PERIYAR UNIVERSITY

SYLLABUS FOR

M.Sc. ORGANIC CHEMISTRY

DEGREE OF MASTER OF SCIENCE

CHOICE BASED CREDIT SYSTEM

(For candidates admitted in the Colleges affiliated to Periyar University from 2021 - 2022 onwards)
1. OBJECTIVES OF THE COURSE:

The objectives of this course are the following:

(a) To impart knowledge in advanced concepts and applications in various fields of Chemistry.

(b) To provide wide choice of elective subjects with updated and new areas in various branches of Chemistry to meet the needs of all students.

2. COMMENCEMENT OF THIS REGULATION:

These regulations shall take effect from the academic year 2021-2022, that is, for students who are admitted to the first year of the course during the academic year 2021-2022 and thereafter.

3. ELIGIBILITY FOR ADMISSION:

A candidate who has passed B.Sc., Chemistry degree of this University or any other University accepted by the Syndicate equivalent thereto, subject to such condition as may be prescribed therefore are eligible for admission to M.Sc., Degree Programme and shall be permitted to appear and qualify for the Master of Science (M.Sc.) Degree Examination in Organic Chemistry of this University.

4. DURATION OF THE COURSE:

The programme for the degree of Master of Science in Chemistry shall consist of two Academic years divided into four semesters.

5. EXAMINATIONS:

The examination shall be of three hours duration for each course at the end of each semester. The candidate failing in any subject(s) will be permitted to appear in the subsequent examination.

The practical / project should be an individual work. The University examination for practical / project work will be conducted by the internal and external examiners jointly at the end of every year.
# COURSE OF STUDY AND SCHEME OF EXAMINATION

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Course (Paper)</th>
<th>Subject Title</th>
<th>Hours / Week</th>
<th>University Examination</th>
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<td>Physical Chemistry - I</td>
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## I SEMESTER

## II SEMESTER

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Core Papers: 9
Core Practicals: 6
Elective papers: 4
EDC: 1
Human Rights: 1
Project: 1

NOTE: II

Distribution of Marks

Theory

University Examination (External) : 75 marks
Internal Assessment : 25 marks

Distribution of Internal Assessment mark

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<tr>
<td>Assignment</td>
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<tr>
<td>Seminar</td>
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Total  25 marks

Passing Minimum : Internal Assessment : 50% - 12 marks
Passing Minimum : External Assessment : 50% - 38 marks
Total Passing Minimum - 50 marks

PRACTICALS
University Examination (External): 60 marks Internal Assessment: 40 marks

Calculation of Internal Assessment mark
Number of Experiments: 10 marks
Experimental skill: 10 marks
Test: 20 marks

Total: 40 marks

Passing Minimum: Internal Assessment: 50% - 20 marks
Passing Minimum: External Assessment: 50% - 30 marks
Total Passing Minimum - 50 marks

Everything should be supported by proper record separate passing minimum is necessary for Internal and External
QUESTION PAPER PATTERN

Theory

Time: 3 Hours
Max. Marks: 75

Part - A: 15X1 = 15

(Answer all questions)
(Three multiple choice questions from each unit)

Part - B: 2X5 = 10

(Answer any two questions) (one question from each unit)

Part – C: 5X10=50

(Answer all questions)
(one question from each unit with internal choice)

Practical

Time: 3 Hours
Max. Marks: 75

Distribution of marks for practical

<table>
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<td>Viva-voce in practical</td>
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Project

Dissertation/Project: 150 marks
Viva-voce: 50 marks
Total: 200 marks
M.Sc. ORGANIC CHEMISTRY
SEMESTER - I
CORE I - ORGANIC CHEMISTRY – I
(75 Hours)

OBJECTIVES

1. To learn about the stereochemistry of organic compounds and ORD and CD.

2. To learn about the formation, stability and structure of intermediates and the mechanism of aliphatic electrophilic substitution.

3. To learn about the effect of structure on reactivity.

4. To learn about the mechanism of aliphatic nucleophilic substitution reactions

5. To learn about the structural elucidation of alkaloids, flavones, isoflavones and anthocyanins.

UNIT I Stereochemistry, ORD and CD (15Hours)

Wedge, Fischer, Newmann and Saw-horse formulae and their inter conversion, R and S notation, axial chirality (biphenyls, allenes and spiranes), planar chirality(cyclophanes, ansa compounds and trans cyclooctene), chirality due to helical shape, stereo selective and stereo specific reactions, asymmetric synthesis- Cram's rule. Homotopic, enantiotopic and diastereotopic atoms, groups in organic molecules. ORD & CD curves, octant rule, cotton effect, axial halo ketone rule and its applications

UNIT II Reaction intermediates and aliphatic electrophilic substitution (15 Hours)

Reaction intermediates - Formation, stability and structure of carbonium ions, carbanions, carbenes, nitrenes and free radicals

Aliphatic electrophilic substitution- SE1,SE2 and SEi mechanisms and electrophilic substitution by double bond shift, hydrogen electrophile-keto-enol tautamerism, halogen electrophile-halogenation of aldehydes and ketones, nitrogen electrophile- aliphatic diazonium coupling, sulphur electrophile- sulphonation and carbon electrophile- Stork-enaminereaction

UNIT III Effect of structure on reactivity (15 Hours)

Resonance and field effects, resonance and steric effects, quantitative treatment- the Hammett equation- linear free energy relationship, substituent constant and reaction constant and limitation of Hammett equation. Taft equation, thermodynamically and kinetically controlled reactions, Hammond's postulate, Non-kinetic methods of determining mechanism- isolation, trapping and detection of intermediates, isotopic labeling, crossover experiments, product analysis, stereo chemical evidence, kinetic method-kinetic isotope effect
Unit IV Aliphatic nucleophilic substitution (15 Hours)
The SN1, SN2, SNi and neighbouring group mechanisms, the neighbouring group participation by pi and sigma bonds, Non classical carbocations, nucleophilic substitution at an allylic, aliphatic trigonal and vinylic carbon. Reactivity- effect of substrates structure, attacking nucleophile, leaving group and reaction medium. Ambident nucleophile, Swain-Scott, Grunwald-Winstein relationship, phase transfer catalysis.

