DEGREE OF BACHELOR OF SCIENCE

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR BRANCH IV- B.Sc. CHEMISTRY

FOR THE STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2021-2022ONWARDS
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REGULATIONS

1. **Preamble and objectives of the Course:**

   Chemistry is central to the current revolutions in Science. No educated person today can understand the modern world without a basic knowledge of Chemistry. The existence of a large number of chemical factories, mines and related industries in the catchment of the University necessitates Chemistry education.

   The programme educational objectives (PEOs) of B.Sc. Chemistry course are
   1. To impart knowledge in fundamental aspects of all branches of Chemistry.
   2. To acquire basic knowledge in the specialized areas like Polymer Chemistry, Environmental Chemistry, Dye Chemistry, Pharmaceutical Chemistry, Industrial Chemistry etc.
   3. To create manpower in Chemical industries and help their growth.
   4. To prepare candidates for a career in Chemical industries.

**Programme Specific Outcomes (PSOs)**

After completion of this programme the candidate will

- have enormous job opportunities at all levels of chemical, pharmaceutical and food product industries.
- get specific placements in R & D and synthetic division of polymer industries & Allied divisions.
- appear in competitive exams conducted by service commission.
- gain complete knowledge about all fundamental aspects of chemistry
- learn about the emerging field of green chemistry, nanochemistry and polymer chemistry
- carry out experiments in the area of organic analysis, estimation, inorganic semi-micro analysis, conductometric & potentiometric equipment.

**Programme Outcomes (POs)**

On successful completion of this programme, students will have the ability to

- think critically and analyze chemical problems.
- present scientific and technical information resulting from laboratory experimentation in both written and oral formats.
- work effectively and safely in a laboratory environment.
- use technologies and instrumentation together to explore new areas of research.
- work as a member of interdisciplinary problem solving team.
- apply their scientific skill to innovative studies.

2. **Condition for Admission**

   A candidate who has passed the Higher Secondary Examination of TamilNadu Higher Secondary Board or an examination of some other board accepted by the syndicate as equivalent there to with Chemistry and Physics and any one of the following subjects namely Maths, Botany, Zoology
or Biology shall be eligible for admission into B.Sc., course in Chemistry.

3. Duration of the Course:

The course for the degree of Bachelor of Science shall consist of three academic years divided into six semesters.

4. Course of Study:

The course of study for the B.Sc. Degree in the Branch IV - Chemistry shall comprise of the following subjects according to the syllabus and books prescribed from time to time. The Syllabus for various subjects shall be demarcated into five units in each subject

Part-I – Tamil / Other languages
Part-II – English
Part-III – Coresubjects
   Allied subjects
   Project / Elective with three courses

Part-IV
1. Non Major elective comprising of two courses.
2. Skill based subjects (Elective)
3. Environmental Studies
4. Value Education
5. Professional English

Part-V – Extension Activities
NSS / NCC / Sports / YRC and other co and extracurricular activities offered under part V of the programmes.

The two allied subjects may be chosen by the respective colleges and the same must be communicated to the University.

Non major elective course subjects may be chosen by the respective colleges and the same must be communicated to the University.

The college may also choose the allied subject of their choice in the first and second year.

I-SEMESTER:
1. Language - Paper I
2. English - Paper I
3. Major Core - Paper I
4. Allied I - Paper I
5. Value Education

II-SEMESTER
7. Language – Paper II
8. English - Paper II
9. Major Core - Paper II
10. Allied I - Paper II
11. Major- practical – I
12. Allied – I Practical
13. Environmental studies
14. Skill based Elective Course I
15. Professional English- II [Add – On Course]

III-SEMESTER
16. Language – Paper III
17. English- Paper III
18. Major Core – Paper III
19. Allied II – Paper I
20. Skill Based Elective course II
21. Non Major Elective course I

IV SEMESTER
22. Language – Paper IV
23. English – Paper IV
24. Major Core – Paper IV
25. Allied II- Paper II
26. Major- Practical III
27. Allied II- Practical
28. Skill Based Elective course II
29. Non Major Elective course II

V SEMESTER
30. Major Core Paper – V
31. Major Core Paper – VI
32. Major Core paper – VII
33. Elective Paper – I
34. Skill Based Elective course III
35. Skill Based Elective course IV

VI-SEMESTER
36. Major Core Paper- VIII
37. Major core paper – IX
38. Major core paper – X
39. Elective Paper – II
40. Skill Based Elective course V
41. Elective Paper -III
42. Major Practicals – III
43. Major Practicals – IV

5. Examinations
There shall be six examinations- two in the first year, two in the second year and two in the third year. Candidates failing in any subject / subjects will be permitted to appear for such failed subject / subjects at subsequent examinations.

The Syllabus has been divided into six semesters. Examinations for I, III and V semesters will be held in November/ December and for II, IV and VI semesters will be held in April / May.

The practical examination I will be held at the end of I year. II will be held at the end of II year. III and IV will be held at the end of III year.

Requirement to appear for the examination
A candidate shall be permitted to appear for the university examinations for any semester
(practical/theory) if He / She secures not less than 75% of attendance in the number of working days during the semester.

6. **Passing Minimum**

A candidate who secures not less than 40% in the university (external) Examination and 40% marks in the external examination and continuous internal assessment put together in any course of Part I, II, III & IV shall be declared to have passed the examination in the subject (theory or Practical). For practical, the minimum for a pass includes the record notebook marks also. There is no passing minimum for the record notebook. However submission of a record notebook is a must.

7. **Classification of Successful Candidates**

Candidates who secure not less than 60% of the aggregate marks in the whole examination shall be declared to have passed the examination in First Class.

All other successful candidates shall be declared to have passed in the Second Class.

Candidates who obtain 75% of the marks in the aggregate shall be declared to have passed the examination in First Class with Distinction provided they pass all the examinations prescribed for the course at the first appearance.

Grading:

Conversion of marks to Grade points and letter grade (Performance in a course/paper)

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<th>Range of marks</th>
<th>Grade Points</th>
<th>Letter Grade</th>
<th>Description</th>
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<tr>
<td>90-100</td>
<td>9.0-10.0</td>
<td>O</td>
<td>Outstanding</td>
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<tr>
<td>80-89</td>
<td>8.0-8.9</td>
<td>D+</td>
<td>Excellent</td>
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<tr>
<td>75-79</td>
<td>7.5-7.9</td>
<td>D</td>
<td>Distinction</td>
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<tr>
<td>70-74</td>
<td>7.0-7.4</td>
<td>A+</td>
<td>Very Good</td>
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<tr>
<td>60-69</td>
<td>6.0-6.9</td>
<td>A</td>
<td>Good</td>
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<td>50-59</td>
<td>5.0-5.9</td>
<td>B</td>
<td>Average</td>
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<td>40-49</td>
<td>4.0-4.9</td>
<td>C</td>
<td>Satisfactory</td>
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<td>U</td>
<td>Re-appear</td>
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<tr>
<td>ABSENT</td>
<td>0.0</td>
<td>AAA</td>
<td>ABSENT</td>
</tr>
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</table>

Ci = Credits earned for course I in any semester
Gi = Grade point obtained for course I in any semester
n = refers to the semester in which such course were credited

**Grade point average (for a Semester):**

Calculation of grade point average semester-wise and part-wise is as follows:

\[
\text{GRADE POINT AVERAGE (GPA)} = \frac{\sum Ci Gi}{\sum Ci}
\]
Sum of the multiplication of grade points by the credits of the courses offered under each part

\[ \text{GPA} = \frac{\sum \text{grade points} \times \text{credits}}{\sum \text{credits}} \]

Calculation of grade point average (CGPA) (for the entire programme):

A candidate who has passed all the examinations under different parts (Part-I to V) is eligible for the following partwise computed final grades based on the range of CGPA.

**CUMULATIVE GRADE POINT AVERAGE** [CGPA] = \[ \sum \text{n} \sum \text{i} \text{Cn}_i \text{Gn}_i / \sum \text{n} \sum \text{i} \text{Cni} \]

Classification of Successful candidates

A candidate who passes all the examinations in Part I to Part V securing following CGPA and Grades shall be declared as follows for Part I or Part II or Part III:

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<th>CGPA</th>
<th>GRADE</th>
<th>Classification of Final Result</th>
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<tr>
<td>9.5-10.0</td>
<td>O+</td>
<td>First Class – Exemplary</td>
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<tr>
<td>9.0 and above but below 9.5</td>
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<td>8.5 and above but below 9.0</td>
<td>D++</td>
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<tr>
<td>8.0 and above but below 8.5</td>
<td>D+</td>
<td>First Class with Distinction</td>
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<td>4.5 and above but below 5.0</td>
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<td>4.0 and above but below 4.5</td>
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**8. Ranking**

Candidates who pass all the examinations prescribed for the course in the first instance and within a period of three academic years from the year of admission to the course only are eligible for University Ranking.

**9. Maximum Duration for the completion of the UG Programme:**

The maximum duration for completion of the UG Programme shall not exceed twelve semesters.

