and biological functions of simple lipids, compound lipids (e.g. phospholipids) and derived lipids: steroids (e.g. cholesterol). Physical property-emulsification. Chemical property-saponification. Functions of bile acids and bile salts.

UNIT-V: Chemistry of Nucleic acids

Definition - nucleoside, nucleotide and polynucleotide. Double helical model of DNA and its biological functions. Structure, types and functions of RNA: tRNA, mRNA and rRNA.

Differences between DNA and RNA.

REFERENCE BOOKS

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan worth Publishers.
2. Harper's Biochemistry-Rober K. Murray, Daryl K. Grammer, McGraw Hill, and Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan , MJP Publishers, Chennai - 5.

COURSE OUTCOMES

At the end of the course, the learners should be able to,

CO 1: Explain the fundamental concepts inBio-chemistry

CO 2 : Explain the different types of carbohydrates and its applications.

CO 3: Describe about proteins

CO 4: Understand the importance of proteins

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓	✓		✓	✓	✓				✓
CO 2				✓	✓			✓		✓
CO 3				✓						✓
CO 4				✓						✓
CO 5										
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – 20X1= 20 (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – 5X5= 25 (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – 10X3= 30 (1 question from each unit, Essay type question)

SEMESTER –VI
MAJOR BASED ELECTIVE COURSE- III(C)
APPLIED CHEMISTRY

Theory Hours :5	Course code : U21CH6MBE3:3
Exam Hours : 3	Credits :5
	Marks : Max marks -100
	Ext - 75
	Int - 25

Objective:

To impart Knowledge about Petrochemicals, Paper Technology, Sugar Industry, Explosives, Photography and Dairy Chemistry,

UNIT I

1.1 Petroleum - Origin – Composition of Petroleum - Inorganic, Engler and Modern theories – Classification – Refining (Simple Refinery) – Cracking – Thermal and Catalytic – Knocking – Octane Rating – Antiknock Compounds – Cetane Rating – Synthetic Petrol – LPG.

1.2 Gobar Gas – Production – Feasibility and Importance of Biogas with special reference to Rural India.

1.3 Petrochemicals – Elementary study – Definition - Chemicals from Natural Gas, Petroleum, Light naphtha and Kerosene – Origin – Composition - Synthetic Gasoline.

UNIT II

2.1 Paper technology – Introduction – Manufacture of pulp – Various raw materials used for the preparation of pulp - Preparation of Sulphite pulp, Soda pulp and Rag pulp.

2.2 Various processes - Beating, Refining, Filling, Sizing and Colouring.

2.3 Manufacture of Paper – Calendering – Uses.

UNIT III

3.1 Sugar industry - Sugar industries in India – Sugarcane and sugar beet - Manufacture of cane sugar – Extraction of juice – Concentration – Separation of crystals.

3.2 Recovery of Glucose from Molasses – Defection – Sulphitation – Carbonation – Testing and Estimation of Sugar – Double Sulphitation Process.

3.3 Preparation of Bagasse – Use of Bagasse for Manufacture of Paper and Electricity - Preparation of Alcohol from Molasses - Preparation of Absolute Alcohol - Manufacture of Wine, Beer, Methylated Spirit and Power Alcohol.

UNIT IV

4.1 Explosives – Primary, Low and High Explosives – Single compound explosives - Binary explosives – Plastic explosives – Dynamites – Blasting explosives - Preparation and Uses of Lead Azide, Nitroglycerine, Nitrocellulose, TNT, Cordite, Picric Acid and Gun Powder – Introduction to Rocket Propellants.

4.2 Photography – Chemical Principle – Preparation of Sensitive Emulsion – Exposure – Developing – Fixing and Printing – Colour photography – Xerographic copying.

4.3 Coal – Classification by rank – Proximate and Ultimate analysis – Low and High Temperature Carbonisation – Otto-Hoffmann’s by-product - Distillation of Coal Tar.

UNIT V

5.1 Milk – Definition – Physico-Chemical properties of milk - Constituents of milk and Their Physico-chemical Properties.

5.2 Chemical change taking place in Milk due to Processing Parameters - Boiling, Pasteurisation, Sterilisation and Homogenisation.

5.3 Definition and Composition of Creams, Butter, Ghee and Ice Creams - Milk Powder Definition, Need for making powder - Principles involved in Drying process - Spray drying and Drum drying.

REFERENCE BOOKS :

1. Fundamental Concepts of Applied Chemistry - Jayashree Ghosh - 1st Edition, S. Chand & Co. Ltd, New Delhi, 2006.
2. Milk and Milk Products - Clarence Henry Eckles, Willes Barnes Combs, Harold Macy - 4th Edition, Tata McGraw Hill Publishing Company Ltd, Reprint 2002.
3. Industrial Chemistry - B. K. Sharma - 13th Edition, Goel Publishing House, 2008.

COURSE OUTCOMES

At the end of the course, the learners should be able to,

CO 1: Explain the fundamental applications of chemistry

CO 2 : Explain the different types of petroleum products

CO 3: Describe about paper manufacturing

CO 4: Understand the importance of milk and milk products

	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	✓	✓		✓	✓	✓				✓
CO 2				✓	✓			✓		✓
CO 3				✓						✓
CO 4				✓						✓
CO 5										
CO 6										

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer all questions – 20X1= 20 (4 multiple choice questions from each unit)

SECTION –B –Answer all questions – 5X5= 25 (2 questions from each unit, either or type)

SECTION –C –Answer any 3 questions – 10X3= 30 (1 question from each unit, Essay type question)

PART-IV
GENDER STUDIES
பாலினசமத்துவம்

Theory Hours :1 Exam Hours : 3	Course code : U216GS Credits :1 Marks : Max marks -100 Ext - 75 Int - 25
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அலகு-I

பாலினதொடர்பானகோட்பாடுகள்-பாலியல்-பாலினம்-
உடற்கூறுரீதியாகநிர்ணயித்தல்-ஆணாதிக்கம்-பெண்ணியம்-பாலினபாகுபாடு -
பாலினவேலைப்பாகுபாடு-பாலினஒருபடித்தானவைகள்-பாலினஉணர்வூட்டல்-
பாலினசமவாய்ப்பு - பாலினசமத்துவம்-பாலினமையநீரோட்டமாக்கள்-
அதிகாரப்படுத்துதல்

அலகு-II

மகளிரியல் Vs பாலினசமத்துவக்கல்வி-
பல்கலைகழகமானியக்குழுவின்வழிகாட்டுதல்கள்-
ஏழாவதுஐந்தாண்டுதிட்டம்முதல்பதினோராவதுஐந்தாண்டுதிட்டம்-
பாலினசமத்துவக்கல்வி-
பெய்ஜிமாநாடுமற்றும்பெண்களுக்குஎதிரானஅனைத்துவன்முறைகளையும்ஒழிப்
பதற்குசர்வதேசஉடன்படிக்கைகள் - இணைத்தல்-உட்படுத்துதல்

அலகு-III

பாலியல்பாகுபாட்டிற்குதளங்கள்:குடும்பம்பாலினவிகிதச்சாரம்-கல்வி-
ஆரோக்கியம்-ஆளுமை-மதம்-வேலை Vs வேலைவாய்ப்பு-சந்தை-ஊடகங்கள்-
அரசியல்-சட்டம்குடும்பவன்மை-பாலியல்துன்புறுத்தல்-
அரசுகொள்கைகள்மற்றும்திட்டங்கள்

அலகு-IV

பெண்கள்மேம்பாடுமற்றும்பாலினசமத்துவமேம்பாடுமுயற்சிகள்சர்வதேசபெண்
களுக்கானதசாப்தம்-சர்வதேசபெண்கள்ஆண்டு-
பெண்களின்மேம்பாட்டிற்கானதேசியகொள்கைகள்-பெண்கள்அதிகாரஆண்டு 2001-
சர்வதேசகொள்கைகளைமையநீரோட்டமாக்கள்

அலகு-V

பெண்கள்இயக்கங்கள்மற்றும்பாதுகாப்புநிறுவனஏற்பாடுகள் -
தேசியமற்றும்மாநிலமகளிர்ஆணையம்-அனைத்துமகளிர்காவல்நிலையங்கள் -
குடும்பநீதிமன்றங்கள்-
குடும்பவன்முறையிலிருந்துபெண்களைபாதுகாக்கும்சட்டம்2005-
பணியிடங்களில்பெண்கள்மீதானபாலியல்துன்புறுத்தல்களைதடுப்பதற்கானஉச்ச
நீதிமன்றவழிகாட்டுதல்கள்-தாய்சேய்திட்டம்-
பெண்களைகருவிலேயேகண்டறியும்தொழில்நுட்பம்
(முறைப்படுத்துதல்மற்றும்தவறாகபயன்படுத்துதலைதடைசெய்திடும்) சட்டம்-
ஈவடிசிங்(பெண்களைதொல்லைசெய்தல்) தடுப்புசட்டம்-சுயஉதவிக்குழுக்கள்-
பஞ்சாயத்துஅமைப்புகளுக்கான73வதுமற்றும்74வதுசட்டதிருத்தம்.

QUESTION PATTERN – 75 MARKS

SECTION –A –Answer All questions – $15 \times 5 = 75$ (2 questions from each unit, Essay type either or question)