Unit V Alkaloids and Anthocyanins (15 Hours)

TEXT BOOKS

REFERENCE BOOKS
OBJECTIVES
1. To understand the basic concepts of Inorganic chemistry.
2. To learn about the structure and bonding of the molecule.
3. To learn the basics of nuclear chemistry and different types of nuclear reactions

UNIT I Structure and Bonding (15 Hours)
Hard and Soft acids and bases-classifications, Acid-Base strength, hardness, symbiosis, Theoretical basis of Hardness and Softness, applications of HSAB.
Rings-Phosphazenes-Structure, Craig and Peddock model, Dewar model, polyorganophosphazenes, Polysulphur-nitrogen compounds.
Inorganic polymers-Silicates-structure, Pauling’s rule, properties, correlation and application; Molecular sleves.
Polyacids-Isopolyacids of V, Cr, Mo and W; Heteropolyacids of Mo and W (only structural aspects)

UNIT II Boron compounds and Clusters (15 Hours)
Boron hydrides – polyhedral boranes, hydroborate ions – a general study of preparation, properties and structure, styx numbers, Wade’s rules. Carboranes–types such as closo and nido-preparation, properties and structure. Metallocarboranes – a general study.
Metal clusters – Chemistry of low molecularity metal clusters only– structure of Re₂Cl₈; multiple metal – metal bonds.

UNIT III Solid State (15 Hours)
Types of solids-close packing of atoms and ions-bcc, fcc and hcp, voids and their types-Goldschmidt radius ratio-derivation-its influence on structures.
Structures of NaCl, NiAs, CdI₂, Pervoskite, rutile, fluorite and antifluorite-zinc blende and wurtzite.
Defects in solids- Point defects, line defects and surface defects; Dislocations-Non-stoichiometric compounds; Use of X-ray powder data in identifying inorganic crystalline solids

UNIT IV Nuclear Chemistry–I (15 Hours)
The Nucleus-subatomic particles and their properties-mass defect - binding energy - n/p ratio in stable and metastable nuclei-Different types of nuclear forces-Liquid drop model and shell model.Modes of radioactive decay-Theory of alpha decay, beta decay and gamma radiation, Orbital electron capture, nuclear isomerism-internal conversion.
Detection and determination of activity-GM, Scintillation and Cherenkov counters
Particle Accelerators: Linear accelerator- cyclotron, synchrotron, betatron and bevatron.
UNIT V - Nuclear Chemistry – II (15 Hours)

**Nuclear Reactions:** Q-value, columbic barrier- nuclear cross section-different types of nuclear reactions-projectile capture-particle emission, spallation, fission and fusion- product distributions - Theories of fission, use of fission products, fissile and fertile isotopes-U-238,U-235,PU-239,Th232-stellarenergy-synthesis of new elements.

**Radio-Isotopes:** Applications-isotopes as tracers - neutron activation analysis and isotopic dilution analysis - uses in structure and mechanistic studies - Carbon dating – Radio pharmacology, Radiation protection and safety precautions - Disposal of nuclear waste.

**TEXT BOOKS**

1. F.A Cotton & Wilkinson, Advanced Chemistry
2. Emelius and Sharpe, Modern Aspects of Inorganic Chemistry.
4. J.D. Lee, Concise Inorganic Chemistry.
5. S.F.A. Kettle, Physical Inorganic Chemistry, Oxford University
8. S. Glasstone, Source Book on Atomic Energy

**REFERENCE BOOKS**

M.Sc. ORGANIC CHEMISTRY
SEMESTER - I
CORE III - PHYSICAL CHEMISTRY – I (75 Hours)

OBJECTIVES
1. To study in detail the basic concepts of classical thermodynamics and statistical thermodynamics
2. To gain knowledge about theories of reaction rates and kinetics of complex and fast reactions
3. To understand the principles of quantum chemistry and group theory

UNIT I Classical Thermodynamics – I (15 Hours)

Concept of chemical Potential-Determination of chemical potential- Direct Method and Method of Intercepts –variation of chemical potential with temperature and pressure-Fugacity –Methods of determination of fugacity – Variation of fugacity with temperature and pressure. Standard states for gases, liquids, solids and components of solutions. Solution of electrolytes – Concept of ionic strength-.mean ionic activity and mean ionic activity coefficient – determination of activity coefficient from freezing point, EMF and solubility measurements

UNIT II Statistical and Irreversible Thermodynamics (15 Hours)

UNIT III Chemical Kinetics – I (15 Hours)
methods-temperature and pressure jump methods -Stopped flow technique, flash photolysis and Crossed molecular beam method.

**UNIT IV Quantum Chemistry – I (15 Hours)**


**UNIT V Group Theory – I (15 Hours)**


**TEXT BOOKS:**

REFERENCE BOOKS:
5. I.N. Levine, Quantum chemistry, Allyn and Bacon, Boston, 1983.
M.Sc. ORGANIC CHEMISTRY SEMESTER - I  
ELECTIVE I  

Paper I - POLYMER CHEMISTRY (75 Hours)

OBJECTIVES

1. To study the basic concepts in Polymer chemistry.
2. To study the determination of molecular weight and properties of polymers.
3. To know about the polymer processing and polymerization techniques.
4. To learn about the synthesis and applications of commercial polymers and conducting polymers.

UNIT 1 Basic Concepts (15 Hours)
Monomers, repeat units, degree of polymerization, Linear, branched and network polymers, Addition polymerization, Condensation polymerization, Mechanism of free radical, cationic and anionic polymerization and co-ordination polymerization. Ziegler- Natta catalyst. Kinetics of free radical, cationic, anionic and co-polymerisation. Determination of Reactivity ratio, Reactivity ratio and co-polymerisation behavior.

UNIT 2 Molecular Weight and Physical Properties (15Hours)
Concept of Average molecular weight, number- average, weight- average molecular weight and viscosity- average molecular weights. Determination of molecular weight - viscosity, light scattering, osmotic and ultracentrifugation methods. Physical properties- crystalline melting point, glass transition temperature, relationship between Tm and Tg and Determination of Tg.

UNIT 3 Polymer Processing and Polymerization Techniques (15Hours)
Polymers processing- Plastics, elastomers and fibres. Compounding, Processing techniques- calendaring, die casting, injection molding, thermofoaming and fibre spinning. Polymerization techniques- Bulk polymerization, solution polymerization, suspension polymerization, emulsion polymerization and melt polycondesation.

UNIT 4 Commercial Polymers (15 Hours)
Synthesis and applications of polyethylene, polyvinyl chloride, polyamide, polyester, phenol resins, epoxy resins, silicone polymers, polybenoxazoles, polyimidazole, polyurethane, polymethylmethacrylate, poly( tetrafluoro ethylene) and polyacrylonitrile.