**10. Commencement of this Regulation:**

These regulations shall take effect from the academic year 2021-2022, i.e. for students who are to be admitted to the first year of the course during the academic year 2021-2022 and thereafter.
11. Marks Distribution and Question Paper Pattern for B.Sc., (For Both Major & Allied)

Theory–Marks Distribution

Maximum Marks: 100 Marks
External : 75 Marks
Internal : 25 Marks

(a). Theory-External Marks Distribution

Time : 3 Hours  Maximum: 75 Marks
Part A : 15 x 1 = 15 (Answer all questions)
Choose the correct answer
(Three questions from each unit)

Part B : 2 x 5 = 10 (Answer any two questions)
(One question from each unit with internal choice)

Part C : 5 x 10 = 50 (Answer All questions)
(One question from each unit with internal choice)

(b). Theory-Internal Marks Distribution

(Total Marks: 25)

Attendance : 5 Marks
Assignment : 5 Marks
Test : 15 Marks

(c) Practical Marks - Distribution

Maximum Marks : 100 Marks
External : 60 Marks
Internal : 40 Marks

INTERNERSHIP (2 weeks)

The students have the option to select any organization – Government / private like industry, R & D organizations, scientific companies, etc., in consultation with the staff coordinator & Head of the Department. The students have to undergo training for a period of two weeks at the end of semester IV during vacation. The students must maintain a work diary and prepare report of the training undergone and submit the same.
For students admitted from 2021-2022 onwards

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Total Credit for I & II Semester = 49 credits
For students admitted from 2021-2022 onwards

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Total Credit for III & IV Semester = 43 credits
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UNIT-I  s,p-Block elements and Volumetric Analysis
1.1 s-block elements – Characteristic properties of group I and II elements, Diagonal relationship between Li and Mg, Be and Al.
1.2 p-block elements – Boron family: Synthesis and structure of diborane and higher boranes (B₄H₁₀ and B₅H₉). Boron nitrogen compound (B₃N₃H₆) and Lewis acid nature of BX₃. Carbon family: Carbides – Classifications (ionic, covalent and interstitial). Chemistry of carborundum and boron carbide.
1.3 Volumetric analysis – Principle, Preparation of standard solutions, types of titration. Theory of acid–base titration, redox titrations: Fe²⁺ vs K₂Cr₂O₇ using internal and external indicators. Precipitation titration: AgNO₃ vs KCl – Complexometric titration: EDTA vs Mg²⁺.

UNIT – II Chemical Bonding
2.1 Ionic bond-Mode of formation – properties of ionic compounds-inert pair effect-Born Haber cycle- polarization of ions- factors affecting polarization-importance of polarization of ions- Fajan’s rules and applications.
2.2 Covalent Bond-Mode of formation-properties of covalent compounds- Valence Bond theory-Postulates of Pauling-Slater’s theory-Different types of overlapping. Molecular orbital theory Postulates-Bonding and anti-bonding molecular orbitals-Tabulation of various M.Os formed from atomic orbitals- Bond order- MO diagrams for Homo and Hetero nuclear diatomic molecules: H₂, He, N₂, O₂, CO, NO and HF. Comparisons between VBT and MOT.

UNIT – III Basic Concepts in Organic Chemistry

UNIT – IV Cycloalkanes, Alkenes and Alkynes
4.1 Cycloalkanes: IUPAC Nomenclature, preparation using Dieckmann’s ring closure and reduction of aromatic hydrocarbons, Substitution reactions with Cl₂ and Br₂ and ring opening reactions of cyclopropane with H₂, Br₂ and HBr, Bayer’s strain theory.
4.2 Alkenes: IUPAC nomenclature, mechanisms of addition reactions with hydrogen halogenhydrogen halide (Markovnikoff’s rule), HBr (peroxide effects), Hydration, Hydroboration, ozonolysis; hydroxylation using KMnO₄ and OsO₄, and allylic substitution by NBS.
4.3 Alkynes – General methods of preparation, properties and uses.

UNIT – V Gaseous State
5.2 Behaviour of Real gases - Deviations from ideal behaviour- Explanation of deviations – derivation of vander Waal’s equation for real gases. PV isotherms of real gases. The virial equation of state-derivation of the principle of corresponding states.

TEXT BOOKS AND REFERENCES:

1. B.R. Puri, L.R. Sharma, K.C. Kalia, principles of inorganic chemistry
5. Morrison and Boyd, Organic Chemistry, Allyn and BaconInc.
6. Puri, Sharma and Pathanaia, Principles of Physical Chemistry
UNIT-I p-Block Elements:
1.2 Oxygen family: Oxides – Types of oxides (acidic, basic amphoteric and neutral), oxides and oxy acid of halogens (structure only). Ozone and hydrogen peroxide – Preparation, properties, structure and uses.

UNIT-II Aromatic Compounds and Electrophilic Substitution:
2.1 Aromaticity: Resonance in Benzene – Huckel’s (4n+2) rule and its simple applications.
2.2 Electrophilic substitution- Nitration, Halogenation, Sulphonation, Friedel Crafts alkylation, acylation and arylation – Mechanism Orientation and reactivity in monosubstituted benzene.
2.3 Polynuclear hydrocarbons- Naphthalene, Anthracene isolation, synthesis, properties and uses.

UNIT-III Aliphatic Nucleophilic Substitution & Elimination:
3.1 Reaction intermediates: carbocation, carbanion, free radicals- formation and stability.
3.2 Aliphatic Nucleophilic substitution: Mechanism and stereochemistry of SN1, SN2 and SNi reactions- Effect of substrate structure, nucleophile, solvent and leaving group.
3.3 Elimination reaction- mechanism of E1 and E2 reactions- Hofmann and saytzeff’s rule- comparison between substitution and elimination.
3.4 Dienes - Isolated and Conjugated dienes, 1,2 and 1,4 addition.

UNIT-IV The Liquid State, Liquid Crystals & Colloids
4.1 The Liquid state: structure of liquids- Vapour-pressure-Trouton’s rule-surface tension- surface energy-some effects of surface tension-viscosity- effect of temperature on viscosity (Experimental determination of surface tension and viscosity not necessary)- Refractive index-specific refraction- molar refraction. Physical properties and chemical constitution- Molar volume and chemical constitution- Parachor and chemical constitution. Viscosity and chemical constitution- molar refraction and chemical constitution.
4.2 Liquid crystals (The mesomorphic state) Thermography-classification of Thermotropic liquid crystals-Smectic liquid crystals- Nematic liquid crystals- Cholesteric liquid crystals- Applications of liquid crystals
4.3 Colloids: Types of sols-characteristic of lyophilic and lyophobic sols- optical, kinetic and electrical properties of sols- Applications of colloids.
UNIT-V Solid State

5.1 The solid state- differences between crystalline and amorphous solids- isotropy and anisotropy – interfacial angle-symmetry in crystal systems- Elements of symmetry, space lattice & unit cell- Bravis lattices- Law of rationality of indices- Millerindices.

5.2 X ray diffraction- Braggs- equation Experimental methods, Structure of NaCl, CsCl, ZnS.

5.3 Band theory and defects insolids.

TEXT BOOKS AND REFERENCES:

2. Madhan R D, InorganicChemistry
5. Morrison and Boyd, Organic Chemistry, Allyn and BaconInc.
6. Puri,Sharma and Pathanaia, Principles of Physical Chemistry
UNIT -I Food Sources
1.1 Sources of foods, types, constituents of foods-carbohydrate, protein, fats, oils and their functions.
1.2 Food colours, flavours and natural toxicants.

UNIT -II Nutrition
2.1 Definition of nutrition, nutrients, functions. Nutritional status – Definition, signs of good and poor nutritional status.
2.2 Mal nutrition- Definition, forms, causes and remedy.
2.3 Health –Definition, guidelines for good health, Balanced diet, Food pyramid.
2.4 BMI (Body Mass Index), Obesity: causes complications, treatment and prevention.

UNIT-III Food Poisoning, Adulteration And Food Preservation
3.1 Food poisoning- Sources, causes and remedy. Causes and remedies for acidity, gastritis, indigestion and constipation
3.2 Food adulteration- Types of adulterants- intentional and incidental, Adulterants in different foods- Milk and milk products- vegetable oils and fats-spices-cereals-pulses, detection and prevention.
3.3 Food spoilage, causes of food spoilage, types of Food spoilage
3.4 Food preservation-preservation and processing by heating - sterilization, pasteurization.
Food preservation by low temperature method, fermentation.

UNIT-IV Vitamins And Minerals
4.1 Sources, requirement and deficiency diseases of fat soluble vitamins - A, D, E, and K, water soluble vitamins- B₁, B₂ and B₆
4.2 Mineral elements in food-source, function, deficiency diseases and daily requirements of Na, K, Mg, Fe, S and P.

UNIT-V Foods In Relation To Disease
5.1 Food borne illness, bacterial and viral food borne disorder, animal parasites, mycotoxins.
5.2 Deficiency diseases - nutritional anaemia, PEM, IDD, VAD - chemical finding, prevention and treatment.
TEXT BOOKS AND REFERENCES:

1. Seema Yadav : —Food Chemistry , Anmol publishing (P) Ltd, NewDelhi
Internal Assessment Marks:25  External Marks:75

Unit-I
Inorganic Qualitative Analysis and Nuclear Chemistry
1.1 Principles of Qualitative analysis: Principles involved in Na₂CO₃ extract preparation- Common ion effect and its application- Solubility product principle & applications in qualitative analysis-complexation reactions in qualitative analysis-separation of cation into groups.
1.2 Nuclear chemistry: Nuclear Stability n/p ratio- nuclear forces- Natural radioactivity- modes of decay- Geiger- Nuttal rule- Kinetics of radioactivity disintegration.
1.3 Mass defect and binding energy- Artificial transmutation and artificial radioactivity.
1.4 Nuclear reactors-types- common features like fuels- moderators, coolant control materials.

Unit-II
Halogen Family and Chemistry of Rare Gases
2.1 Position of halogens in periodic table- Oxides and Oxyacids of halogens. Inter halogen compounds. Basic properties of halogens.
2.2 Rare gases: Position of rare gases in the periodic table - General properties- compounds of Xenon – oxides, halides and oxy-halides.