UNIT 5 Conducting Polymers (15 Hours)
Conducting polymers- Introduction, Electrochemical doping, Electrochemical synthesis and applications of polypyrrole, polythiophene, polyindole, polyaniline, polyacetylene and poly(p-phenylene).
REFERENCE BOOKS
2. L. Gupta, Polymer Science, Pragathi Prakashan Publication.
M.Sc. ORGANIC CHEMISTRY
SEMESTER - I
ELECTIVE I

Paper-II - NANO AND GREEN CHEMISTRY (75 Hours)

OBJECTIVES

1. To learn about the synthesis, properties and applications of Nanomaterials.
2. To learn the tools for Characterisation of Nanomaterials.
3. To understand the green concept of organic reactions.

UNIT I Introduction and Synthesis of Nano materials (15 Hours)

Definition - Classification –Historical perspective-synthetic approaches –physical methods–
electricarcmethod–laserablation–physicalvapourdeposition–sputtering
- chemical methods – reduction of metal ions - solvo thermal synthesis – photo chemical
synthesis – electro chemical methods (anodic and cathodic process)– thermolysis – sonochemical
routes –synthesis of semiconductor nano materials –sol – gel methods and biological methods of
synthesis.

UNIT II Properties and applications of Nanomaterials (15 Hours)

Properties -Nanoclusters- Catalytic, electrical and optical and magnetic properties of
nanomaterials. Applications- Nano catalyst-Nano sensors-Nano medicines- Bioimaging with
quantum dots, Cancer Therapy-nano particles in environmental remedy-Removal of toxins-
water treatment.

UNIT-III Tools for Characterisation of Nano Materials (15 Hours)


Spectroscopy: UV-visible spectroscopy- FTIR –Raman spectroscopy-x-ray photo electron
spectroscopy-Luminescence-Photoluminescence

Tools for nano structures: Nanolithography-Electron beam-Ion beam- Nanosphere-self-
assembled monolayers–Coreshell–Nanosheells

Unit IV Introduction to Green chemistry (15 Hours)

Choice of starting materials, Choice of reagents, Choice of catalysts- biocatalyst, polymer
supported catalysts, Choice of solvents. Synthesis involving basic principles of green
chemistry, examples- Synthesis of Adipic acid, Methylmethacrylate, Paracetamol. Ultrasound
assisted reactions- Esterification, Reductions, Coupling reactions, Strecker synthesis and
Reformatsky reactions.
**Unit V Solvent free organic synthesis** (15 Hours)

Reactions on solid supports, Phase transfer catalysis, Solvent free esters saponification, Reactions without support or catalyst- examples, Microwave assisted reactions in water- Oxidation of toluene to benzoic acid, Microwave assisted reactions in organic solvent- Diel's - Alder reaction, Coupling reactions ( Stille, Suzuki,Heck, Sonogashira), Solvent free microwave assisted organic synthesis, Microwave activation and heating, Advantages of microwave exposure and specific effects of microwaves, Organic synthesis under microwaves- benefits and limitations.

**REFERENCE BOOK**


M.Sc. ORGANIC CHEMISTRY
SEMESTER II
CORE IV - ORGANIC CHEMISTRY – II (75 Hours)

OBJECTIVES

1. To understand the basic concepts of aromaticity.
2. To learn the mechanism of Elimination reaction and free radical reactions.
3. To study the mechanism of Aromatic electrophilic and Nucleophilic substitution reactions
4. To know the effects of light in organic reactions.
5. To study the concepts of pericyclic reactions

Unit I Aromaticity (15 Hours)

Aromaticity-Aromaticity in benzenoid, nonbenzoid, [2, 6, 10 & 18] electrons systems and hetero cyclic compounds. NMR concept of Aromaticity and non-aromaticity, systems of 10 electrons and more than 10 electrons [14, 18] annulunes, concept of antiaromaticity and homoaromaticity, antiaromaticity in [12, 16]annulunes, non- aromaticity, alternate and non-alternant hydrocarbons, Aromaticity in fullerences and Mobius Aromaticity.

Unit II Elimination and Free radicals (15 Hours)

The E1, E2,E1CB mechanisms, orientation of the double bond- Hofmann, Zaitsev’s and Bredt rules, competition between Elimination and substitution, mechanism of pyrolytic elimination, Chugaev and Cope Elimination reactions.

Reactions of free radicals- polymerization, addition, halogenation, aromatic substitution and rearrangement. Reactivity - reactivity on aliphatic, aromatic substrate, reactivity in the attacking radical and effect of solvents.

Unit III Aromatic electrophilic and nucleophilic substitution (15 Hours)

The arenium ion mechanism, orientation and reactivity in monosubstituted benzene ring- o, m, p-directing groups, ortho, para ratio, ipso attack, Vilsmeier- Haack, Jacobson and Scholl’s reactions. The SNAr, SN1 and benzene mechanisms, Reactivity - effect of substrate structure, leaving group and attacking nucleophiles.

UNIT IV Organic Photo chemistry (15 Hours)

The fate of excited molecules, Jablonski diagram, Norrish type I and type II reactions, photo reduction of ketones, Paterno-Buchi reactions, photo chemistry of arenes, photo oxidation (formation of peroxy compounds), photo isomerisation (cis-trans), photo addition of olefin and amines to aromatic compounds. Fries, di-pi methane rearrangements, rearrangement of 4,4-diphenylcyclohexadienone.
Unit V Pericyclic reactions (15 Hours)

Pericyclic reactions - Classification, basic concept of orbital symmetry, Woodward- Hofmann rules. Electrocyclic reactions - concept of con and disrotation, cyclisation of butadiene and 1,3,5-hexatriene- correlation diagram and FMO approach. Cycloaddition reactions - superfacial and antarafacial addition, theory of (2+2) and (4+2) cycloaddition reactions- correlation diagram and FMO approach. Sigmatropic migration of hydrogen and carbon, Sommelet-Hauser, Cope and Claisen rearrangements.

TEXT BOOKS


REFERENCE BOOKS


M.Sc. ORGANIC CHEMISTRY
SEMESTER II
CORE V - INORGANIC CHEMISTRY -II
[75 Hours]

OBJECTIVES
1. To learn the various theories of coordination compounds
2. To study the various reaction of coordination compounds
3. To understand the basics behind the origin and principle of electronic spectra

Unit I Theories of coordination compounds: (15 Hours)
VB theory-CFT-Splitting of d orbital in ligand field and different symmetries-CFSE-Factors affecting the magnitude of 10 Dq-Evidence for crystal field stabilization (Structural and thermodynamic effects) - Spectrochemical series – Site selection in spinels - tetragonal distortion from octahedral symmetry-John Teller distortion – Nepheauxetic effect-MO theory octahedral-tetrahedral and Square planar complexes-pi bonding and molecular orbital theory-experimental evidence for pi bonding.