Unit-III
Carbonyl Compounds
3.1 General methods of preparation of aldehydes and ketone - Addition reaction of carbonylic group. addition of HCN, NH₂OH, NH₂NH₂, phenyl hydrazines, semicarbazide, and grignard reagent.
3.2 Mechanism of reduction of carbonyl group by NaBH₄, LiAlH₄, Wolf Kishner, Clemmenson and Meerwin-ponndorf verley (MPV) reduction.
3.3 Carbonyl polarization-Reactivity of carbonyl group- Acidity of carbonyl group- Haloform reaction – Mechanism.
3.4 Aldol condensation and Cannizzaro reaction - mechanism.

Unit-IV
Thermodynamics and Thermochemistry
4.2 Expansion of an ideal gas- work done in reversible isothermal expansion-work done in reversible isothermal compression-work done in reversible adiabatic expansion–.
4.3 Joule- Thomson effect, Joule- Thomson coefficient-Inversion temperature- Zeroth Law of thermodynamics- Absolute temperature scale - Kirchoff’s equation.
Unit-V
Second Law of Thermodynamics - I

5.1 Limitations of the first Law- need for second law- Spontaneous process- cyclic process Carnot cycle -Efficiency-Carnot theorem- thermodynamic scale of temperature.

5.2 Concept of entropy- Entropy- a state function- Entropy change in isothermal expansion of an ideal gas- Entropy change in reversible and irreversible processes- Clausius inequality- Entropy change accompanying change of phase- Entropy of mixture of ideal gases-entropy of mixing- physical significance of entropy.

TEXT BOOKS AND REFERENCES:

2. Madhan R D, InorganicChemistry
5. Morrison and Boyd, Organic Chemistry, Allyn and BaconInc.
6. Puri,Sharma and Pathanaia, Principles of PhysicalChemistry
B.Sc. CHEMISTRY SEMESTERS – III and IV
SKILL BASED ELECTIVE COURSE – II (30 hours)
POLYMER CHEMISTRY
CODE -21UCHS02

Internal Assessment Marks: 25 External Marks: 75

UNIT-I
1.1 Basic concepts: Monomer, polymerization, degree of polymerization, repeat units. Classification of Polymers-addition and condensation polymers, natural and synthetic, inorganic and organic, thermoplastic and thermosetting resin.
1.2 General methods of preparation of polymers. Polymerization through functional groups, multiple bonds and ring opening and Coordination polymerization.

UNIT-II
2.1 Structure of polymers- linear, branched and cross linked. Homo & hetro copolymers. Block copolymers & graft copolymers. Stereochemistry of polymers-Isotactic, Syndiotactic and Atactic
2.2 Properties of polymers: The crystalline melting point. The glassy state and glass transition temperature. Determination of glass transition temperature.

UNIT-III
3.1 Molecular weight of polymers Number average molecular weight and weight average molecular weight. Determination of molecular weight by viscosity and osmometry methods.
3.2 Polymer processing- calendaring, Die casting, blow moulding, injection moulding, extrusion moulding and wet spinning.

UNIT-IV
4.1 Preparation, properties and uses of Poly olefins-polythene, PTFE, Freons, PVC, polypropylene and polystyrene.

UNIT-V

REFERENCES:
B.Sc. CHEMISTRY SEMESTER-IV
GENERAL CHEMISTRY-IV (75 hours)
CODE -21UCH04

Internal Assessment Marks:25
External Marks :75

UNIT-I

d-Block elements & Principles of Metallurgy
1.1 Transition elements - position in the periodic table - general characteristics - objective study of the properties expected. Occurrence, extraction, properties and uses of Titanium, Zirconium, Molybdenum. Chemistry of Titanium dioxide, Titanium tetrachlorate, Vanadium pentoxide, Ammonium vanadate, Zirconium dioxide, Zirconium halide, Ammonium molybdate & Molybdenumblue.
1.2 Principles of Metallurgy: Minerals, ores. Different metallurgical operations employed in extracting metals from ores. Methods of concentration, Reduction of mineral to metal and Refining of metals.

UNIT – II
Gravimetric Analysis
2.1 Principle - Theories of precipitation - conditions of precipitation - co precipitation & post precipitation - Reduction of errors, precipitation from homogeneous solution - Washing & Drying of precipitate. Choice of precipitant - Specific & Selective precipitants - Anthranilic acid, Cupferon, Dimethylglyoxime ethylene diamide, 8-hydroxy quinoline - use of masking agent.
2.2 Crucible - Types, care & uses. Calculation in gravimetric analysis. Use of Gravimetric factor.

UNIT – III
Carboxylic Acids
3.1 Unsaturated acids - preparation and properties of acrylic, crotonic, oleic and cinnamic acids.
3.2 Hydroxy acids - classification preparation and reactions of glycolic acid, malic acid and citric acid - Action of heat on α, β and γ acids.
3.3 Dicarboxylic acids - preparation and properties of oxalic, malonic, succinic, glutaric and adipic acids.
3.4 Mechanism of conversion of acids into acid derivatives - esterification including transesterification. Hydrolysis of esters.

UNIT-IV
Reaction Mechanism
4.1 Reaction and Mechanism of Kolbe’s reaction - Reimer - Tiemann reaction, Gattermann, Lederer manasse and Houben Hoesch reactions.
4.2 Reaction and Mechanism of Mannich, Stobbe, Darzen, Wittig and Reformatsky reactions.
UNIT-V
Second law of thermodynamics - II
5.1 Work and free energy functions - Maxwell’s relationships for reversible and irreversible process - Gibbs Helmholtz equation – Partial molar free energy-chemical potential-Gibb’s Duhem Equation,. Clapeyron - Clausius equation - Applications of Clapeyron - Clausius equation.
5.2 Third law of thermodynamics Nernst heat theorem - statement of III law Evaluation of absolute entropy from heat capacity measurements - Test for the validity of the law.

TEXT BOOKS AND REFERENCES:
2. Madhan R D, Inorganic Chemistry
4. Kalsi P S, Organic Reactions and their Mechanism
5. Morrison and Boyd, Organic Chemistry, Allyn and Bacon Inc.
6. Puri, Sharma and Pathanaia, Principles of Physical Chemistry
7. Rajaram and Kuriacose, Thermodynamics for Students Of Chemistry
Internal Assessment Marks: 25

Unit I
Coordination Chemistry

1.1 Definition of the terms-Classification of ligands- Nomenclature of mononuclear and polynuclear complexes-chelating ligands and chelates- Examples-chelate effect-explanation.
1.2 Werner’s theory-conductivity and precipitation studies – Sidgwick’s theory- Effective Atomic Number concept.
1.3 Isomerism in complexes-Structural Isomerism—types. Stereoisomerism- Geometrical isomerism in 4 and 6 coordinated complexes. Optical isomerism in 4-and 6-coordinated complexes.

Unit II
Theories of Coordination Compounds

2.2 Crystal Field Theory (CFT)-postulates-d-orbital splitting in octahedral, tetrahedral and square planar complexes-strong and weak ligands- Spectrochemical series- High spin and low spin complexes-C.F. Theory and magnetic properties of complexes-Crystal Field Stabilisation Energy (CFSE) and its uses-Calculation of CFSE values of d¹ to d¹⁰ Octahedral and Tetrahedral complexes-CFT and colour of complexes-limitations of CFT -comparison between VBT andCFT.

Unit III
Reactions Mechanisms and Applications of Complexes

3.1 Substitution reactions in square planar complexes-Trans Effect-Trans effect series-uses of Trans effect-Theories of Trans effect- polarisation theory and π- bonding theory.
3.2 Application of coordination compounds in Qualitative and Quantitative analysis-separation of Copper and Cadmium ions, Cobalt and Nickel ions- Identification of Cu, Fe, and Ni.
3.3 EDTA and its applications - estimation of metals, hardness of water and sequesterisation.

Unit IV
Chemistry of f-blockelements

4.1 Position in the Periodic Table-General characteristics of Lanthanides and Actinides Lanthanide contraction and its consequences.
4.2 Isolation of Lanthanides from Monazite including the Ion exchange resin method.
4.3 Actinides-occurrence and preparation.
4.4 Chemistry of Thorium and Uranium-Important compounds - preparation, properties and uses of
Uranyl nitrate, Uranium hexafluoride, Thorium dioxide.

Unit V
Concepts of acids, bases and non aqueous solvents

5.1 Acids and Bases: Arrhenius, Bronsted-Lowry, the Lewis concepts of acids and bases. Relative strength of acids and bases.
5.2 Hard and Soft Acids and Bases-classification of acids and bases as hard and soft– examples Pearson’s HSAB concept, acid-base strength and hardness and softness, Theoretical basis of hardness and softness, Applications of HSAB principle.
5.3 Non-aqueous solvents- physical properties of a solvent, types of solvents and their general characteristics. Reactions in non- aqueous solvents with reference to liquid NH$_3$and liquid SO$_2$- Comparison.

TEXT BOOKS AND REFERENCES:

1. Madhan R D, InorganicChemistry
3. Madhan R D, Tuli G D and Wahid U Malik, Selected topic in InorganicChemistry
5. Gurdeep Chatwaal and M.S. Yadav Coordination Chemistry.
6. Gurdeep Advanced InorganicChemistry
7. Madhan R D and Sathya Prakash Modern Inorganic Chemistry
UNIT – I

UNIT – II

UNIT – III
3.1 Phenols – Acidity of Phenol, explanation on the basis of the resonance stabilization.
3.3 Di and trihydric phenols – preparation and properties of catechol, resorcinol, alpha and beta naphthols – Preparation and properties.