UNIT II Stability and Stereochemical Aspects (15 Hours)
Stereochemical aspects -stereoisomerism in inorganic complexes, isomerism arising out of ligand distribution and ligand conformation,chirality.
Macro cyclic ligand types - porphyrins, corrins, Schiff bases, crown ethers, cryptates and catenands. (simplecomplexes).

UNIT III Reaction Mechanism of transitionmetal complexes (15 Hours)

UNIT IV Electronic Spectra of Complexes (15 Hours)
Spectroscopic Term symbols for d n ions – derivation of term symbols and ground state term symbol-Hund’s rule; Selection rules – break down of selection rules,spin-orbit
coupling- band intensities- weak and strong field limits- correlation diagram; Energy level diagrams; Orgel and Tanabe - Sugano diagrams; effect of distortion and spin orbit coupling on spectra; Evaluation of Dq and B values for octahedral complexes of Nickel; Charge transfer spectra. Spectral properties of Lanthanides and Actinides.

UNIT V Bonding in Organometallic Complexes and metal carbonyls (15 Hours)


TEXT BOOKS


REFERENCE BOOKS

M.Sc. ORGANIC CHEMISTRY
SEMESTER II

COREVI PHYSICAL CHEMISTRY –II

[75 Hours]

OBJECTIVES

1. To impart knowledge on quantum chemistry, group theory and spectroscopy
2. To study the concepts and principles of surface chemistry and cataysis
3. To understand theoretical electrochemistry and to learn the applications of electrochemical cells

UNIT I Quantum Chemistry –II (15 Hours)
Theory of chemical bonding – Born – Oppenheimer approximation – LCAO- MO approximation for hydrogen molecule ion and hydrogen molecule – Valence Bond theory of hydrogen molecule – Concept of hybridisation – sp, sp\(^2\) and sp\(^3\) – hybridisation – Huckel Molecular orbital (HMO) theory for conjugated \(\pi\)- systems application to ethylene, butadiene and benzene – Self consistent field approximation – Hartree and Hartree – Fock self consistant field theory.

UNIT II Group Theory –II (15 Hours)
Symmetry selection rules for vibrational, Electronic and Raman Spectra – determination of vibrational modes in non-linear molecules such as H\(_2\)O, NH\(_3\), CH\(_4\), XeF\(_4\), – symmetry of hybrid orbitals in non-linear molecules (H\(_2\)O, NH\(_3\), CH\(_4\), XeF\(_4\),PCl\(_5\)) -Electronic spectra of formaldehyde.

UNIT III Surface Chemistry and Catalysis (15 Hours)


UNIT IV Electrochemistry – I (15 Hours)


UNIT -V Electrochemistry – II (15 Hours)

TEXT BOOKS

REFERENCE BOOKS
OBJECTIVES

To develop analytical skill in

1. Separation of organic mixture
2. Organic qualitative analysis
3. Preparation of organic compounds involved in single stage

I. Identification of components in a two component mixture and preparation of their derivatives. Determination of boiling point/melting point for components and melting point for their derivatives.

II. Preparation.
1. Beta naphthyl methyl ether from betanaphthol
2. s-Benzyl isothiuronium chloride from benzylchloride
3. Beta glucose penta acetate from glucose
4. ortho-Benzoyl benzoic acid from phthalicanhydride
5. Resacetophenone from resorcinol
6. para-nitrobenzoic acid from para-nitrotoluene
7. meta-nitroaniline from meta-dinitrobenzene
8. Methyl orange from sulphanilicacid
9. Anthraquinone from anthracene
10. Benzhydrol from benzophenone

REFERENCE BOOKS


OBJECTIVES

1. To improve the skill in the qualitative analysis of mixture of four cations containing two common and two rare.

2. To impart the skill in estimation of metal ions by colorimetric method.

Part I

Semimicro qualitative analysis of mixtures containing the following cations to be tested
W, Tl, Pb, Se, Te, Mo, Cu, Bi, Cd, Tl, Ce, Th, Zr, V, Cr, Fe, Ti, Zn, Ni, Co, Mn, Ca, Ba, Sr, Li and Mg.

Part II

Colorimetric analysis

Visual and Photometric determination of Iron, Nickel, Manganese and Copper

REFERENCE BOOKS

OBJECTIVES

1. To perform experiments in potentiometry, Electrochemistry and Chemical kinetics

List of Experiments

1. **Viscosity**: Variation of viscosity of liquids with temperature
2. Determination of the partial molar volume of glycine /methanol/ formic acid /sulphuric acid by graphical method and by determining the densities of the solutions of different compositions.
3. Study the surface tension-concentration relationship of solutions (Gibb’s equation)
4. **Electromotive Force**:  
   i) Determination of Standard Potentials (Cu, Ag and Zn)  
   ii) Determination of PH and PKa values using Quinhydrone electrodes  
   iii) Determination of dissociation constant of acetic acid by titrating it with sodium hydroxide using quinhydrone as an indicator electrode and calomel as a reference electrode.
5. **Potentiometric Titrations**:  
   i) Titration of mixture of acids against strong base  
   ii) Titration of Ferrous ammonium sulphate against potassium permanganate.  
   iii) Titration of mixture of halides Vs AgNO3
6. **Chemical Kinetics**:  
   i) Determination of rate constant and order of reaction between potassium persulphate and potassium iodide and determine the temperature coefficient and energy of activation of the reaction.  
   ii) Study the primary salt effect on the kinetics of ionic reactions and test the bronsted relationship (iodide ion is oxidised by persulphate ion)  
   iii. Study the kinetics of acid hydrolysis of the ethyl acetate determine the activation energy and temperature coefficient of the reaction.  
   iv. Study the kinetics of the reaction between acetone and iodine in acidic medium and determine the order with respect to iodine and acetone.
Phase diagram

Construction of phase diagram for a simple binary system (naphthalene - phenanthrene or benzophenone - diphenylamine).

7) Conductivity Experiments

i) Determination of equivalent conductance of a weak acid at different concentrations and verify Oswald's dilution law and calculation of the dissociation constant of the acid.

ii) Determination of equivalent conductance of a strong electrolyte at different concentrations and examine the validity of the Onsager's equation.

iii) Titration of a mixture of HCl and CH₃COOH against NaOH

REFERENCE BOOKS

EXTRA DISCIPLINARY COURSES

LIST OF EXTRA DISCIPLINARY COURSE PAPERS

I. Industrial Chemistry
II. Agricultural Chemistry
III. Food and Medicinal Chemistry
IV. Water Chemistry
M.Sc. CHEMISTRY SEMESTER
II
EXTRA DISCIPLINARY COURSE
PAPER-I- INDUSTRIAL CHEMISTRY
(60 Hours)

OBJECTIVES
1. To learn the basic concepts of Glass, Ceramics and Cement and its manufacture.
2. To gain the knowledge of Dyes, Paints, Synthetic fibers, Plastics, Oils, Fats and Waxes and their applications.