UNIT- IV
Molecular rearrangements:
4.1 Mechanism of pinacol – pinacolone (migratory aptitude), Beckmann, Hoffmann, curtius, Schmidt, Benzilic acid, Claisen, Cope and Fries rearrangements. Difference between inter and intramolecular nature.

UNIT – V
Chemistry of natural products
5.1 Alkaloids-classification-isolation–general methods of determination of structure of alkaloids. Structural elucidation and synthesis (any one method) of the following alkaloids, nicotine, papaverine Atropine.
5.2 Terpenes-classification-isolation-isoprene rule-synthesis and structural elucidation of citral, geraniol, alpha pinene.

TEXT BOOKS AND REFERENCES:

1. Kalsi P S, Stereochemistry, Conformation and Mechanism
5. Finar I L, , Organic Chemistry Vol I & II
7. Nasipuri D Stereo Chemistry of Organic compounds
9. O P Agarwal Reactions and Reagents in Organic Chemistry
Internal Assessment Marks: 25

External Marks: 75

UNIT-I Chemical Equilibrium
1.1 Thermodynamic derivation of equilibrium constants-Kp, and Kc - Relations between Kp, and Kc - Standard free energy change-Derivation of van’t Hoff reaction isotherm DeDonder’s treatment of chemical equilibria-concept of chemical affinity (no derivation)-Temperature dependence of equilibrium constant-van’t Hoff isochore-Pressure dependence of equilibrium constant.
1.2 Adsorption- Physical and chemical adsorption-Types of adsorption isotherms-Freundlich adsorption isotherm-Derivation of Langmuir adsorption isotherm (BET isotherm (postulates only) BET equation (statement).

UNIT-II Chemical Kinetics-I
2.1 Derivation of rate constant of a second order reaction-when the reactants are taken at different initial concentrations-when the reactants are taken at the same initial concentrations Determination of the rate constant of a II order reaction-Derivation of rate constant of a third order reaction-when the reactants are taken at the same initial concentrations. Derivation of half-life periods for second and third order reactions having equal initial concentration of reactants.
2.2 Methods of determining the order of reaction-Experimental methods in the study of kinetics-volumetry, manometry, polarimetry and colorimetry.
2.3 Effect of temperature on reaction rates-Derivation of Arrhenius equation-concept of activation energy-determination of Arrhenius frequency factor and energy of activation.

UNIT-III Chemical Kinetics-II
3.1 Collision theory (CT) of reaction rates-Derivation of rate constant of a bimolecular reaction from collision theory-Failures of collision theory.
3.2 Lindemann theory of Unimolecular reactions.
3.3 Theory of Absolute Reaction Rates (ARRT) -Thermodynamic derivation of rate constant for a bimolecular reaction based on ARRT- comparison between ARRT and CT. Significance of free energy of activation and entropy of activation.

UNIT-IV Electrochemistry – I
4.1 Metallic and electrolytic conductance –Definitions of specific, equivalent and molar conductance – Relations between them – measurement of conductance and cell constant.
4.3 Ionic mobilities and Ionic conductance. Diffusion and ionic mobility—molar ionic conductance and viscosity—Walden rule.


UNIT – V Theory of strong electrolytes
5.1 Debye–Huckel–Onsager theory—verification of Onsager equation—Wein and Debye—Falkenhagen effect.

5.2 Activity and activity co-efficients of strong electrolytes—ionic strength. Ostwald’s dilution law—determination of dissociation constants—Ionic product of water—pH value.

5.3 Buffer solution—Henderson equations—uses of Buffers including living systems—common ion effect—solubility product principle—relation to solubility—Applications in qualitative and quantitative analysis.

5.4 Hydrolysis of salts—expression for hydrolysis constant—Degree of hydrolysis and pH of salt solutions for different types of salts—Determination of Degree of hydrolysis—conductance and distribution methods.

TEXT BOOKS AND REFERENCES:
1. Puri, Sharma and Pathanaia, Principles of Physical Chemistry
2. Glasstone S, An Introduction to Electrochemistry
3. Kundu and Jain, Physical Chemistry
4. Yadav M S, Electrochemistry
5. Gurdeep Raj Advanced Physical Chemistry
6. J Rajaram and Kuriaconse Kinetics and mechanisms of Chemical Transformation
Internal Assessment Marks:25

External Marks:75

UNIT – I Chromatography
1.1 Column Chromatography- principle, types of adsorbents, preparation of the column, elution, recovery of substances and applications.
1.2 TLC- principle, choice of adsorbent and solvent, preparation of chromatoplates, R_f-values, factors affecting the R_f-values- Significance of R_f-values.
1.3 Paper Chromatography- principle, solvents used, development of chromatogram, ascending, descending and radial paper chromatography.

UNIT – II Thermoanalytical method
2.1 Principle - Thermogravimetric analysis and differential thermal analysis-discussion of various components with block diagram- TGA & DTA curves of CuSO_4.5H_2O, MgC_2O_4. H_2O and Ca(OOCCH_3)_2.H_2O-Simultaneous DTA-TGA curves of SrCO_3 in air and CaC_2O_4.H_2O in air and in CO_2- factors affecting TGA & DTA curves.
2.2 Thermometric titrations-principle- apparatus- applications.

UNIT – III Electroanalytical method
3.1 Polarography- Principle, dropping mercury electrode (DME)-advantages and disadvantages- Migration, residual, limiting and diffusion currents- Use of supporting electrolytes-Ilkovic equation (derivation not required) and significance- experimental assembly- Current voltage curve- oxygen wave. Half wave potential (E_{1/2})- Polarography as an analytical tool in quantitative and qualitative analysis.
3.2 Amperometric titrations: Basic principle – types of titrations- advantages, disadvantages – applications.

UNIT-IV UV-Visible & IR spectroscopy
4.1 UV-Visible Spectroscopy-Types of Electronic transition-Beer-Lambert’s law Instrumentation- Applications of UV.
4.2 I.R. Spectroscopy-Principles-modes of vibration of diatomic, triatomic linear (CO_2) and nonlinear triatomic molecules(H_2O)-Stretching and bending vibrations-selection rules. Expression for vibrational frequency (derivation not needed)-Instrumentation-Applications.
UNIT-V NMR & Mass spectroscopy

5.1 NMR Spectroscopy- principle of nuclear magnetic resonance, instrumentation-chemical shift-shielding and deshielding-spin-spin coupling and coupling constants- Interpretation of Anisole, Benzaldehyde, Ethyl acetate, Ethylamine and Ethyl Bromide.

5.2 Mass spectroscopy- Basic principles- instrumentation- molecular ion peak, base peak, metastable peak, isotopic peak- Interpretation of Anisole, Benzaldehyde, Ethyl acetate, Ethylamine and Ethyl Bromide.

TEXT BOOKS AND REFERENCES:

2. Gurdeep R Chatwal, Instrumental methods of Chemical analysis
4. Sharma B K, Analytical Chemistry
Internal Assessment Marks: 25

UNIT – I Fertilizers
1.1 Fertilizers - Primary, Secondary and micronutrients on plant growth and development.
Commercial method of Nitrogenous fertilizers - preparation and uses of urea, ammonium nitrate and ammonium sulphate.
1.2 Phosphate Fertilizers - Preparation and uses of mono and diammonium phosphate, super phosphate and triple superphosphate.
1.3 Potassium Fertilizers – Preparation and uses of potassium nitrate, potassium chloride and potassium sulphate. Complex fertilizers and mixed fertilizers – their manufacture and composition.

UNIT – II Manures
2.1 Manures : Organic manures - Bulky organic manures – Farm yard manure – Difference between fertilizers and manures–
2.2 Handling and storage practices- fresh manure, fermentation and liquid treatment – Aerobic and Anaerobic- Enriched organic manures -oil cakes, blood meal and fish manures.

UNIT – III Pesticides And Insectides
3.1 Pesticides : classification of Insecticides, fungicides, herbicides as organic and inorganic –general methods of application and toxicity. Safety measures when using pesticides.

UNIT – IV Fungicides And Herbicides
4.1 Fungicide : Sulphur compounds, Copper compounds, Bordeaux mixture.

UNIT – V Soils
5.1 Soils-Composition of soil- organic and inorganic constituents-Classification- Properties of soils-physical and chemical-Important functions of water in plant growth-Biological system of the soil- Role of soil organisms.
5.2 Soil analysis – pH, Electrical conductivity, Estimation of macronutrients and micronutrients.

References
2. Shreve’s Chemical Process Industries, G.T. Austin
B.Sc. CHEMISTRY SEMESTER V
Skill Based Elective Course –IV
CODE -21UCHS04
DYE CHEMISTRY (30 hours)

Internal Assessment Marks:25
External Marks:75

UNIT-I
1.1 Colour and constitutions, Definition- Dye, chromophore, auxochrome, bathochromic effect and hypsochromic effect –Quinoid theory.
1.2 Classification- acid, base, azo, vat and reactive dyes.
1.3 Anthroquinone and Mordant Dyes- synthesis and applications of Alizarin.

UNIT II
2.1 Diphenylmethane Dyes- synthesis and application of Auramine-
2.2 Triphenylmethane Dyes- Malachite Green, Crystal Violet, Pararosaniline- Preparation and applications.
2.3 Indigo Dyes- Preparation and application of Indigo, Derivatives of Indigo- Synthesis and uses of Indigosol and tetrabromo indigo- (Ciba blue)

UNIT-III
3.1 Phthalein Dyes – Phenolphthalein – preparation and applications.
3.2 Xanthein Dyes – Rhodamine B, Fluorescein – Preparation and applications.
3.3 Acridine dyes- synthesis and application of Acriflavin and proflavin.
3.4 Reactive dyes – synthesis and applications of Procion Blue HB.

UNIT-IV
Pigments
4.1 Requirements of organic pigments- Types of pigments- Applications. Fluorescent, Brightening agents.
4.2 Applications of dyes in other areas- medicine, chemical analysis, cosmetics, colouring agents.

UNIT-V
5.1 Textile Effluent- Characteristics, effect of untreated effluent, degradability of wastes
5.2 Effluent treatment plants- Aerated lagoon, photo oxidation process.

References:
1. B.K.Sharma, Industrial Chemistry ,Goel Publishing co,1997
3. R.S.Prayag, Dyeing of wool, Silk and manmade fibres.
4. V.A.Shenai, Chemistry of Dyes and Principles of Dyeing.
Internal Assessment Marks: 25
External Marks: 75

UNIT I - Organometallic compounds – I
1.1 Definition - Nomenclature of organometallic compounds - classification-ionic, σ - bonded and Π- bonded organometallic compounds- examples- nature of carbon-metal bond.
1.2 Organometallic compounds of Lithium & Boron- preparation, properties, structure and uses.
1.3 Olefin complexes –Zeise’s salt –synthesis and structure
1.4 Cyclopentadienyl complexes -Ferrocene- preparation, properties, structure and uses.

UNIT II - Organometallic compounds – II
2.1 Metal carbonyls - EAN rule, 18 electron rule. Structure & bonding in 3d transition metal carbonyls; polynuclear carbonyls, bridging & terminal carbonyls.
2.2 Uses of IR absorption spectra for the determination of structure of metallic carbonyls.
2.3 Homogeneous catalysis-Wilkinson’s catalyst and alkene hydrogenation, hydroformylation, Monsanto acetic acid process, Wacker process, Zeigler-Natta catalyst and polymerization of olefins.

UNIT III - Bioinorganic Chemistry
3.1 Essential and trace elements in Biological processes – Role of Na⁺, K⁺, Mg²⁺ & Ca²⁺ ions in biological process-Sodium and Potassium pump.
3.2 Toxic effects of some metals(Cu, Pb, As, Hg, Cd), Fixation of atmospheric nitrogen. Structure & Biological functions of Haemoglobin, Myoglobin, Chlorophyll and Vitamin B₁₂.

UNIT IV - Some Special compounds
4.1 Silicones – types, preparation, properties & uses.
4.2 Silicates-classification and structure–examples. Composition, properties and uses of asbestos and zeolite.
4.3 Boron nitrides - Borazole- metal borides
4.4 Phosphonitrilic compounds- Phosphazenes, Polysulphur nitrogencompounds

UNIT V - Magnetic properties of molecules:
5.1 Origin - Magnetic susceptibility. Types of magnetic behaviour- diamagnetism and paramagnetism, Temperature and magnetic behaviour, Ferromagnetism and antiferromagnetism- Temperature independent paramagnetism-determination of magnetic moment using Guoy Balance- Applications of magneticmeasurements.
5.2 Magnetic properties of transition metal complexes-Spin orbit coupling and its effect - Magnetic behavior of some complexes of metals of 3d transition series

34
TEXT BOOKS AND REFERENCES:

1  Puri and Sharma, Kalia Principles of Inorganic Chemistry.
2  Madhan R D, Tuli G D and Wahid U Malik, Selected topic in InorganicChemistry
3  Sharpe A G, Inorganic Chemistry
4  Gurdeep Raj, Advanced InorganicChemistry
5  Cotton and Wilkinson, Advanced InorganicChemistry
6  G.R. Chatwal, Ajay Kumar Bhagi, M. Arora, Bio- Inorganic Chemistry.
UNIT – I Carbohydrates
1.2 Disaccharides – chemistry and structure of Sucrose and lactose.
1.3 Polysaccharides – starch and cellulose – derivatives – cellulose nitrate, cellulose acetate, Ethyl cellulose.

UNIT – II
Amino acids and proteins
2.1 Amino acids-classification-essential and non essential amino acids-preparation of alpha amino acids- glycine, alanine and tryptophan-General properties of amino acids-Zwitter ions, isoelectric point.
2.2 Peptides and proteins-synthesis of peptide- Bergmann method. Proteins-classification based on physical and chemical properties and on physiological functions-primary and secondary structure of proteins-helical and sheet structures (elementary treatment only) – Denaturation of proteins.

UNIT – III
Organic photochemistry

UNIT – IV
Steroids, Hormones and Vitamins
4.1 Steroids- definition–Cholesterol and Erhosterol (structure only). Steroidal Harmones-Androsterones, Testosterone, Prohestrone and Oestron (Structureonly).
4.2 Vitamin-Classification- deficiency of vitamins- Synthesis of Retinol and Ascorbic acid.
UNIT – V
Heterocyclic compounds
5.1 Aromaticity – preparation, properties and uses of furan, Pyrrole, thiophene and pyridine. Comparative study of basicity of pyrrole and pyridine with amines.
5.2 Synthesis and reactions of quinoline, isoquinoline and indole with special reference to Skraup’s, Bischler and Napieralski and Fischer Indole synthesis.

TEXT BOOKS AND REFERENCES:

1. Bhal BS and Arun Bhal, A text book of Organic Chemistry
2. Finar I L, Organic Chemistry Vol-I &II
3. Agarwal O P, Reactions and Reagents
4. K. K. Rohatgi-Mukherjee, Fundamentals of Photochemistry
6. O P Agarwal Organic Chemistry
7. R. Gurdeep Chatwal Organic Chemistry of Natural Products.
Unit-I Solutions
1.2 Nernst Distribution law-Thermodynamic derivations- applications, Solvent extraction.
1.3 Thermodynamic derivation of elevation of boiling point and depression of freezing point vantHoff factor- Abnormal molecular mass-Degree of dissociation and association.

UNIT – II Phase Rule
2.1 Definition of terms-Derivation of phase rule -One component systems-H₂O system, Sulphur system– explanation using Clausius - Clapeyron equation-supercooling and sublimation.
2.2 Two component systems-solid liquid equilibria-reduced phase rule – simple eutectic systems-Ag-Pb only- Compound formation with congruent melting point-Mg-Zn system only. KI-H₂O system efflorescence-deliquescence.
2.3 C.S.T-phenol water system only. Effect of impurities on CST.

UNIT – III Electro chemistry – II
3.2 Derivation of Nernst equation both for emf of cells and single electrode potentials – Nernst theory for single electrode potential – standard reduction potentials – electro chemical series – significance.

UNIT – IV Cells and Batteries

UNIT – V Photochemistry
5.1 Consequences of light absorption-The Jablonski diagram- non radiative transitions-radiative transitions- Grotthus-Draper law- The Stark Einstein law of photochemical equivalence-Quantum efficiency (quantum
yield).
5.2 Energy transfer in photochemical reactions- photosensitisaiton-Photosynthesis in plants
Chemiluminescence - fluorescence and phosphorescence-lasers- uses oflasers.
5.3 Photochemical reactions-Kinetics of hydrogen-bromine reaction-decomposition of HI

TEXT BOOKS AND REFERENCES:

4. Puri,Sharma and Pathanaia, Principles of PhysicalChemistry
5. Atkins Physical Chemistry
6. Samuel Glasstone An Introduction to Electro Chemistry
B.Sc. CHEMISTRY SEMESTER VI
ELECTIVEPAPER-II
CODE-21UCHE02
NANO AND GREEN CHEMISTRY (60 hours)

Internal Assessment Marks:25
External Marks:75

UNIT I Introduction To Nanoscience And Nanotechnology


1.2 A historical perspective of nanoparticles - Classification of nanostructures - zero, one, two and three dimensional nanostructures. Size dependency innanostructures.

1.3 Definition and description of nanomaterials such as carbon nanomaterials, Inorganic nanoparticle, nanocrystal, quantum dots, nano composites, nano hybrid nanomaterials.

UNIT II Nanomaterial Synthesis And Characterisation Techniques

2.1 Process of nanomaterial synthesis: top down and bottom up approach.

2.2 Method of nanomaterials preparation : Nucleation and growth of nanosystems; self- assembly, mechanical milling, sputtering, microwave plasma, hydrothermal, micelles, sol- gel processes, Chemical vapour deposition and Microwave.

2.3 Principle and applications of UV-VIS-NIR Spectroscopy, Scanning electron microscopy, Atomic force microscopy, X–ray diffraction and Cyclic voltammeter.

UNIT III Properties And Applications Of Nanostructures

3.1 New properties of nanomaterials: Role of Physical and chemical properties,

3.2 Discussion on properties and applications of nanomaterials: Surface, mechanical optical electrical electronic and chemical properties.

3.3 A short discussion on commercial utilization of nanomaterials in drug delivery and medications, cosmetics, electronics, energy harvesting, and environment remediation

3.4 Toxicity of nanomaterials

UNIT IV Principles Of Green Chemistry

4.1 Green Chemistry- Definition, need of green chemistry, Twelve basic principles of green chemistry, selection of starting materials, reagents, catalysts and solvents.

4.2 Synthesis involving basic principles of green chemistry – synthesis of methyl methacrylate and paracetamol. Water as green solvent- reactions in ionic-liquid.