UNIT I Glass and Ceramics
(12Hours)
Ceramics: Definition. Manufacture and applications.

UNIT II Cement
(12Hours)

UNIT III Dyes and Paints
(12Hours)
Dyes: Classifications of dyes, application of dyes in other areas-medicine, chemical analysis, cosmetics, colouring agents, Food and beverages.
Paints: Constituents of paints, Manufacture of paints, Setting of paints, requirement of a good paint, paintfailure.

UNIT IV Synthetic fibres and Plastics
(12Hours)
Synthetic fibres: Difference between natural and synthetic fibres, Synthesis and applications of Viscose rayon, Terylene, Nylon and Taflon.
Plastics: Classification, properties and applications of plastics.

UNIT V Oils, Fats and Waxes
(12Hours)
TEXT BOOKS

REFERENCE BOOKS
M.Sc. ORGANIC CHEMISTRY  
SEMESTER II  
EXTRA DISCIPLINARY COURSE  
PAPER- II- AGRICULTURAL CHEMISTRY  
(60 Hours)  

OBJECTIVES  
1. To learn the Analysis of Water and Soil.  
2. To gain the knowledge of Soil treatment, Irrigation, Fertilizer, Pesticides and Insecticides.  

UNIT I Water analysis and water treatment (12hours)  
Water analysis and water treatment-acidity, alkalinity, pH, Biological oxygen demand (BOD). Chemical oxygen demand (COD) and their determinations, Recycling of water and water management.  

UNIT II Chemistry of soil (12 Hours)  

UNIT III Soil treatment and Irrigation (12 Hours)  
Soil treatment-Soil erosion- causes and prevention, soil reclamation, alkali soil, saline soils, methods for soil reclamation, Environmental degradation- causes and prevention, Methods of irrigation and Irrigation projects.  

UNIT IV Fertilizers (12 Hours)  
Fertilizers: Effect of Nitrogen, potassium and phosphorous on plant growth. Secondary nutrients – micronutrients- their functions in plants, classification of fertilizers, natural fertilizers, artificial fertilizers, phosphate fertilizers; Manufacture of urea and triple super phosphate  
Manures: Bulky organic manures- Farm yard manure- handling and storage, oil cakes. Blood meal, fish manures.
UNIT V Pesticides and Insecticides  (12Hours)


TEXT BOOKS


REFERENCE BOOKS

OBJECTIVES

1. To understand the importance of Food, its constituents, Food poisoning, Food preservatives, Vitamins and Minerals.

2. To gain the knowledge of various types of Drugs, AIDS and Medicinal plants.

UNIT I FOOD AND ITS CONSTITUENTS (12Hours)
Sources of food, types, advantages and disadvantages, constituents of foods, carbohydrates, proteins, fats and oils, colours, flavours, natural toxicants. Food poisoning-Sources, causes and remedy. Causes and remedies for acidity, gastritis, indigestion and constipation. Food spoilage, causes of food spoilage, types of food spoilage, food preservation.

UNIT II Vitamins and minerals (12 Hours)
Vitamins: Sources, requirement, deficiency diseases of A, B, C, H and K.
Minerals: Mineral elements in food-principal mineral elements - Source- Function - Deficiency and daily requirements- Na, K, Mg, Fe, S, P and I.

UNIT III Antibiotics, Sulphonaamides and Analgesics (12 Hours)
Antibiotics: Definition, Classification as broad and narrow spectrum, mode of action and uses of penicillin, Chloramphenicol, tetracyclines, ciphalosporin, ampicillin and erythromycin.

Sulphonamides: Mechanism and action of sulpha drugs, preparation and uses of sulphadiazine, sulphathiazole, sulphapyridine and sulphafurazole.

UNIT IV Antiseptics, Disinfectants and Anaesthetics (12 Hours)
Antiseptics and disinfectants- definition and distinction- phenol coefficient, phenol as disinfectant, chlorhexidine, formaldehyde and nitrofurazone-uses.
Anaesthetics- definition- classification- local and general- volatile, nitrous oxide, ether, chloroform, cyclopropane- uses and disadvantages- nonvolatile- intravenous- thiopental sodium, methohexitone, propanidid, local anaesthetics- cocaine and benzocaine- uses and disadvantages.

UNIT V (12 Hours)
Drugs affecting CNS- Definition and one example for tranquilisers, sedatives, hypnotics, psychedelic drugs- chlorpromazine and barbitone-uses
Hypoglycemic agents- Diabetes-types-causes-symptoms-Insulin-uses.
Oral hypoglycemic agents- sulphonyl ureas- action and uses.
Antineoplastic drugs- Causes of cancer, Antineoplastic agents, cytotoxic. anti-metabolites, plant products, harmones- one example and uses
AIDS-causes, prevention and control.
Indian medicinal plants and uses- tulasi, kilanelli, mango, semparuthi, adadodai and thoonthuvalai.

TEXT BOOKS

REFERENCE BOOKS
OBJECTIVES
To gain the knowledge of Characteristics of water, Analysis of water, Treatment of industrial water and Treatment plants

Unit I  Introduction  (12 Hours)
Sources of Water; Physical and chemical characteristics of water; Water analysis; Potable water – WTO standard: uses of water

Unit II  Water Pollution  (12 Hours)
Water pollution – wastewater generation - classification of water pollutants; constituents and characteristics of wastewater; measurement techniques – sampling, colour & odour, dissolved oxygen, BOD, COD, TOC, N& P, suspended solids and bacteriological measurements.

Unit III  Wastewater Treatment  (12 Hours)
Wastewater treatment: Pretreatment – screening, grit removal and pre-chlorination; Primary treatment – settling and sedimentation; Secondary treatment – trickling filter process, activated sludge process; Aeration.

Unit IV  Industrial Wastewater Treatment  (12 Hours)
Industrial wastewater treatment: Activated sludge treatment plants – mass balances, with and without recycle plants; Types of plants – single tank, contact stabilization, biosorption plants.

Biofilters: Hydraulic film diffusion, two component diffusion; Types of plants – trickling filters, submerged filters and rotating disc; removal of particulate organic matter.

Unit V  Treatment Plants  (12 Hours)
Treatment plants for nitrification – mass balances, nitrifying plants and types of plants.

Treatment plant for denitrification - mass balances, denitrifying plants and types of plants; redox zones in the biomass.
TEXT BOOKS


REFERENCE BOOKS

CHEMISTRY IN HEALTH SCIENCE

OBJECTIVE

- To acquire knowledge about good physique fitness, skin care, hair care, clinical chemistry and diagnostic tools.

UNIT I

HEALTH MAINTENANCE (7 hours)


UNIT II

SKIN CARE AND HAIR CARE (8 hours)

Skin Care - Structure and functions of skin - Skin care products - raw materials - its characterisation and formulation. Herbal extracts and essential oils in skin care.

Hair Care – Structure - Types and functions - characterisation and formulation of shampoo and anti-dandruff shampoos- classification and formulation of hair colorants.

UNIT III

CLINICAL CHEMISTRY (8 hours)

Determination of sugar in serum and urine - detection of cholesterol - estimation of red cell count, Na, K, Ca, bicarbonates and phosphates in serum and their significance. Reason for abnormal value of sugar, cholesterol, urea, creatinine - control measures.

UNIT IV

DIAGNOSTIC TOOLS (7 hours)

Principle and uses of Microscopy, Endoscopy, Differential cell counter, X-Ray, ECG, Scanning, Ultrasound, Echo, CT and MRI.
References.


OBJECTIVES
1. To learn the mechanism of addition to Carbon - Carbon and Carbon - Hetero atom multiple bonds.
2. To learn the mechanism of molecular rearrangements and oxidation and reduction reactions
3. To study the structural elucidation of steroids.
4. To learn the uses of reagents in organic synthesis.

Unit I Addition to carbon-carbon and carbon-hetero multiple bonds (15 Hours)
Electrophilic addition to carbon-carbon multiple bonds- Hydroboration, Addition of NOCl to olefins, Michael addition, 1,3-dipolar addition, carbine and their addition and Diel's-Alder reaction
Nucleophilic addition to C=O bond-Mechanism and application of Mannich, Stobbe, Darzen glycidic ester condensation, Benzoin condensation, Peterson olefination, Wittig, Wittig-Horner, Thrope, Ritter and Prins reactions

Unit II Molecular rearrangements (15 Hours)
Study of the following rearrangements with mechanism-Wagner- Meerwin, Demjanov, Dienone-phenol, Favorski, Baeyer-Villiger, Wolff, Stevens, Von-Richter, Beckmann, Smiles, Neber and Hofmann- Martius

Unit III Oxidation and reduction reactions (15 Hours)
Study of the following reactions with mechanism- Oxidation of alcohols by CrO₃, K₂Cr₂O₇, CrO₂Cl₂, DCC, KMnO₄, MnO₂, DMSO alone, DMSO in combination with DCC, Acetic anhydride and oxalyl chloride, Oxidation of aryl methane, oxidation of methylene group alpha to carbonyl, allylic oxidation of olefins, oxidative cleavage of glycols, ozonolysis, hydroxylation of olefins-OsO₄, KMnO₄, Prevost and Woodward dihydroxylation.
Catalytic hydrogenation, Homogenous and heterogenous catalytic reductions, Dissolving metal reductions including Birch reduction, Bouveault-Blanc
reduction, Metal hydride reductions- NaBH₄, LiAlH₄, LTBA, BH₃, Bu₃SnH and Sodium cyano borohydride.

**Unit IV Steroids and steroid hormones (15 Hours)**


**Unit V Reagents in organic chemistry (15 Hours)**

Reagents and their uses – LDA, DCC, DDQ, DBU, DIBAL, 9-BBN, NBS, 1,3- dithiane (umpolug), trimethylsilylchloride, trimethylsilyliodide, Baker's yeast, Gilman's reagent and Wilkinson's catalyst

**TEXT BOOKS**

REFERENCE BOOKS


M.Sc. ORGANIC CHEMISTRY
SEMESTER III
CORE VIII BIOORGANIC CHEMISTRY (75 Hours)

OBJECTIVES

1. To know about the structure of mono saccharides and disaccharides
2. To understand the structure of Vitamins, Terpenoids, Carotenoids and Nucleicacids
3. To know about the basic concepts of Nucleic acids, Lipids, Proteins, Enzymes and Coenzymes.

Unit I Carbohydrates (15 Hours)

Introduction, Classification, Determination of configuration and ring size of D-glucose and D-fructose, Ferrier, Hanesian reactions and Ferrier rearrangement, Determination of structure and ring size of sucrose and maltose, Structure and biological functions of starch and cellulose.

Unit II Vitamins (15 Hours)

Vitamins-Structural elucidation and synthesis of Retinol, Thiamine, Riboflavin, Pyridoxin, Pantothenic acid, Ascorbic acid, Tocopherols, Vitamin K, Cyanocobalamine.

Unit III Terpenoids and Carotenoids (15 Hours)


Unit IV Nucleic acid and Lipids (15 Hours)

Nucleic acid – Structure and synthesis of Nucleosides and Nucleotides, Primary, Secondary and Tertiary structure of DNA, Types of RNA and their structures, Replication, Transcription, Translation, Genetic code and Finger printing.

Lipids – Introduction, Classification, Chemical synthesis and Biosynthesis of Phospholipids and Glycolipids.

Unit V Proteins, Enzymes and Coenzymes (15 Hours)

Proteins- Biological importance, Peptide synthesis by solid phase and solution phase methods. Enzymes- Definition, Classification, Mechanism of enzyme action- lock & key model, induced Fit theory and substate strain theory and Mechanism of enzyme catalysis. Coenzymes- Introduction, Classification, Structure and biological functions of Coenzyme A, Thiamine pyrophosphate (TPP), Pyridoxal phosphate (PLP), Flavin adenine nucleotide FAD, FADH2 and Adenosine triphosphate (ATP)
Reference Books


OBJECTIVES

1. To study in detail about UV-VIS, IR, NMR, 13C NMR, EPR, Mossbauer spectroscopic and Mass spectrometry techniques.

2. To develop problem solving skills from various type of spectra.

UNIT I UV-VIS AND IR SPECTROSCOPY (15 Hours)

UV-VIS: The nature of the electronic excitations, origin of UV band structure and the principle of absorption, chromophores and auxochromes, factors affecting intensity- solvent effects and position of absorption bands- dienes, polyenes and enones. Woodward- Fisher rules for dienes, enones and aromatics- calculation of \( \lambda_{\text{max}} \) for organic molecules- applications of UV-spectroscopy.

IR: IR absorption process, modes of stretching and bending vibrations, bond properties and their relations to absorption frequencies, Characteristics. group frequencies of aliphatic and aromatic organic molecules, carbonyl, carboxylic acid, ester, alcohol, phenol and amides. Factors influencing vibrational frequencies, interpretation of IR spectra of organic molecules- applications of IR-spectroscopy.

UNIT II NMR SPECTROSCOPY – I (15 Hours)

\(^1\)H NMR- principle - Shielding and deshielding - chemical shift, factors influencing chemical shift – magnetic anisotropy- Spin – spin splitting- (n+1rule), Coupling constant –Pascal's triangle, calculation of coupling constants, mechanism of coupling (one bond, germinal, vicinal and long range coupling). First order & non first order spectra - Chemical and magnetic equivalence, shift reagents, NMR instrumentation– Applications.

UNIT III NMR SPECTROSCOPY – II (15 Hours)

\(^{13}\)C NMR - The \(^{13}\)C nucleus – Chemical shifts –Modes of couplings and multiplicity-proton coupled \(^{13}\)C spectra, Homonuclear and heteronuclear decoupling – NOE- Broad band decoupling – Off resonance decoupling – intensity of signals, Chemical shift equivalence, equivalent carbons, chemical shifts of \(^{13}\)C nuclei, DEPT technique, comparison of \(^1\)H and \(^{13}\)C NMR, 2D NMR-COSY and HETCOR techniques- simple molecules and applications of \(^{13}\)CNMR.
UNIT IV EPR AND MOSSBAUER SPECTROSCOPY (15 Hours)

EPR-Introduction, factors affecting the g-value, limitations, instrumentation, electron nucleus interaction, hyperfine interactions-isotropic and anisotropic coupling constants–spin Hamiltonian-applications


UNIT V MASS SPECTROMETRY AND SPECTROSCOPIC APPLICATIONS (15 Hours)

Mass spectra- Basic principle, molecular ion peak, base peak, meta stable ion peak, isotopic peaks, Nitrogen rule, ring rule, Mc-Lafferty rearrangement, rules for fragmentation pattern, Examples of mass spectral fragmentation of organic compounds (alkanes, aromatic hydrocarbons, alkyl halides, aldehydes, ketones, alcohols, acids and esters).

Spectroscopic applications: Structural elucidation of simple organic molecules using UV-VIS, IR, Proton NMR spectroscopy and Mass spectrometry

REFERENCE BOOKS

4. G.W.Ewing, Instrumental methods of chemical analysis, Mcgraw hill Pub, 1975
5. P.S.Kalsi, Spectroscopy, NewAgeInternational(P)Ltd, reprint 2009
OBJECTIVES
1. To study in detail the fundamental aspects of various experimental and instrumental methods in chemistry
2. To understand the principles and instrumentation of destructive and non-destructive techniques
3. To understand the various techniques in Chromatography

UNIT I SURFACE IMAGING (15 Hours)
Basic concepts in surface imaging – Principle, Instrumentation and Applications – secondary electron microscopy(SEM), secondary Auger microscopy(SAM), scanning probe microscopy(SPM), scanning tunneling microscopy(STM), transmission electron microscopy(TEM).

UNIT II CHEMICAL ANALYSIS (15 Hours)
Non-destructive techniques – X-ray absorption, Diffraction and fluorescence spectroscopy – theory, instrumentation and applications.

UNIT III ELECTROANALYTICAL TECHNIQUES (15 Hours)
Polarography – Theory, apparatus, DME, diffusion, kinetic and catalytic currents, current voltage curves for reversible and irreversible systems, qualitative and quantitative applications to inorganic systems.
Amperometric titrations – Theory, apparatus, types of titration curves, successive titrations and two indicator electrodes, applications – Complexometric titrations – chelating agents, types of EDTA titration – direct and back titrations, replacement titrations – masking and demasking reagents.

UNIT IV SEPARATION METHODS - I (15 Hours)

UNIT V SEPARATION METHODS – II (15 Hours)
Gel chromatography or Gel Permeation Chromatography – Principle, Materials, Gel preparation, column Packing and Detectors – applications and advantages of gel chromatography.
Ion Exchange Chromatography – Definition, Principle, cation and anion exchangers – regeneration - column used in separations - Ion exchange capacity and techniques - Applications

**REFERENCE BOOKS**
2. Frank A. Settle, Handbook of instrumental techniques for analytical chemistry, Prince Hall, New jersey, 1997
OBJECTIVES
1. To understand the basic concepts of electroanalytical chemistry
2. To study the principles and instrumentation of various electroanalytical techniques

UNIT I Basic Electrochemical principles (15 Hours)

UNIT II Methods Based on Diffusion (15 Hours)
Principle, instrumentation and applications of the following techniques:
Chronoamperometry; Polarography - Ilkovic equation - Square wave polarography; Linear Sweep voltammetry – Randles Sevrk equation; Cyclic voltammetry - Normal pulse, Differential pulse and Square wave voltammetry.

UNIT III Coulometric and Potentiometric Methods (15 Hours)
Galvanostatic and potentiostatic methods. Principle, instrumentation and applications of the following techniques: Controlled potential coulometry and electrolysis; Chronocoulometry; Potentiometry and Chronopotentiometry.

UNIT IV Stripping voltammetry (15 Hours)
Principle, instrumentation and applications of Anodic stripping voltammetry, Cathodic stripping voltammetry and Adsorptive stripping voltammetry.

UNIT V Sine wave methods (Electrochemical Impedance Spectroscopy) (15 Hours)
Principle of Impedance technique - Analysis of Faradaic impedance – Bode Diagrams. Dynamic electrode techniques, Principle, instrumentation and applications of RDE and RRDE techniques.

TEXT BOOKS
2. Willard, Merit, Dean and Settle, Instrumental Methods of Analysis, CBS Publishers and Distributors, IV Edn.1986
REFERENCE BOOKS

OBJECTIVES
1. To study about heterocyclic compounds containing two heteroatoms
2. To study about retro synthesis and protecting groups
3. To learn about named reactions and their applications
4. To gain knowledge of petrochemicals, paints and dyes

Unit I Heterocyclic Compounds (15 Hours)
5-Membered heterocyclic with 2-heteroatoms - Synthesis and reactivity of Pyrazole, Imidazole, Oxazole, Thiazole, Isoxazole and Isothiazole. 6-Membered heterocyclic with 2 or more atoms - Synthesis and reactions of Diazines (Pyridazine, Pyrimidine and Pyrazine), Synthesis and reactions of Purines and Pteridines, Synthesis of Caffeine, Theobromine and Theophylline.

Unit II Retro synthesis and Protecting groups (15 Hours)

Unit III Named reactions and applications in organic chemistry (15 Hours)
Dieckmann cyclization, Shapiro, Stork enamine, Sharpless asymmetric epoxidation, Robinson annulation, Duff, Simmons-Smith, Hoffman - Loffler- Freytag, Bamford-Stevens, Henry, Ugi, Wadsworth-Emmons, Barton and ene reactions.

Unit IV Petrochemicals (15 Hours)
Origin of petroleum, Products from fractional distillation, classification, composition of petroleum, fuel gases, knocking, octane number, cetane number, lubricating oils, greases and waxes. Cracking, types of cracking, hydrocarbons from petroleum and LPG. Manufacturer and uses of acetaldehyde, acetic acid, formaldehyde, ethylene glycol, 1, 3 – butadiene and styrene. Chemical processing of aromatic hydrocarbons.
Unit V Paints and Dyes  

(15 Hours)

Paints – composition, pigments, binders, extenders, thinners and surface- active agents, functions of the ingredients, paint formulations. Importance of PVC, alkyds, epoxy and polyurethane resins. Dyes – Color and chemical constitution, Classification, brightening agents, cyanine dyes, chemistry of color developer, instant color processes, synthesis and applications of congo red, crystal violet, malachite green and Rhodamine B.

REFERENCE BOOKS


OBJECTIVES
1. To understand the basic concepts of the drugs.
2. To study the classification, synthesis and mode of action of various types of drugs.

UNIT I Basic Concepts of Drugs (15 Hours)
Drug design- analogues and pro-analogues, factors governing drug design, rational approach, method of variation and tailoring of drugs. Classification of drugs, mechanism of action of drugs, metabolism of drugs, absorption of drugs, factors affecting adsorption of drugs and SAR relationships.

UNIT II Drugs Acting on CNS (15 Hours)

UNIT III Drugs Affecting the Cardiovascular System (15 Hours)
Antiarrhythmic drugs - Classification, synthesis and mode of action of Quinidine sulphate and Procainamide hydrochloride. Vasodilator- Classification, synthesis and mode of action of Hydralazine hydrochloride and sodiumnitroprusside.
UNIT IV Drugs Affecting the Harmonal System and Immune System  
(15 Hours)

Drugs affecting the Hormonal systems and immune systems. Drugs affecting hormonal systems
Hypoglycemic drugs - Causes of diabetes, classification, synthesis and mode of action of
Insulin, Tolbutamide and Glipizide. Thyroid drugs- Mode of action of thyroid hormones,
Synthesis and uses of Thyroxine and Propyl thiouracil. Drugs affecting the immune systems.
Non - steroidal anti inflammatory drugs - Classification, synthesis and mode of action of
Flurbiprofen and Indomethacin. Antihistamics (Antiallergic agents) - Histamine, Classification,
SAR amongst H1-receptor blockers, prevention of histamine release, synthesis and mode of
action of Diphenhydramine hydrochloride and Promethazine hydrochloride. Antulcers-
Histamine H2 Receptor Antagonists,SAR, synthesis and Characteristic features of Cimetidine
and Ranitidine.

UNIT V Chemotherapeutic Agents  
(15 Hours)

Antibiotics- Classification, synthesis and mode of action of Penicillins, Chloramphenicol and
Azithromycin. Sulpha drugs- Classification, SAR and mode of action of sulphonamides.
Synthesis and uses of Sulfacetamide and sulpha guanidine. Antiviral drugs- Classification,
synthesis and mode of action of Acyclovir and Methiazone. Antimycobacterial drugs-
Classification, synthesis and mode of action of Pyrazinamide and Ciprofloxacin hydrochloride.
Antelmintics- Types of warm parasites, classification, synthesis and mode of action of
Albendazole and Mebendazole. Antineoplastic drugs- Causes of cancer, classification, synthesis
and mode of action of Melphalan and Methotrexate.

TEXT BOOKS
1. Jayashree Ghosh, A Textbook of Pharmaceutical Chemistry, S.Chand& Company Ltd,
   Reprint 2012.
6. Chatwal, Medicinal Chemistry.

REFERENCE BOOKS
2. Wilson and Gisvold, Textbook of Organic Medicinal and Pharmaceutical Chemistry,
OBJECTIVES

To develop analytical skill in

i) Organic quantitative analysis.

ii) Preparation of organic compounds involving two stages.

I. ORGANIC ESTIMATION

1. Phenol
2. Aniline
3. Methyl Ketone
4. Glucose
5. Iodine value of an oil

II. ORGANIC PREPARATION INVOLVING TWO STAGES

1. Sym-tribromobenzene from aniline.
2. m- Nitrobenzoic acid from methylbenzoate
3. para – Nitroaniline from acetanilide.
4. Benzanilide from benzophenone.
5. Aspirin from methylsalicylate
6. Anthraquinone from phthalic anhydride.

REFERENCE BOOKS


M.SC. ORGANIC CHEMISTRY IV

CORE PRACTICAL – V

ORGANIC CHEMISTRY PRACTICAL III

OBJECTIVES

To develop analytical skill in

1. Estimation of functional group
2. Preparation of organic compounds involving multistages

1) ESTIMATION OF THE FOLLOWING

1. Hydroxyl group
2. Amino group
3. Amide group
4. Glycine
5. Ascorbic acid
6. COD

II. MULTISTAGE PREPARATION INVOLVING OXIDATIONS AND REDUCTIONS

1. Preparation of cyclohexanone (Oxidation)
2. Preparation of adipic acid (Oxidation)
3. Preparation of trimethyl acetic acid (Oxidation)
4. Preparation of ethyl benzene (Wolff-Kishner reduction)
5. Preparation of benzhydrol (Reduction)
6. Preparation and stereochemistry of azobenzene (Reduction).

REFERENCE BOOKS

M.Sc. ORGANIC CHEMISTRY
SEMESTER IV
CORE PRACTICAL – VI

ORGANIC CHEMISTRY Practical IV

OBJECTIVES

To understand the techniques involved in

1. Extraction of natural products

2. Separation of mixture of organic products

2. Apply knowledge about spectra to identify the structure of unknown organic compounds.

1. Extraction of natural products such as caffeine, embelin, piperine, stigmasterol and β -carotene.

2. Separation and identification of aminoacids and sugars by paper and thin layer chromatography.

3. Column chromatographic separation of mixture of organic compounds

(a) Purification of anthracene

(b) Separation of aminoacids

(c) Separation of benzoic acid from benzaldehyde.

4. Elucidation of the structure of an organic compound from the spectra provided.

REFERENCE BOOKS


3. ArunSethi, Lab experiments in organic chemistry, New Age International Publishers