UNIT V Designing A Green Chemical Synthesis

5.1 Planning a green synthesis in a chemical laboratory- Solvent-less reactions- Solid support organic synthesis, Phase transfer catalyst (PTC).
5.2 Microwave activation and heating - Use of microwaves in chemical reactions- microwave assisted reactions in water – oxidation of toluene to benzoic acid, microwave assisted reactions in organic solvent – Diels alder reaction,

5.3 Ultrasound assisted reactions: Esterification, saponification, substitution reactions, Cannizaroreaction.

Reference:

B.Sc. CHEMISTRY- SIXTH SEMESTER
Skill Based Elective Course -V
Paper Code: 21UCHS05

PHARMACEUTICAL CHEMISTRY (30Hours)

Internal assessment Marks: 25
External Marks: 75

UNIT-I
1.1 Definition of the terms-drug, pharmacophore, pharmacodynamics, pharmacopoea, pharmacology, bacteria, virus, fungus, actinomycetes, metabolites, antimetabolites, LD<sub>50</sub>, ED<sub>50</sub>. Therapeutic index and its significance.

UNIT-II
2.1 Sulphonamides-mechanism and action of sulpha drugs-preparation and uses of sulphadiazine, sulphapyridine.
2.2 Antibiotics-Definition-classification as broad and narrow spectrum, Antibiotics-penicillin, ampicillin, structure, mode of action only (no structural elucidation) and uses.

UNIT-III
3.1 Analgesics-definition and actions-narcotic and non narcotic-morphine, Heroin.
3.2 Antipyretic analgesics-salicylic acid derivatives-methyl salicylate, aspirin. Anti-inflammatory agents.

UNIT-IV
4.2 Antianaemic drugs-iron, vitamin B<sub>12</sub> and folic acid-mode of action.

UNIT-V
5.1 Diabetics-Hypoglycemic agents-sulphonyl urea, biguanides.
5.2 AIDS-causes, prevention and control.
5.3 Cardio Vascular Drugs – Cardiac glycosides- Antiarrhythmic Drugs-preparation, dosage and therapeutic uses.
5.4 Indian medicinal plants and uses-tulasi, kilanelli, mango, semparuthi, adadodai and thoothuvalai.

Reference Books
1. A text book of pharmaceutical chemistry, Jayashree Ghosh
2. Pharmaceutical Chemistry, S.Lakshmi
B.Sc. CHEMISTRY - SIXTH SEMESTER
Elective Paper – III
Industrial Chemistry
Paper Code: 21UCHE03
INDUSTRIAL CHEMISTRY (60 hours)

Internal assessment Marks: 25
External Marks: 75

UNIT-1: Industrial fuels
1.1 Classification of fuels: solid, liquid and gas. Calorific value of fuels and its determination.
1.2 Solid fuels – Coal- types – properties and uses – lignite, sub-bituminous coal, bituminous coal and anthracite. Coking and non-coking coal.
1.3 Liquid fuels: Refining of crude petroleum and uses of fractions. Hydrodesulphurisation. Cracking: thermal and catalytic (fixed bed and fluidised bed catalysis).
1.4 Gaseous fuels Natural gas and gobar gas: production, composition and uses, Gobar electric cell.

UNIT-2: Water treatment
2.3 Removal of microorganism – Chlorination, Reverse osmosis, Desalination.

UNIT-3: Industries:
3.1 Sugar Industry: Manufacture of sugar from molasses and beetroot – sugar industries in India. Fermentation: Manufacture of spirits and wines. Distillation: Manufacture of vinegar and ethyl alcohol.
3.2 Match industries: Manufacture – chemistry of lighting and pyrotechnics.
3.3 Explosives: Definition – Classification – Characteristics of explosives – Nitro cellulose, T.N.T. Picric acid, Gun Powder, Cordite and Dynamite.

UNIT-4: Energy resources
4.1 Renewable and non renewable sources of energy, conventional and non conventional sources of energy, solar energy, solar technology, solar photovoltaic cell – application.
4.2 Wind energy: Nature of the wind – power in the wind – factors influencing wind, applications. Wind energy potential in India.

UNIT-5 Industrial Wastes treatment:
5.1 Industrial Wastes and Treatment Processes, characteristic of industrial wastes, types of industrial wastes, solid industrial wastes, principles of industrial waste treatment, waste reduction process.
5.2 Treatment and disposal of industrial wastes-mention of the general methods adopted for the treatment of industrial wastes, sanitary chemical analysis of industrial effluents and sewage.
References
1. B.K.Sharma, Krishnaprakasam (2014), Industrial Chemistry Including Chemical Engineering, Media, Meerut

Note: Industrial Visit for two days is recommended under the guidance of teachers.
B.SC CHEMISTRY BRANCH – IV

CORE PRACTICAL – I
VOLUMETRIC ESTIMATIONS AND ORGANIC PREPARATIONS
CODE -21UCHP01

Internal Assessment Marks:40  External Marks :60

I. 1. ACIDIMETRY-ALKALIMETRY
   a) Estimation of Sodium Hydroxide – Standard SodiumCarbonate
   b) Estimation of oxalic acid – Standard Oxalicacid

2. Permanganometry:
   a) Estimation of ferrous iron. Standard Oxalic acid
   b) Estimation of Oxalic acid. Standard Oxalic acid

3. Dichrometry:
   Estimation of ferrous iron using diphenylamine internal indicator. Standard FeSO₄

4. Iodometry andiodimetry
   a) Estimation of potassium dichromate standardK₂Cr₂O₇
   b) Estimation of Copper standard K₂Cr₂O₇

5. ComplexometricTitrations
   a) Estimation of Zn / Mg usingEDTA
   b) Estimation of hardness ofwater

II. ORGANIC PREPARATIONS.
   1. Preparations involving the following:
      a) Oxidation ofbenzaldehyde.
      b) Hydrolysis of Methyl salicylate or ethylbenzoate.
      c) Nitration – p – nitroacetanilide and m – dinitrobenzene
      d) Bromination- p – bromoacetanilide andtribromophenol
      e) Benzoylation – naphthylbenzoate

TEXT BOOKS AND REFERENCE BOOKS:

2. A. O. Thomas, Practical Chemistry
BRANCH – IV

CORE PRACTICAL – I

VOLUMETRIC ESTIMATIONS AND ORGANIC PREPARATIONS

Time : 3 hours

Maximum Marks : 60

Volumetric Estimations: 35
Organic Preparation: 15

Record 10

1. Estimate Volumetrically the amount of __________ present in the whole of the given solution. You are provided with __________ and a suitable link solution. Get the titre values attested by the examiners.

2. Prepare maximum quantity of __________ from the given sample. Submit the dried sample for evaluation.
BRANCH – IV
CORE PRACTICAL – II
CODE -21UCHP02
INORGANIC QUALITATIVE ANALYSIS AND INORGANIC PREPARATIONS

Internal Assessment Marks:40
External Marks :60

I. INORGANIC QUALITATIVE ANALYSIS
1. Analysis of a mixture containing two cations and two anions of which one will be an interfering ion. Semimicro methods using the conventional scheme with hydrogen sulphide may be adopted.
2. Anions to be studied: Carbonate, sulphate, nitrate, fluoride, chloride, bromide, borate, oxalate, phosphate. Cations to be studied: lead, bismuth, copper, cadmium, iron, manganese, aluminium, cobalt, nickel, zinc barium, strontium, calcium, magnesium and ammonium.

II. INORGANIC PREPARATIONS:
a) Ferrous ammonium sulphate
b) Tetraammine copper (II) Sulphate
c) Microcosmic salt
d) Bis (acetyl acetonato) Nickel (II) or Copper(II)
e) Tris (Thiourea) copper (II) sulphatedihydrate
f) Potassium tri (oxalato) ferrate –III

TEXT BOOKS AND REFERENCE BOOKS
2. A. O. Thomas, Practical Chemistry
3. V.V. Ramanujam, Inorganic Semimicro Qualitative Analysis
1. Analyse systematically the given Inorganic mixture containing two acid radicals and two basic radicals, one acid radical being interfering one, Record your observations and inferences then and there Exhibit confirmative tests for each radical for evaluation.

2. Prepare maximum quantity of __________ from the given simple salts. Submit the dried sample for evaluation.
BRANCH – IV
CORE PRACTICAL – III
CODE -21UCHP03
PHYSICAL CHEMISTRY PRACTICALS
Internal Assessment Marks:40                                  External Marks :60

1. **Kinetics**
   a) Determination of rate constant – Acid catalysed hydrolysis of an ester (methyl acetate
   orethyl acetate)

2. **Molecular weight determination** – Rastmethod

3. **Heterogenous Equillibrium**
   a) Effect of impurity on CST of phenol – water system and determination of
   concentration of SodiumChloride
   b) Determination of transition temperature of hydrated salts :sodium thiosulfate,
   Sodiumacetate, StrontiumChloride.

4. **Phase rule** : Simple Eutectic system – Naphthalene –Biphenyl

5. **Electrochemistry:**
   Conductivity Experiment
   i) Determination of cellconstant
   ii) Equivalent conductance of strongelectrolyte
   iii) Conductometric titration- acid basetitration

6. **Potentiometry** – Potentiometric titration – acid - basetitration

**TEXT BOOKS AND REFERENCE BOOKS**
1. V. Venkateswaran, R. Veerasamy and A. R. Kulandaivelu, Basic Principles of
   Practical Chemistry, Sultan Chand & Sons, ISBN: 9788180547768, 8180547760,
   Edition: 2012
2. J.P. Yadav, Advanced Practical Physical Chemistry.
3. S. Oolvi, Practical Physical Chemistry.
Choose any one of the questions given below by lot

1. Determine the rate constant of the acid catalyzed hydrolysis of the given ester at room temperature.
2. Determine the molecular weight of the given solute. You are provided with a suitable solvent. whose Kf value is
3. Determine the transition temperature of the hydrated salt by a thermometric method.
4. Find out the concentration of the given sodium chloride solution. You are provided with pure phenol and 1 % solution of Sodium Chloride.
5. Determine the molar depression constant K of the given solvent. You are provided with a solute of known molecular weight.
6. Determine the strength of the given Hydrochloric acid solution conductometrically using a standard Sodium Hydroxide solution.
7. Find out the cell constant of the given conductivity cell using 0.1 N and 0.01 N potassium chloride solutions. whose specific conductivities are given. Determine the equivalent conductance of the two solutions of known concentration.

TEXT BOOKS AND REFERENCE BOOKS

2. J.P. Yadav, Advanced Practical Physical Chemistry.
3. S. Oolvi, Practical Physical Chemistry.
BRANCH – IV
CORE PRACTICAL – IV
CODE -21UCHP04

GRAVIMETRIC ESTIMATIONS AND ORGANIC PRACTICALS

Internal Assessment Marks:40 External Marks : 60

I. GRAVIMETRIC ESTIMATIONS
1. Estimations of Barium as Barium sulphate
2. Estimation of Barium as Barium chromate
3. Estimation of Lead as Lead chromate
4. Estimation of Calcium as Calcium oxalate monohydrate
5. Estimation of Sulphate as Barium sulphate
6. Estimation of Nickel as Nickel DMG

II. ORGANIC QUALITATIVE ANALYSIS
Analysis of organic compounds. Characterisation of organic compounds by their functional groups and confirmation by preparation of derivative. The following functional groups may be studied.
Aldehydes, Ketones, Carboxylic acids, Aromatic primary amines, Phenol, Aromatic ester, Amide, Diamide, Anilide, Nitro compounds and monosaccharids.

TEXT BOOKS AND REFERENCE BOOKS
2. Dr. N. S. Gnanapragasam, Organic Chemistry, Laboratory Manual
1. Estimate Gravimetrically the amount of ___________ present in the whole of the given ______________ solution by converting it into _____________________.

Get the weighings attested by the Examiners.

2. Analyse the given organic compound and report on the following:
   a) Whether Aliphatic or Aromatic
   b) Saturated or Unsaturated
   c) Special elements present (or) absent
   d) Functional group present Submit a colour reaction or derivative in support of functional group present
UNIT-I Chemical Bonding
1.1 Types of Bonding- Ionic Bond, covalent Bond and coordinate bond Molecular Orbital Theory-bonding, antibonding and nonbonding orbitals. M.O. diagrams of Hydrogen, Helium, Nitrogen, discussion of bond order and magnetic properties.
1.2. Hydrides-classification and characteristics - preparation, properties and uses of Borazole, NaBH₄ and LiAlH₄.

UNIT-II Nuclear Chemistry
2.1 Natural radioactivity-radioactive series including Neptunium series-Group displacement law.
2.2 Nuclear Binding energy, mass defect-Calculations.
2.3 Nuclear Fission and Nuclear Fusion-differences – Stellar energy.
2.4 Nuclear reactors, Applications of radioisotopes-C-14 dating, rock dating.

UNIT-III Basic Concepts of Organic Chemistry
3.2 Ethylene and Acetylene Electron displacement Effects: Inductive, Resonance, Hyper conjugative & steric effects. Their effect on the properties of compounds.

UNIT-IV Aromatic compounds
4.1 Aromatic compounds-Aromaticity-Huckel’s rule
4.2 Electrophilic substitution in Benzene-Mechanism of Nitration, Halogenation-Alkylation, Acylation.
4.3 Isolation, preparation, properties and structure of Naphthalene Haworth_s synthesis.
4.4 Heterocyclic compounds:- Preparation, properties and uses of Furan, Thiophene, Pyrrole.

UNIT-V Polymer Chemistry
5.1 Basic concepts: Monomer, polymerization, degree of polymerization, repeat units. Classification of Polymers-addition and condensation polymers, natural and synthetic, based on structure, inorganic and organic, thermoplastic and thermosetting resin.
5.2 Preparation, properties and uses of Poly olefins-polythene, PTFE, Freons, PVC, polypropylene and polystyrene.
5.3 Natural and synthetic rubbers-Constitution of natural rubber, Buna-N, Buna-S, Neoprene, Polyurethane and silicone rubbers.
Reference books:
2. Bhal B.S. and Arun Bhal, A Text Book of Organic Chemistry
3. Puri B.R, L.R. Sharma and Pathania, Physical Chemistry
4. V.R Gowrikar, N.V. Viswanathan, Polymer Science
UNIT-I
Co-ordination chemistry
1.2 Pauling’s theory-postulates-Application to octahedral, square planar and tetrahedral complexes. Pauling’s theory and magnetic properties of complexes. Merits and demerits of Pauling’s theory
1.3 Biological role of Haemoglobin and Chlorophyll (Elementary idea of structure and functions).

UNIT-II
Carbohydrates & Aminoacids
2.1 Carbohydrates: Classification, preparation and properties of Glucose and Fructose-Properties of Starch, Cellulose and derivatives of Cellulose. Inter conversion of Glucose to Fructose and vice versa.
2.2 Amino Acids-classification, preparation and properties of Glycine and Alanine.

UNIT-III
Pharmaceutical chemistry
3.1 Chemotherapy: Preparation, uses and mode of action of sulpha drugs-prontosil, sulphadiazine and sulphafurazole. Uses of penicillin, chloramphenicol and streptomycin, Definition and one example each for-analgesics, antipyretics, tranquilizers, sedatives, hypnotics, local anaesthetics and general anaesthetics. Cause and treatment of diabetes, cancer and AIDS.

UNIT-IV
4.2 Phase Rule: Phase rule and the definition of terms in it. Application of phase rule to water system. Reduced phase rule and its application to a simple eutetic system (Pb-Ag) Freezing mixtures.
UNIT-V


5.2 Corrosion: Methods of prevention.

Reference books:

2. Puri and Sharma, Text book of Inorganic Chemistry-Vishalpublishing
5. Kundu and Jain, Physical Chemistry, S. Chand.
I. TITRIMETRY
a) Estimation of Sodium hydroxide - Standard sodium carbonate.
b) Estimation of Hydrochloric acid - Standard Oxalic acid.
c) Estimation of Ferrous sulphate – Standard Mohr’s Salt.
e) Estimation of Ferrous iron using diphenylamine as internal indicator.

II. Organic Analysis:
a) Detection of elements - nitrogen, sulphur and halogens.
b) Detection of aliphatic or aromatic.
c) Detection of whether saturated or unsaturated compounds.
   Preliminary tests and detection of functional groups, phenols, aromatic amines, aromatic acids, Urea, benzamide & carbohydrate.

TEXT BOOKS AND REFERENCE BOOKS
2. A O. Thomas, Practical Chemistry
DEPARTMENT OF CHEMISTRY
NON MAJOR ELECTIVE COURSES
(THIRD and FOURTH SEMESTERS)

1. DairyChemistry - 21UCHN01
2. TextileChemistry - 21UCHN02
3. IndustrialChemistry - 21UCHN03
4. BiologicalChemistry - 21UCHN04
5. MedicinalChemistry - 21UCHN05
6. FoodChemistry - 21UCHN06
7. Agro Chemistry - 21UCHN07
8. Polymer&Plastics - 21UCHN08

NOTE:

Any two papers from the above eight papers may be choosen for all B.A/B.Sc.students except B.Sc.Chemistry major students for NMEC in semester III and IV and the same must be communicated to the University for Examination purpose.
UNIT I
Milk: General composition of milk. Factors affecting the gross composition of milk, physico-Chemical change taking place in milk due to processing parameters-boiling, pasteurization-sterilization and homogenization.

UNIT II
2.1 Milk lipids-terminology and definitions
2.2 Milk proteins: Physical properties of milk proteins-Electrical properties and hydration, solubility. Reaction of milk proteins with formaldehyde and ninhydrin.
2.3 Milk carbohydrate-Lactose-Estimation of lactose in milk.
2.4 Milk vitamins-water and fat soluble vitamins, effect of heat and light on vitamins.
2.5 Ash and mineral matters in milk.

UNIT III
3.1 Creams : Definition-composition-chemistry of creaming process-gravitational and centrifugal methods of separation of cream-Factors influencing cream separation (Mention the factors only)- Cream neutralization. Estimation of fat in cream.
3.2 Butter : Definition-% composition-manufacture-Estimation of fat, acidity, salt and moisture content-Desibutter.

UNIT IV
4.2 Ice cream : Definition-percentage composition-types- ingredients needed manufacture of ice-cream stabilizers-emulsifiers and their role.

UNIT V
5.1 Dairy Detergents : Definition-characteristics-classification-washing procedure (modern method) sterilization-chloramine-T and hypochlorite solution.

REFERENCE BOOKS
1. Outlines of Dairy Technology-SukumarDe
DEPARTMENT OF CHEMISTRY
NON MAJOR ELECTIVE COURSE II
PAPER CODE -21UCHN02
TEXTILE CHEMISTRY (30 Hours)

Internal Assessment Marks:25External Marks:75

Unit 1. FibreScience


Unit 2. Chemical preparatory process:

Fabric preparatory processes: Grey inspection, Shearing, Cropping, Singeing & its types, Introduction to desizing, technology of acid and enzymatic desizing methods. Chemistry and technology of hypochlorite, peroxide and chlorite bleaching, Wool scouring, bleaching; silk degumming and bleaching. Introduction to Mercerisation, its chemistry and technology; Textile auxiliaries for scouring and bleaching.

Unit 3. Dyes &Coloration of textiles


Unit 4. Finishing of Textiles

Unit 5. Technical Textiles and Textile Effluent:

Basic introduction about technical textiles. Fibres that are used for technical textiles. Production of high performance fibres like Kevlar and aramid. Different types of Technical textiles; Filtration, Automotive, Home, Packaging & Medical.

Textile Effluent: Characteristics and determination of BOD, COD, TDS, pH and Toxicity
Modern Textile Effluent Treatment process - Primary, Secondary, Tertiary & Membrane technology. Concept of Zero Discharge and its importance.

References:

Indian Author
5. R.S. Bhagwat, Handbook of Textile Processing Machinery, Color Publication, 1999

Foreign Author

Website:

https://www.cottoninc.com/
DEPARTMENT OF CHEMISTRY
NON MAJOR ELECTIVE COURSE- III
INDUSTRIAL CHEMISTRY
CODE -21UCHN03

Internal Assessment Marks:25          External Marks:75

UNIT I  Fuels

UNIT II  Soaps and detergents
Definition, classification of soaps, manufacture of soaps – kettle process, hydrolyser process; cleansing action of soap, synthetic detergents, classification- anionic, cationic and non-ionic; additives used in detergents, differences between hard and soft detergents, differences between soaps and detergents.

UNIT III  Chemistry of sugar and fermentation
Manufacture of sucrose from cane sugar-extraction of juice, purification, concentration, crystallization, separation and refining of crystals, recovery of sucrose from molasses, estimation of sucrose and inversion sugar by polarimetry. Manufacture of alcohol from molasses and starch by fermentation process.

UNIT IV  Glass & Cement Industry
Glass- Types of glass, composition, manufacture and uses.
Cement- Manufacture wet and dry processes, composition of portland cement, setting of cement, Concrete and RCC.

UNIT V  Leather & Paper Industry
Leather industry - Curing, preservation and tanning of hides and skins, process of dehairing and dyeing. Treatment of tannery effluents.
Paper industry - Manufacture of paper production of sulphite pulp and conversion to paper (bleaching, filling, sizing and calendaring).

References
1. B.K.Sharma, Krishnaprakasam (2014), Industrial Chemistry Including Chemical Engineering, Media, Meerut
UNIT I  Amino acids and Nucleic acids

Amino acids- classification, essential and nonessential amino acids and functions. Nucleic acids-DNA,RNA-constituents, structure and functions.

UNIT II  Carbohydrates and lipids

Carbohydrates- classification and functions.
Lipids- classification, biological functions and difference between fats and oils.

UNIT III  Vitamins

Classification, sources, biological function and deficiency diseases of Vitamins A,C,K,E1 and B6.

UNIT IV  Minerals

Sources, biological functions and deficiency disease of macro minerals-Sodium, Potassium, Calcium, Phosphorous and Magnesium. Micro minerals: Selenium, copper, Iron, Zinc and Manganese.

UNIT V  Enzymes and Hormones

Enzymes: Classification and functions.
Hormones: Classification and biochemical functions of Adrenalin, Thyroxine, Oxytocin, Insulin and Sex hormones.

Reference:

3. P.Palanivelu, Laboratory manual for analytical biochemistry and separation techniques, School of Biotechnology, Madurai Kamaraj University Press, Madurai.
UNIT I - Introduction

UNIT II - Drugs
Various sources of drugs, pharmacologically active constituents in plants, Indian medicinal plants – tulsi, neem, keezhanelli – their importance – Classification of drugs – biological chemical (Structure not required) Drug receptors and biological responses – factors affecting metabolism of drugs. (Basic concepts only)

UNIT III - Chemotherapy
Chemotherapy Drugs based on physiological action, definition and two examples each of anesthetics-General and local – analgesics – narcotic and synthetic – Antipyretics and anti inflammatory agents – antibiotics – Penicillin, Streptomycin, Antivirals, AIDS – symptoms, prevention, treatment – Cancer (Structure not required)

UNIT IV - Common body ailments
Diabetes – Causes, hyper and hypoglycemic drugs – Blood pressure – Sistolic & Diastolic Hypertensive drugs – Cardiovascular drugs – depressants and stimulants – Lipid profile – HDL, LDL cholesterol lipid lowering drugs. (Structure not required)

UNIT V - Health promoting drugs
Vitamins A, B, C, D, E and K micronutrients – Na, K, Ca, Cu, Zn and I, Medicinally important inorganic compounds of Al, P, As, Hg and Fe, Examples and applications, Agents for kidney function (Aminohippuric acid). Agents for liver function (Sulfo bromophthalein), antioxidants, treatment of ulcer and skin diseases. (Structure not required)

RECOMMENDED REFERENCE BOOKS
3. Romas Nogrady, Medicinal Chemistry, Oxford Univ. Press
Internal Assessment Marks:25  External Marks :75

UNIT - I Food source & Constituents of foods
Food: Source, functions of foods. Food groups: Basic five food groups.
Constituents of food: Carbohydrates, Classification – Storage of Carbohydrates and its function. Proteins – Classification sources and functions. Fats and oils, Dietary sources, Uses of fat and oils and their role in biological systems.

UNIT - II Food Adulteration
Adulterants in different foods - Milk, and milk products, Vegetable oils and fats spices, cereals, pulses. Contamination with toxic chemicals - Pesticides and Insecticides Detection and prevention of food Adulteration.

UNIT - III Food Spoilage and food preservation
Causes of Food spoilage-Food preservation - Principle and methods of preservation - By using high temperature - sterilization, pasteurization and Blanching. Low temperature food preservation methods.

UNIT - IV Vitamins
Classification, sources, functions and deficiencies of fat soluble vitamins – A, D, E, and K, water soluble vitamins – B₁, B₂, and B₆.

UNIT - V Minerals
Mineral elements in foods, Principal mineral elements – sources, functions and deficiencies of Na, K, Mg, Fe, S and P.

Reference books:
1. Food & Nutrition - Dr. M. Swaminathan
2. Food Science - Srilakshmi
3. Food processing & preservation – Sivasankar
4. Text book on food chemistry - Dr. M. Swaminathan
DEPARTMENT OF CHEMISTRY
NON MAJOR ELECTIVE
COURSE-VII-AGRO CHEMISTRY (30 hours)
PAPER CODE -21UCHN07

Internal Assessment Marks:25  External Marks:75

UNIT I Chemistry of soil
1.1 Definition of soils, Classification, Properties of soils-physical properties - structure and texture, soil water, soil air and soil temperature.
1.2 Chemical properties- soil mineral matter-soil colloids, ion-exchange reactions. Soil fertility and its evaluation.

UNIT II Soil analysis
2.1 Soil organic matter and their influence on soil properties – N ratio effects.
2.2 Soil reactions. Soil pH, acidity, alkalinity, buffering of soils and its effects on the availability of N, P, K, Ca, Mg, I, Al, Mn & sulphuric acid- soils salinity, acid & alkaline soils- their formation and reclamation.

UNIT III Fertilizers
3.1 Primary, secondary and micro nutrients on plant growth and development. Nitrogenous fertilizers, manufacture of ammonium nitrate, ammonium sulphate and urea.
3.2 Phosphate fertilizers - preparation and uses of mono and diammonium phosphates, superphosphate.
3.3 Potassium fertilizers-potassium nitrate, potassium chloride, potassium sulphate and mixed fertilizers.

UNIT IV Pesticides
4.1 Classification-Insecticides, fungicides and herbicides, application and toxicity. Insect attractants and repellents-fluorine compounds, boron compounds, arsenic compounds, organomercuric compounds.
4.2 General methods of preparation of DDT, BHC. Structure and uses of Herbicides: 2,4-D and 2,4,5-T. Structure and uses of Fungicides: Preparation of Bordeaux mixture, lime-sulphur.

UNIT V Water Treatment & Water Analysis
5.1 Water Treatment- Hard and soft water, water softening methods - lime soda process, phosphate conditioning and ion-exchange processes.
5.2 Water analysis - determination of hardness of water, acidity, alkalinity, pH value, amount of free CO₂, fluoride content, chloride content. Biological oxygen demand (BOD), chemical oxygen demand (COD), recycling of water.
References

2. Shreve’s Chemical Process Industries, G.T. Austin
POLYMER & PLASTICS (30Hours)

UNIT-I
1.1 Basic concepts : Monomer, polymerization, degree of polymerization, repeat units. Classification of Polymers-addition and condensation polymers, natural and synthetic, based on structure, inorganic and organic, thermoplastic and thermosetting resin.
1.2 General methods of preparation of polymers. Polymerization through functional groups, multiple bonds and ring opening and Coordination polymerization.

UNIT-II
2.1 Structure of polymers- linear, branched and cross linked. Homo & hetro copolymers. Block copolymers & graft copolymers. Stereochemistry of polymers-Isotactic, Syndiotactic and Atactic
2.2 Properties of polymers : The crystalline melting point. The glassy state and glass transition temperature

UNIT-III
3.1. Molecular weight of polymers
3.2 Number average molecular weight and weight average molecular weight. Determination of molecular weight by Viscosity and Osmometry methods.
3.3. Polymer processing- calendaring, Die casting, blow moulding, and Wet spinning.

UNIT-IV
4.1 Poly olefins-polythene , PTFE , Freons ,PVC ,polypropylene and polystyrene.

UNIT-V

REFERENCES: