DEGREE OF BACHELOR OF
SCIENCE
CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR BRANCH IV- B.Sc. CHEMISTRY

FOR THE STUDENTS ADMITTED FROM THE
ACADEMIC YEAR 2012 – 2013 ONWARDS
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### ALLIED PAPERS

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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 major objectives 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 etc.
   3. To create manpower in Chemical industries and help their growth.
   4. To prepare candidates for a career in Chemical industries.

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 BranchIV- Chemistry shall comprise of the following subjects according to the syllabus and books prescribed from time to time.

i) Foundation Courses (Languages and English)

ii) Core Courses: (Major and Allied and skilled based elective course and non major elective course subjects)

   Major: Chemistry
   Allied I- Physics (Compulsory)
   Allied II- Mathematics or Botany or Zoology

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. Environmental studies
6. 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
### III-semester
15. Language – Paper III  
16. English- Paper III  
17. Major Core -Paper III  
18. Allied II - Paper I  
19. Skill Based Elective course II  
20. Non Major Elective course I

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

### V-semester
29. Major Core Paper -V  
30. Major Core Paper -VI  
31. Elective Paper -I  
32. Elective Paper -II  
33. Skill Based Elective course III  
34. Skill Based Elective course IV

### VI-semester
35. Major Core Paper- VII  
36. Major Core Paper -VIII  
37. Elective Paper –III  
38. Elective Paper -IV  
39. Skill Based Elective course V
40. Skill Based Elective course VI
41. Major Practicals – III
42. 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.

6. Passing Minimum

A candidate shall be declared to have passed the examination if he /she secures not less than 40% of the marks in each paper / practical. Candidates who do not secure the required minimum marks for a pass in a paper / practical shall be required to appear for and pass the same at a subsequent appearance. 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.

**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 2012-2013, i.e. for students who are to be admitted to the first year of the course during the academic year 2012-2013 and thereafter.

**11. Transitory Provision**
Candidates who were admitted to the UG course of study before 2010-2011 shall be permitted to appear for the examinations under those regulations for a period of three years i.e. up to and inclusive of the Examination of April/May 2017. Thereafter, they will be permitted to appear for the examination only under the regulations then in force.

**12. Pattern of Question Paper (For Both Major & Allied)**

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<th>Time : 3 Hours</th>
<th>Maximum.-75 Marks</th>
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<td>(Answer all questions)</td>
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<td>(Two questions from each unit)</td>
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<td><strong>Part B</strong> : 5 x 5 = 25</td>
<td>(Answer all questions)</td>
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<td>(One question from each unit with internal choice)</td>
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<td><strong>Part C</strong> : 3 x 10 = 30</td>
<td>(One question from each unit-any three Questions out of five)</td>
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### B.Sc. Chemistry Major (CBCS)
**For students admitted from 2012-2013 onwards**

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Total Credit for I & II Semester = 42 credits
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For students admitted from 2008-2009 onwards

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<td>Total credits for V semester = 22 credits</td>
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| VI SEMESTER |                             |                      |            |        |       |   |
| III  | Core Chem major(inorganic chemistry) | 4                    | 3          | 4      | 25    | 75 | 100 |
| III  | Core Chem major(organic chemistry)         | 4                    | 3          | 4      | 25    | 75 | 100 |
| III  | Core Course (Physical Chemistry)          | 4                    | 3          | 4      | 25    | 75 | 100 |
| III  | Elective paper Analytical chemistry       | 5                    | 3          | 5      | 25    | 75 | 100 |
| III  | Core Chem Major Practical(physical)       | 3                    | 3          | 4      | 40    | 60 | 100 |
| III  | Core Chem Major Practical (organic & Gravimetric) | 6               | 6          | 8      | 40    | 60 | 100 |
| IV   | SBEC V – Pharmaceutical Chemistry         | 2                    | 3          | 2      | 25    | 75 | 100 |
| IV   | SBEC Vl-Industrial Chemistry              | 2                    | 3          | 2      | 25    | 75 | 100 |
| V    | Extension activities                     | 1                    |            |        |       |   |   |
|      | Total Credits for VI Semester = 34 Credits |

Total Credits for 3 years = 140 Credits
B.Sc.CHEMISTRY-FIRST SEMESTER

Major Core Paper –I

Paper Code : 12UCH01

Internal assessment marks: 25 External Marks :75

GENERAL CHEMISTRY – I (75 Hours)

UNIT-I Atomic Structure


Wave mechanical concept of atom – Schrodinger’s wave equation (derivation not needed)-significance of $\Psi$and $\Psi^2$ – Eigen functions and Eigen values-shapes of different orbitals – Differences between an orbit and orbital.

UNIT- II Electronic structure


2.2. Periodic properties: Atomic and ionic radii, Ionization Energy, Electron affinity and Electro negativity – Definition, Variation of the periodic properties along periods and groups-theoretical explanation for the variations.

2.3. s, p, d and f block elements-classification and characteristic properties.

UNIT - III Structure and Bonding

3.1.Electron displacement effects :

3.1.1. Inductive, inductomeric and steric effects-their effect on properties of compounds
3.1.2. Mesomeric, resonance, hyperconjugation-localised and delocalised chemical bond

3.2.1 Cycloalkanes-Nomenclature-methods of formation-Wurtz reaction, Dieckmann ring closure & reduction of aromatic hydrocarbons-Chemical reactions-.Baeyer’s strain theory and its limitations.

3.2.2. Nomenclature and classification of dienes-isolated, conjugated and cumulated dienes-butadiene-1,2 and 1,4 additions-thermodynamic and kinetic controlled products-Diels - Alder reaction-synthesis of dienes- 1,3-butadiene, isoprene & chloroprene.

UNIT – IV The Gaseous State


Kinetic molecular theory of gases-the kinetic gas equation-Derivation of the gas laws-kinetic theory and temperature-Boltzmann constant-Maxwell’s distribution of molecular velocities-types of molecular velocities-Expansivity and compressibility-collision diameter-collision frequency-mean free path

4.2. Behaviour of Real gases

Deviations from ideal behaviour-Explanation of deviations - Boyle point. The virial equation of state-derivation of the principle of corresponding states.

UNIT – V Qualitative and Volumetric Analysis

5.1. Principles of Qualitative analysis: Basic principles of Inorganic semi micro analysis-semi micro techniques-principles involved in Na₂CO₃ extract preparation-common ion effect and solubility product and their applications in qualitative analysis.

5.2. Principles of Volumetric analysis- Definition of molarity, molality, normality and mole fraction-Definition and examples for Primary and Secondary standards. Theories of acid-base, redox, iodometric and iodimetric titrations.
MODEL QUESTION PAPER
Periyar University Salem

SEMESTER-I
B.Sc. Chemistry – Major core paper – I

General Chemistry –I  Code : 12UCHO1

Time: 3 Hrs  Max. Marks: 75

Section A (10 x 2 = 20)
Answer all questions.

1. What are the four quantum numbers?
2. Write the Schrödinger’s wave equation.
3. Write Aufbau principle.
4. Define electro negativity and what is its variation along the period?
5. Explain hyper conjugation.
6. State and Explain wurtz reaction.
7. Define collision diameter.
8. What is root mean square velocity?
9. What is a primary standard? Give 2 examples.
10. What is the colour of phenolphthalein in acidic and alkaline medium? Why?

Section-B (5 x 5 = 25)
Answer all questions.

11. (a) Derive de Broglie equation and give its significance.
    (b) What is the Significance of $\Psi$ and $\Psi^2$ in Schrödinger wave equation?

12. (a) How are atomic and ionic radii varies along the period and group in a periodic table?
    (b) Write the characteristic properties of ‘s’ block elements.

13. (a) Compare the acidity of $\text{CCl}_3\text{COOH}$, $\text{CH}_2\text{ClCOOH}$, $\text{CH}_3\text{COOH}$ and explain.
    (b)
b) why is Aniline less basic than aliphatic amines?

14. a) What are most probable and Average Velocity ?
   (or)
   b) How is kinetic energy related with temperature?

15. a) How is solubility product principle helpful in qualitative analysis?
    (or)
   b) i) How many moles of NaOH is there in 40g of it ?
      ii) Calculate the normality of NaOH when 20g of it is dissolved in one lit. of water.

**Section C**  (3x10=30)

**Answer any three questions:**

16. a) Explain Bohr’s atom model.
    b) Explain Heisenberg’s Uncertainty principle.

17. a) Write the characteristic principles of ‘d’ block elements.
    b) What is Pauli’s exclusion principle ?

18. Write notes on (i) Diels Alder reaction.
    (ii) Synthesis and uses of 1,3- butadiene

19. a) Write note on Boyle temperature.
    b) Derive the relation between coefficient of expansion and compressibility.

20. a) Write the theory behind acid-base titration.
    b) How chloride is detected with Sodium Carbonate extract ?
UNIT – I Chemical Bond

1.1. Ionic bond-mode of formation – properties of ionic compounds-inert pair effect-Born-Haber cycle-polarisation of ions-factors affecting polarisation-importance of polarisation of ions-Fajan’s rules and applications.


UNIT-II

2.1. Hydrides-Classification-Types of Hydrides and periodic Table -Ionic Hydrides-LiH and NaH-Preparation, properties, uses and structure.

Covalent Hydrides – silanes - General study - Chemistry of monosilanes and disilanes-Differences between silanes and alkanes.

Metallic Hydrides-Preparation, properties, structure and uses (A brief study.) Complex Hydrides-NaBH₄ and LiAlH₄-preparation, properties, uses and structure.

2.2. Carbides-Preparation, properties and technical applications.
UNIT-III

3.1. Reaction intermediates: carbocation, carbanion, free radicals, with examples.

3.2. Aliphatic nucleophilic substitution- \( \text{S}_1 \), \( \text{S}_2 \) and \( \text{S}_\text{N} \) reactions – Reactivity-effects of structure of substrate, attacking nucleophile, leaving group and reaction medium-Relative reactivity of ethyl, isopropyl, tertiary butyl, vinyl and benzyl halides-competition between substitution and elimination.

3.3. Elimination reactions-mechanisms of \( \text{E}_1 \) and \( \text{E}_2 \) reactions-cis and trans eliminations-Hofmann and Saytzeff rule.

UNIT-IV

4.1. Electrophilic and free radical mechanism of addition in alkenes-Markownikoff’s rule-peroxide-effect-mechanism of Hydroboration, Ozonolysis and allylic substitution by NBS-polymerisation.

4.2. Aromatic hydrocarbons and aromaticity-reasonance in benzene-delocalised cloud in benzene-aromaticity-Huckel’s \((4n+2)\) rule and its simple applications.


4.2.2. Polynuclear aromatic hydrocarbons- naphthalene, anthracene -isolation, synthesis ,properties, and uses.

UNIT-V

5.1. 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-optical exaltation-optical activity.

5.2. Liquid crystals (The mesomorphic state)

Thermography-classification of Thermotropic liquid crystals-Smectic liquid crystals-Nematic liquid crystals-Cholesteric liquid Crystals.
MODEL QUESTION PAPER
Periyar University, Salem-11
B.Sc. Degree - Branch IV - CHEMISTRY. SECOND
SEMESTER – MAJOR CORE PAPER – II General
Chemistry II – 12UCH02

Time: Three Hours Maximum Marks :75

PART – A – (10 X 2 = 20)

Answer All Questions

1. Sodium chloride is ionic while Aluminium chloride is covalent. Explain.
2. Hydrogen sulphide is a gas while water is a liquid. Give reason.
3. Give the preparation and uses of Li AlH₄.
4. Mention two differences between silanes and alkanes.
5. State Markownikoff’s rule. Give an example.
6. What are carbanion and carbonium ion?
7. Give the products of ozonolysis of propane.
8. Explain Friedel –Craft’s acylation.
9. What is parachor?
10. State and explain Trouton’s rule.

PART – B – (5x5=25)

Answer all questions

    (or)
    b) Give the postulates of molecular orbital theory.

12. a) Give the preparation and uses of sodium borohydride.
    (or)
    b) Give the preparation of any two carbides.

13. a) Explain the effect of leaving groups on SN¹ reaction.
    (or)
    b) Explain E₁ mechanism with an example.

14. a) Explain ortho-para orientation with two examples.
    (or)
    b) Give two methods of preparation of Naphthalene.
PART A – (3 x 10 = 30)

PART B – (3 x 10 = 30)

PART C – (3 x 10 = 30)

Answer any three of the following

15. a) Write a short note on viscosity and chemical constitution.
   (or)
   b) Write a short note on smectic crystals.

16. a) Explain the molecular orbital picture of CO.
   b) Give a comparative study of Valence bond and M.O. theory.

17. Write a note on preparation, properties and applications of carbides.

18. Explain the relative reactivity ethyl isopropyl and tertiary butyl halides for substitution and elimination reaction.

19. Write a brief account on isolation, synthesis, properties and uses of anthracene.

20. Write a brief account on liquid crystals.
B.Sc. CHEMISTRY-SECOND SEMESTER
SKILL BASED ELECTIVE COURSE - I
PAPER CODE - 12UCHS 01
FOOD and NUTRITION (30 Hours)

UNIT-I FOOD ADULTERATION

1.1. Sources of foods, types, advantages and disadvantages, constituents of foods, carbohydrate, protein, fats, oils, colours, flavours, natural toxicants.

UNIT-II FOOD POISONING

2.1. Sources, causes and remedy- Causes and remedies for acidity, gastritis, indigestion and constipation

UNIT-III FOOD PRESERVATION AND PROCESSING

3.1. Food spoilage, courses of food spoilage, types of Food spoilage, food preservation, preservation and processing by heating- sterilisation, pasteurisation

UNIT-IV VITAMINS

4.1. Sources, requirement deficiency diseases of A, C, K, E1 and B1, B2, B6

UNIT-V MINERALS

5.1. Mineral elements in food- Principal mineral elements-source.
Function- Deficiency and daily requirements - Na, K, Mg, Fe, S and P

REFERENCE BOOKS:

1. Seema Yadav : “Food Chemistry” , Anmol publishing (P) Ltd, New Delhi


MODEL QUESTION PAPER
Periyar University, Salem-11
B.Sc. Degree- Branch IV- CHEMISTRY.
SECOND SEMESTER – SKILL BASED ELECTIVE COURSE – I
FOOD and NUTRITION PAPER CODE -12UCHS 01

Time : Three hours.  Maximum : 75 Marks

PART – A – (10 X 2 = 20)
Answer All Questions

1. Define food.
2. Mention any two sources of food.
3. Mention any two toxicants in pulses.
4. Mention any four metals that cause food poisoning.
5. Mention any two methods of food preservation.
6. Mention any two causes of food spoilage.
7. Mention the sources of Vitamin A.
8. What is the name of the deficiency disease caused by the lack of Vitamin C?
9. Mention any two minerals which are micronutrients.
10. What is the name of the disease caused by IRON deficiency?

PART – B – (5x5=25)
Answer all questions

11. a) Write an account on carbohydrates.
   (or)
   b) Write an account on oils and fats.

12. a) Mention the causes and remedy for acidity.
    (or)
    b) What is the cause and make a note on the remedy for constipation?

13. a) Mention the types of food spoilage.
    (or)
    b) Describe any one method of food preservation.
14. a) Mention the source and deficiency disease of Vitamin C.  
    (or)  
    b) Write an account on Vitamin B6.

15. a) Write an account of mineral elements in food.  
    (or)  
    b) What is the source, function and deficiency effect of potassium?

**PART C – (3 x 10 = 30)**

Answer any three of the following

16. Write notes on (i) flavours and (ii) natural toxicants.

17. Write an account on (i) gastritis and (ii) indigestion.

18. Write a brief account on food preservation and food spoilage.

19. Write a brief account on sources, requirements and deficiency diseases of A, K, & E.

20. Write a brief account on micronutrients.
B.Sc. CHEMISTRY-THIRD SEMESTER
Major   Core Paper –III
Paper code : 12UCH03
Internal assessment marks: 25       External Marks :75
GENERAL CHEMISTRY – III (75 Hours)

UNIT-I   Transition Elements
1.1 Transition Elements – position in the Periodic Table-General characteristics of d-block elements – an objective study of the properties expected.

1.2. Occurrence, extraction, properties and uses of Titanium, Zirconium, Molybdenum.

1.3. Chemistry of Titanium dioxide, Titanium tetrachloride, Vanadium pentoxide, Ammonium Vanadate, Zirconium dioxide, Zirconium halides, Ammonium molybdate, Molybdenum blue.

UNIT-II   Reaction Mechanism

2.2. Addition to Carbon – heteromultiple bond - Addition of HCN, NH₂OH, 2,4-dinitrophenyl hydrazine, semicarbazide & Grignard reagent.

2.3. Mechanisms of Mannich, Stobbe, Darzen, Wittig and Reformatsky reactions.

2.4. Mechanism of reduction of carbonyl group by NaBH₄, LiAlH₄ –Wolf-Kishner, Clemmensen and MPV reductions.
UNIT III Carboxylic acids and Esters

3.1. Carboxylic acids

3.1.1. Unsaturated acids-preparation and properties of acrylic, crotonic, oleic and cinnamic acids

3.1.2. Hydroxy acids-classification – preparation and reactions of Glycolic acid, Malic acid and Citric acid-Action of heat on \( \alpha,\beta,\gamma \) and \( \delta \) acids.

3.2. Dicarboxylic acids-preparation and properties of oxalic, malonic, succinic, glutaric and adipic acids.

3.2.1. Mechanism of conversion of acids into acid derivatives-esterification including trans esterification.

3.2.2. Hydrolysis of esters-mechanism - effect of substituents-structural and steric factors.

3.3. Tautomerism-definition-keto-enol, amido-imido and nitro-acinitro tautomerisms-acid-base inter conversion mechanism.

UNIT IV

UNIT V

5.1. The first law of thermodynamics and thermochemistry

MODEL QUESTION PAPER
Periyar University Salem
SEMESTER-III
B. Sc. Chemistry – Major core paper – III

General Chemistry – III Code : 12UCHO3

Time: 3 Hrs Max. Marks: 75

Section-A

Answer all Questions 10 x 2 = 20 Marks

1. Why most of the transition metals are paramagnetic?
2. Give a reaction to prove the reducing nature of TiO. How will you convert Benzaldehyde to Mandelic acid through HCN addition?
3. Explain wolf kishner reductions.
4. How will you prepare Crotonic acid from Ethanal by Knoevenagel reaction?
5. What is Trans esterification?
6. Explain Miller Indices.
7. Define space lattice and unit cell.
8. What is inversion temperature?
9. Give the statement of First law of Thermodynamics.
10. What is inversion temperature?

Section-B

Answer all Questions 5x5 = 25 Marks

11. a) Give one preparation and two properties for TiCl4.

(or)

b) How V2O5 reacts with HCl and NaOH?

12. a) Explain the mechanism of Reimer-Tiemann reaction.

(or)

b) Give the mechanism of Reformatsky reaction.

13. a) Explain the action of heat on α, β, γ and δ Hydroxy acids.

(or)

b) Explain the keto-enol Tautomerism in ethylacetoacetate.
14. a) List out the symmetry elements in NaCl Crystal.
   (or)
   b) Explain how Dragg’s equation is used to identify the structure of Crystals.

15. a) Derive Kirchoff’s equation.
   (or)
   b) Explain Hess’s law of Constant heat of Summation with an example.

Section – C

Answer ANY THREE Questions (3 x 10 = 30 Marks)

16) Explain the extraction, Properties and uses of Molybdenum.

17) Explain the Nucleophilic addition reactions of the following across carbonyl group in Aldehydes and Ketones.
   a) HCN  b) NH₂CONH₂  C) NH₂OH  D) Grignard reagent

18) Give the Synthetic uses of Ethyl aceto acetate.

19) a) Differentiate Isotropy and Anisotropy.
    b) Though NaCl and KCl are isomorphic their X-ray diffraction differs. Why?

20) a) Prove PV= constant for adiabatic expansion of an Ideal gas.
    b) Explain Joule- Thomson effect and Joule- Thomson coefficient.
B.Sc. CHEMISTRY
THIRD and FOURTH SEMESTERS
SKILL BASED ELECTIVE COURSE II
PAPER CODE -12UCHS02

Internal assessment marks :25  External Marks :75
( Note: The paper will be taught in third and fourth semesters, but the examination will be at the end of fourth semester)

POLYMER CHEMISTRY  (30 Hours)

UNIT-I
1.1. Basic concepts : An introduction to polymers and macro molecules.
Natural and synthetic polymers. Classification of Polymers-addition and condensation polymers.
Coordination polymerization.

UNIT-II
2.1. Structure of polymers- linear, branched and cross linked
Stereochemistry of polymers-Isotactic, Synisotactic and Atactic
2.2. properties of polymers : The crystalline melting point. The glassy state and glass transition temperature

UNIT-III
3.2. Molecular weight of polymers
Number average molecular weight and weight average molecular weight. Determination of molecular weight by Viscosity and Osmometry methods.
UNIT-IV
4.1. Poly olefins-polythene , PTFE , Freons ,PVC ,polypropylene and polystyrene.

UNIT-V
5.1. Plastics and Resins

REFERENCES:
MODEL QUESTION PAPER
Periyar University Salem
SEMESTER-IV
B.Sc. Chemistry
Skill based elective course – II
Polymer Chemistry Code 12UCHS02

Time: 3 Hrs
Max. Marks: 75

Section – A (10 x 2 = 20)

Answer all questions:
1. What is high polymer? Give two examples.
2. Give two examples for natural and addition polymer.
3. How can you distinguish linear and cross linked polymers?
4. What is glass transition temperature of a polymer?
5. Define copolymerization.
6. What is number average molecular weight of a polymer?
7. What are the monomers used in the preparation of polystyrene and PVC and give their structural formula?
8. What is the special feature of polyurethane?
9. What is the function of fillers in plastics?
10. Mention any four uses of thermoplastic resins.

Section B (5 X 5 = 25)

Answer all questions:
11. a) Write a note on co-ordination polymerization.
    (or)
    b) How is Nylon-6, 6 synthesised? Write any two uses of it.
12. a) Classify the polymers on the basis of their stereochemistry.
    (or)
    b) Explain how the crystallinity affects the properties of a polymer.
13. a) Distinguish Block and Graft copolymers.
    (or)
    b) Distinguish homo and hetero polymers.
14. a) Write the preparation, properties (any two) and uses of polypropylene.
   (or)
   b) Write note on silicone rubbers.

15. a) Differentiate thermosetting and thermoplastic resins.
   (or)
   b) Write a short note on pigments used as constituent in plastics.

   **Section – C (10 x 3 = 30)**

**Answer any three questions.**

16. Write any one method of preparation of a condensation polymer and addition polymer. Mention some of their uses.

17. How is Molecular weight of a polymer is determined by viscosity method?

18. a) Write the preparation, properties and uses of polyethylene.
   b) Write note on Buna- S rubber.

19. Write note on the following
   i) Dyes ii) Plasticizers iii) Lubricants iv) catalysts

20. What is glass transition temperature of a polymer bring out the relationship between Tg and Tm.
UNIT-I Nuclear Chemistry

1.1. Nuclear stability-n/p ratio- nuclear forces-Exchange theory and nuclear fluid theory.


1.3. Mass defect and binding energy - Artificial transmutation and artificial radioactivity.

1.4. Application of radioactive isotopes-C-14 dating, rock dating -Numerical problems - isotopes as tracers-study of reaction mechanism (e.g. ester hydrolysis), radiodiagnosis and radiotherapy.

1.5. Nuclear reactors-types-common features like fuels, moderators, coolant control materials, reactor shielding- uses-Nuclear reactors in India.

UNIT II - Heterocyclic Compounds

2.1. General classification-aromatic and non-aromatic heterocyclics.

2.2. Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine.
2.3. Preparation, properties and uses of furan, pyrrole & thiophene.

2.4. Synthesis and reactions of pyridine comparative study of basicity of pyrrole, pyridine with amines.

UNIT III

3.1. Aliphatic amines-separation of amines by Hinsberg’s & Hofmann methods - preparation and properties of dimethyl amine, trimethyl amine, (ethylene diamine and hexamethylene diamine).


3.3. Diazonium compounds-diazotisation mechanism-diazonium ion as a weak electrophile-preparation and synthetic uses of diazoacetic ester & diazomethane.

UNIT IV

4. Second law of thermodynamics-I


UNIT V

5. Second law of thermodynamics-II

5.1. Work and free energy functions-Maxwell’s relationships criteria for reversible and irreversible processes -Gibbs-Helmholtz
equation-Partial molar free energy. Clapeyron equation-Clapeyron-Clausius equation-Applications of Clapeyron-Clausius equation.

5.2. Third law of thermodynamics

MODEL QUESTION PAPER

Periyar University Salem

SEMESTER-IV

B.Sc. Chemistry – Major core paper – IV

General Chemistry – IV Code: 12UCHO4

Time: 3 Hrs

Max. Marks: 75

Section A (10 x 2 = 20)

Answer all the question:

1. Why is $^{92}_{\text{U}}^{238}$ not suitable for chain reaction?
2. What is mass defect?
3. Why Furan is least aromatic when compared with Thiophene and pyrrole?
4. Give any two nucleophilic substitution reactions of pyridine.
5. Why is Benzenediazonium ion a weak electrophile?
6. Give one preparation each for Acetanilide and N-Methyl aniline.
7. Calculate the efficiency of a Carnot engine operating between the temperatures 100°C and 0°C?
8. What is the need for Second Law of Thermodynamics?
9. What are work and free energy functions? Give their relations?
10. State Nernst heat theorem.

Section-B (5 x 5 = 25)

Answer all questions

11. Explain Geiger-Nuttal rule with examples?
    (or)
    Explain nuclear stability with respect to n/p ratio?
12. Give one synthesis each for pyridine and piperidine?
   (or)
   Compare the aromatic nature and basic nature of pyrrole, furan, thiophene and pyridine?

13. How are aliphatic amines separated by Hofmann’s and Heinsberg’s methods?
   (or)
   Explain the mechanism of diazotization.

14. Explain Clausius inequality principle?
   (or)
   Derive an expression for the entropy of mixing of Ideal gases?

15. Derive Clausius Clapeyron equation.
   (or)
   How is absolute entropy evaluated from heat capacity measurements?

Section C  (3×10=30)

Answer any three questions:

16. Write note on:
   a) Nuclear fusion
   b) Nuclear fission
   c) Stellar Energy

17. Give the electrophilic substitution reactions of
   a) Pyrrole       b) Pyridine

18. Give any five synthetic uses of
   a) Diazomethane  b) Diazo aceticester

19. Discuss carnott cycle and derive an expression for the efficiency of a carnot engine?

20. a) Drive Gibbs – Helmholtz equation
    b) Test for validity of third law of thermodynamics.
UNIT-I    Concept of acids, bases and Non aqueous solvents

1.1. Acids and Bases: Arrhenius, Bronsted-Lowry, the Lewis concepts of acids and bases. Relative strength of acids and bases.

1.2. 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, Electronegativity and hard and soft species - Applications of HSAB principle

1.3. Non-aqueous solvents-physical properties of a solvent, types of solvents and their general characteristics. Reactions in non-aqueous solvents with reference to liq. NH₃ and liq SO₂- Comparison.

UNIT II Chemistry of f-block elements

2.1. Position in the Periodic Table-General characteristics of Lanthanides and Actinides-Lanthanide contraction and its consequences.

2.2. Isolation of Lanthanides from Monazite including the Ion exchange resin method.

2.3. Actinides-occurrence and preparation
2.4. Chemistry of Thorium and Uranium - Important compounds-preparation, properties and uses of Uranyl nitrate, Uranium hexafluoride, Thorium dioxide.

**UNIT III Coordination Chemistry**

3.1. Definition of the terms-Classification of ligands-Nomenclature of mononuclear and polynuclear complexes-chelating ligands and chelates-Examples-chelate effect-explanation. Coordination Number and stereochemistry of complexes.

3.2. Werner’s theory-conductivity and precipitation studies - Sidgwick’s theory-Effective Atomic Number concept.

3.3. Isomerism in complexes-Structural Isomerism—types. Stereoisomerism-Geometrical isomerism in 4 and 6 coordinated complexes. Optical isomerism in 4-and 6-coordinated complexes-

**UNIT-IV**


4.2. Crystal Field Theory-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-Calculator of CFSE values
of d$^1$ to d$^{10}$ Octahedral and Tetrahedral complexes- C.F theory and colour of complexes-limitations of C.F. theory-comparison between VBT and CFT.

**UNIT-V Reaction Mechanism and Application of Complexes**

5.1. 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.

5.2. 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.

5.3 EDTA and it’s applications - estimation of metals, hardness of water and sequesterisation.
MODEL QUESTION PAPER
Periyar University Salem
B.Sc. Degree Examination
Fifth Semester
B.Sc. Chemistry – Major core paper – V
Inorganic Chemistry Code : 12UCH05

Time : Three hours. Maximum : 75 Marks

Section – A (10 x 2 = 20 Marks)

Answer all the questions

1. Compare the acidity of CH₃COOH and HCN.
2. What is a hard acid? Give two examples.
3. What are 4f and 5f block elements?
4. How is monazite mineral concentrated to obtain thorium.
5. What is a chelating ligand? Give one example.
6. What is the geometry of the following complexes (a) [Cu(CN)₄]²⁻
(b) [Cu(CN)₂]⁻
7. What is the hybridization involved and geometry of the following Complexes?
   (i) [Co(NH₃)₆]³⁺      (ii) [Cr(CN)₆]³⁻
8. What is ‘Spin only’ formula and its use?
9. What is EDTA? What is the metal ion indicator used when it is used as titrant?

Section B (5 x 5 = 25 Marks)

Answer All Questions

11. (a) Explain Bronsted. Lowry theory of Acid and Base.
    (or)
    (b) Mention any two applications of HSAB principle.

12. (a) Write the characteristic properties of Lanthanides.
    (or)
b) How is Uranium extracted from its mineral?

13.a) Explain EAN rule by taking [Fe(CO)]₅ as an example.
    (or)
    b) Explain Werner’s coordination theory of complexes.

14.a) What are the postulates of valence Bond Theory of complexes?
    (or)
    b) [CoF₆]³⁻ is an outer orbital complex—Explain it and also its magnetic property.
    (or)
15.a) Explain Trans effect based on polarization theory.
    (or)
    b) Write a brief procedure for the estimation of Hardness by EDTA method.

Section C (3 x 10 = 30 Marks)

Answer any three questions

16.a) Explain the Lewis concept of acid-base. b)

   Why is liquid NH₃ used as solvent?

17.a) What is lanthanide contraction and its consequences?

   b) How are the following prepared?
      (i) Thorium dioxide  (ii) uranyl nitrate.

18. Explain isomerism exhibited by complexes.
19. Explain CFT and some of its applications.

20. a) Write briefly about Trans effect.

   b) How is copper and cadmium separated by complexing them.
UNIT I

1.1. Definition-Classification - Optical and Geometrical isomerism.

1.2. Optical isomerism – Optical activity-Optical and Specific rotations-conditions for optical activity-asymmetric centre-Chirality-achiral molecules-meaning of (+) and (-) and D and L notations-Elements of symmetry.

1.3 Projection formulae-Fischer, and Newmann projection formulae-Notation of optical isomers-Cahn-Ingold –Prelog rules-R-S. notations for optical isomers with one and two asymmetric Carbon atoms-erythro and threo representations.

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

1.5. Optical activity of allenes, spiranes and biphenyls.

UNIT II


2.2. Conformational Analysis-introduction of terms-conformers-dihedral angle, torsional strain, conformational analysis of ethane,
ethylene glycol, chlorohydrin and n-butane including energy diagrams-conformers of cyclohexane (chair, boat and skew boat forms)-axial and equatorial bonds-ring flipping showing axial equatorial interconversions-conformers of mono and disubstituted cyclohexanes-1:2 and 1:3 interactions-Conformation and stereochemistry of Cis and Trans decalins.

**UNIT III  Amino acids and proteins**

3.1. 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

3.2. Peptides-synthesis - Bergmann method-structure determination of polypeptides-end group analysis.

3.3. 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- IV**

4.1.**Heterocyclic Compounds-II**

Condensed five and six membered heterocyclics-preparation of indole, quinoline and isoquinoline-Fischer indole synthesis, Skraup synthesis and Bischer-Napieralski synthesis-Electrophilic substitution reactions.

4.2. **Urides and Nucleic acids**

4.2.1. Ureides-classification-pyrimidines-thymine, uracil and cytosine-purines-adenine and guanine – synthesis (structural elucidation not necessary)
4.2.2. Nucleic acids-structures of ribose and 2-deoxyribose-
DNA and RNA – their components – Biological functions of nucleic
acids-Elementary ideas on replication and protein synthesis.

UNIT V

5. Chemistry of natural products

5.1. Alkaloids -classification- isolation– general methods of
determination of structure of alkaloids-synthesis and structural
elicitation of piperine, atropine and nicotine.

5.2. Terpenes-classification-isolation- isoprene rule-synthesis
and structural elucidation of citral, geraniol, alpha pinene.
MODEL QUESTION PAPER
Periyar University Salem
B.Sc. Degree Examination
Fifth Semester
B.Sc. Chemistry – Major core paper – VI
Organic Chemistry Code: 12UCH06

Time: Three hours. Maximum: 75 Marks

Section – A (10 x 2 = 20 Marks)

Answer all the questions

1. What are diastereoisomers? Give examples.
2. What is a meso compound?
3. What is meant by 1,3 – diaxial interaction?
4. Differentiate between configuration and conformation.
5. Describe the effect of heat on alpha, beta and gamma amino acids.
6. What is denaturation of proteins?
7. What happens when quinoline is treated with nitrating mixture?
8. What are Ureides? How are they classified?
10. What is ZEISEL method?

Section B ( 5 x 5 = 25 Marks)

Answer All Questions

11.a) What do you understand by the term optical activity? Explain it with reference to lactic acid.
   (or)
   b) Designate as R or S

   i) Cl

   ClH₂C ———— CH(CH₃)₂
   CH₃
12. a) Explain important conformations exhibited by ethane.
   (or)
   b) Write the Newmann Projection formula of n-butane. Which of them is the preferred conformation?

13. a) Write an account of the general properties of proteins.
   (or)
   b) What methods would you suggest for the preparation of glycine?

14. a) Explain the Skraup synthesis of Quinoline.
   (or)
   b) What is DNA? Write short notes on replication.

15. a) What are terpenoids? How are they classified?
   (or)
   b) How is nicotine isolated from tobacco leaves?

**Section C (3 x 10 = 30 Marks)**

**Answer any three questions**

16. Explain:
   i) Racemisation  
   ii) Resolution 
   iii) Walden inversion

17.) How are the configurations of maleic and fumaric acids determined? Give any three methods.
   b) Discuss the different conformations exhibited by 1, 4-dimethylcyclohexane.

18. a) Write the Bergmann method of synthesis of peptides.
   b) Discuss about the classification of proteins according to functions.

19. a) Give the preparation of
   i) Indole 
   ii) Isoquinoline

   b) What are the differences between DNA and RNA.

20. Isolate, synthesize and elucidate the structure of piperine.
UNIT-I  Solutions


1.2. Nernst’s Distribution law-Thermodynamic derivations-applications. Solvent extraction.

1.3. Thermodynamic derivation of elevation of boiling point and depression of freezing point-van’t Hoff factor-Abnormal molecular mass-Degree of dissociation and association.

UNIT-II  Chemical Equilibrium

2.1. Thermodynamic derivation of equilibrium constants-Kp, Kc and Kx-Relations between Kp, Kc and Kx-Standard free energy change-Derivation of van’t Hoff reaction isotherm

De-Donder’s treatment of chemical equilibria-concept of chemical affinity (no derivation)-Temperature dependance of equilibriumconstant-van’t Hoff isochore-Pressure dependance of equilibrium constant.

2.2. 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-III Chemical Kinetics-I

3.1. 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.

3.2. Methods of determining the order of a reaction-Experimental methods in the study of kinetics-volumetry, manometry, polarimetry and colorimetry.

3.3 Effect of temperature on reaction rates-Derivation of Arrhenius equation-concept of activation energy-determination of Arrhenius frequency factor and energy of activation.

UNIT-IV Chemical Kinetics-II

4.1. Collision theory of reaction rates-Derivation of rate constant of a bimolecular reaction from collision theory-Failures of CT.

4.2. Lindemann theory of Unimolecular reactions.

4.3. Theory of Absolute Reaction Rates-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-V

5. Photochemistry


5.2. Energy transfer in photochemical reactions-photosensitisaiton-Photosynthesis in plants-Chemiluminescence - fluorescence and phosphorescence-lasers-uses of lasers.

5.3. Photochemical reactions-Kinetics of hydrogen-bromine reaction-decomposition of HI.
MODEL QUESTION PAPER
Periyar University Salem
B.Sc. Degree Examination
Fifth Semester
B.Sc. Chemistry – Elective paper – I
Physical Chemistry Code : 12UCHE01

Time : Three hours. Maximum : 75 Marks

Section – A (10 x 2 = 20 Marks)

Answer All Questions

1. Under what conditions Henry’s law is obeyed by solution of gases in liquids?

2. The vanthoff factor “i” for a very dilute aqueous solution of HCN is 1.00002. Calculate the percentage of degree of dissociation of HCN?

3. When $K_p$ becomes equal to $K_x$?

4. Give the statement of Freundlich adsorption isotherm.

5. Give the units of rate constants for second and third order reactions.

6. How does Arrhenius relation $k=A e^{-Ea/RT}$ changes when $E_a$ becomes zero?

7. Give an example each for consecutive and parallel reaction.

8. Give the failures of collision theory.

9. State Stark-Einstein’s law of photochemical equivalence?

10. What is Grotthus-Draper law?

Section B (5 x 5 = 25 Marks)

Answer All Questions

11.a) Derive Thermodynamically Nernst distribution law?

(or)

b) With an example discuss Azeotropic distillation of maximum boiling point Azeotrope.
12. a) Discuss De-Donder’s treatment of chemical equilibria.
    (or)
    b) Write any five applications of adsorption?

13. a) Derive the rate constant for the reaction \(2A \rightarrow \text{products}\)?
    (or)
    b) How will you experimentally determine the rate constant for
       the acidic hydrolysis of sucrose?

14. a) Compare collision theory with ARRT?
    (or)
    b) Discuss the significance of free energy of activation and
       entropy of activation?

15. a) Explain Jablonski diagram for Radiative and Non-radiative
       Transitions.
    (or)
    b) What are Lasers? Give the uses of Lasers.

**Section C (3 x 10 = 30 Marks)**

**Answer any three questions**

16. Derive thermodynamically an expression connecting molality of
    a dilute solution with its freezing point depression?

17. a) Derive Vant hoff reaction Isotherm?
    B) The equilibrium constant of a reaction doubles on raising the
    temperature from \(25^\circ\text{C}\) to \(35^\circ\text{C}\). Calculate \(\Delta H^o\) for the reaction?

18. a) Derive the rate constant for the reaction \(A+B \rightarrow \text{products}\)?
    b) Explain the significance of energy of activation?

19. a) Thermodynamically derive the rate constant for a bimolecular
    reaction based on ARRT?
    b) What is temperature coefficient?

20. a) Discuss the kinetics of reaction between \(\text{H}_2\) and \(\text{Br}_2\)?
    b) Write notes on photo sensitization.
UNIT – I

UNIT-II
2.1 I.R.Spectroscopy-principles-modes of vibration of diatomic, triatomic linear \( \text{CO}_2 \) and non-linear triatomic molecules \( \text{H}_2\text{O} \)-stretching and bending vibrations-selection rules. Expression for vibrational frequency (derivation not needed) -instrumentation-sampling techniques. Applications.

UNIT-III
3.1. Raman spectroscopy-condition-Rayleigh and Raman scattering, stokes and antistokes lines. Differences between Raman and I.R.Spectroscopy. Mutual exclusion principle \( \text{CO}_2 \) and \( \text{N}_2\text{O} \)

UNIT IV
4.1. NMR Spectroscopy principle of nuclear magnetic resonance basic instrumentation- number of signals-chemical shift- shielding and deshielding-spin-spin coupling and coupling constants-TMS as NMR standard.
4.2. Interpretation of NMR spectra of simple organic compounds such as Acetone, Anisole, Benzaldehyde, Ethyl acetate, Ethylamine, Ethyl Bromide, Toluene and Isopropyl phenyl ketone.

**UNIT V**


5.2. Interpretation of mass spectra of simple organic compounds such as  Acetone, Anisole, Benzaldehyde, Ethyl acetate, Ethylamine, Ethyl Bromide, Toluene and Isopropyl phenyl ketone.
Periyar University Salem  
V SEMESTER  
B.Sc Chemistry  
Elective Paper –II  SPECTROSCOPY  
Paper code: 12UCHE02

Time: Three hours.  
Maximum: 75 Marks

Section – A (10 x 2 = 20 Marks)

Answer all the questions

2. What are chromophores and auxochromes?
3. Draw the vibrational modes of CO2. Which vibration is IR active?
4. Define Zero point energy.
5. What are stokes and anti stokes lines?
7. Write the resonating conditions for NMR.
8. Define chemical shift.
9. What is Base peak?
10. Explain Meta Stable ion.

Section B (5 x 5 = 25 Marks)

Answer All Questions

11. a) Explain the reason for deviation of Beer’s law.  
    (or)  
    b) Explain various types of electronic transitions possible in a molecule.
12. a) Explain how hydrogen bond is detected by IR spectroscopy.  
    (or)  
    b) Explain the terms (i) force constant (ii) wave number
13. a) Explain Mutual exclusion principle.  
    (or)  
    b) Explain the basic principle of microwave spectroscopy.
14. a] Explain shielding mechanism.  
    (or)  
    b) What are advantages of TMS as internal standard?

15. a) Write a note on chemical ionization.  
    (or)  
    b) Explain McLafferty rearrangement.

Section C (3 x 10 = 30 Marks)

Answer any three questions

16. Explain any 2 types of detectors used in UV spectrometry.

17. Explain the instrumentation and operation of a IR spectrometer.

18. Explain how diatomic molecule acts as a rigid rotator.

19. Explain the factors affecting chemical shift.

20. Write in detail  
    a) Molecular Ion peak.  
    b) Satellite peak  
    c) Ring rule
B.Sc.CHEMISTRY-FIFTH SEMESTER

SKILL BASED ELECTIVE COURSE -III

PAPER CODE -12UCHS03

Internal assessment marks :25 External Marks :75

AGRICULTURALCHEMISTRY (30 Hours)

UNIT – I


UNIT – II

Manures : Bulky organic manures – Farm yard manure – handling and storage-oil cakes- blood meal – fish manures.

UNIT – III

Pesticides and Insecticides :

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 :

Fungicide : Sulphur compounds, Copper compounds, Bordeaux mixture.


Preservation of seeds.

UNIT – V

SOILS -Classification and properties of soils –soil water, soil temperature, soil minerals, soil acidity and soil testing.
MODEL QUESTION PAPER
Periyar University Salem
B.Sc. Chemistry
Fifth Semester
SBEC-III Code: 12UCHS03
Agricultural Chemistry

Time: Three hours. Maximum: 75 Marks

Section – A (10 x 2 = 20 Marks)

Answer all the questions

1. Give any two properties of soil.
2. How the acidity of the soil can be tested?
3. What are fertilizers?
4. Mention any four nitrogen fertilizers.
5. Mention any four micro nutrients in plant growth.
6. What are blood meal & fish manures?
7. Define pesticides?
8. Mention any two herbicides.
10. Define acaricides: give one example.

Section B (5 x 5 = 25 Marks)

Answer All Questions

11. a) Give the properties of soil.
   (or)
   b) Write a note on soil testing.

12. a) Explain the effect of nitrogen on plant growth.
   (or)
   b) Give the preparation of urea.

13. a) Write a note on bulky organic manure.
   (or)
   b) What are the functions of micro nutrients in plants?

14. a) Give the differences between fertilizers and manures.
   (or)
b) Describe the handling practices of manures.

15. a) Write a note on toxicity.
   (or)
   b) Give the preparation of Bordeaux mixture.

Section C (3 x 10 = 30 Marks)

Answer any three questions

16. Give a brief account on characteristics and properties of soil.

17. a) Write notes on primary and secondary nutrients.
   b) Give the preparation of triple superphosphate.

18. a) How are insecticides and fungicides useful in plant growth.
   b) Give the preparation of DDT and mention its uses.

19. a) What are the safety measures in handling pesticides?
   b) Give the preparation of BHC and mention its uses.

20. Discuss various methods of preservation of seeds.
B.Sc.CHEMISTRY-FIFTH SEMESTER SKILL
BASED ELECTIVE COURSE -IV PAPER

CODE -12UCHS 04

Internal assessment marks :25       External Marks :75

DYESTUFFS AND TREATMENT OF EFFLUENTS (30 Hours)

UNIT-I
1.1. Quinonoid Dyes-Examples and structure-Anthraquinone and
Mordant Dyes-Synthesis and Applications of Alizarin-Phthalocyanin
dyes-Copper Phthalocyanin-Synthesis and Applications.

UNIT-II
2.1. Diphenylmethane Dyes- Auramine-Triphenylmethane Dyes-
Malachite Green, Crystal Violet, Pararosaniline-Preparation and
applications.
2.2. Indigo Dyes-Preparation and application-Derivatives of Indigo-
Synthesis and uses of Indigosol and tetrahaloindigo.

UNIT-III
3.1. Phthalein Dyes-Phenolphthalein- Preparation and applications
3.2. Xanthein Dyes-Rhodamine B, Fluorescein-Eosin- Preparation and
applications.

UNIT-IV
4.1. Acridine Dyes-Proflavin, Acriflavin, Acridine violet- Preparation and
applications
4.2. Cyanine, Isocyanine and Carocyanine Dyes- Preparation and uses
of Quinoline blue, Ethyl red, Sensitol red.

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

References:
MODEL QUESTION PAPER
Periyar University Salem
B.Sc. Chemistry
Fifth Semester
SBEC-IV Code: 12UCHS04
Dye stuffs and treatment of Effluents

Time: Three hours. Maximum: 75 Marks

Section – A (10 x 2 = 20 Marks)

Answer all the questions

1. What are quinonoid dyes? Give an example.
2. Give the structure of alizarin.
3. Mention the structure of auramine and give its use.
4. Give the structure of crystal violet and mention its use.
5. What is the structure of phenolphthalein? What is its application?
6. What is eosin? Give its structure.
7. What are acridine dyes? Mention one of its application.
8. Give the structure of quinoline blue.
9. What are degradable wastes?
10. How textile effluent can be treated?

Section B (5 x 5 = 25 Marks)

Answer All Questions

11. a) Give the preparation of alizarin and mention its application.
    (or)
    b) Give any one method of preparation of copper phthalocyanine.

12. a) Give the preparation of malachite green.
    (or)
    b) How is pararosaniline prepared? What is its use?
13. a) Give the preparation of fluorescein.
   (or)
   b) Mention the preparation of RhodamineB and give its application.

14. a) How is acridine violet prepared?
   (or)
   b) Mention the preparation of ethyl red.

15. a) Give the characteristics of textile effluent.
   (or)
   b) Explain photo oxidation process.

Section C (3 x 10 = 30 Marks)

Answer any three questions

16. a) What are mordant dyes?
   
   b) Give any two methods of preparation of copper phthalocyanine.
   
   c) Mention its uses.

17. Give the preparation and uses of Indigo.

18. Give the preparation and uses of phenolphthalein.

19. a) What are carbocyanines?
   
   b) Give the preparation and uses of sensitolred.

20. a) Mention the effects of untreated textile effluents.
   
   b) Write note on degradability of wastes.
UNIT-I

1.1. Bioinorganic Chemistry-Essential and trace elements in Biological processes- Biological role of Haemoglobin and Chlorophyll (elementary idea of structure and mechanism of their action )

1.2. Metal carbonyls-Bonding in carbonyls-Mono and binuclear Carbonyls of Ni, Fe, Cr, Co and Mn-Hybridisation and structure. Preparation, properties and uses.

1.3. Silicates-classification and structure-examples. Composition, properties and uses of asbestos, talc, mica, and zeolite.

UNIT II

2. Organometallic compounds

2.1. Definition-classification-ionic, σ-bonded and π-bonded organometallic compounds-examples- nature of carbon-metal bond.

2.2. General methods of preparation. General properties of organometallic compounds -physical and chemical characteristics.

2.3. Organometallic compounds of Lithium & Boron-preparation, properties, structure and uses.

2.4. Olefin complexes –Zeisels salt –synthesis and structure

2.5. Cyclopentadienyl complexes -Ferrocene-preparation,properties, structure and uses.

2.6. Uses of organometallic compounds.
UNIT-III

3.1. Solids: Band theory of conductors, semiconductors and insulators

3.2. Imperfections in a crystal-Outline of Schottky defects, Frenkel defects, metal excess and metal deficiency defects and line defects.

3.3. Nano materials – an elementary study.

UNIT IV - Some Special compounds

4.1.1. Classification and structure of carboranes.

4.1.2. Boron Nitride-Borazole-metal Borides (elementary idea)

4.2. Interhalogen Compounds-Naming of the compounds- Types. Preparation, properties, structure and uses of ICl, BrF₃, IF₅, IF₇. Basic properties of Iodine.

4.3. Pseudohalogens-Definition, similarities and dissimilarities between halogen and pseudohalogen, cyanogens, thiocyanogen- Preparation, properties and uses.

UNIT V

5.1. Symmetry Elements and Symmetry operations – point groups-point groups of simple molecules like H₂, HCl, CO₂, H₂O & NH₃.

5.2. Magnetic properties of molecules: 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 magnetic measurements.
MODEL QUESTION PAPER

Periyar University Salem
B.Sc. Degree Examination
Sixth Semester
B.Sc. Chemistry – Major core paper – VII
Inorganic Chemistry Code : 12UCH07

Time : Three hours. Maximum : 75 Marks

Section – A (10 x 2 = 20 Marks)

Answer all the questions

1. Write the structures of Hemoglobin and chlorophyll.
2. Write the hybridisation and structure of Ni(CO)₄.
3. What are ionic organometallic compounds?
4. How is organometallic compound prepared by any two method?
5. What is Frenkel defect in crystal?
6. Define and give an example for an insulator.
7. Define symmetry elements.
8. Define magnetic susceptibility.
9. What is Inorganic Benzene?
10. What are Carboranes?

Section B (5 x 5 = 25 Marks)

Answer All Questions

11. a) Write the preparation, structure and properties (any two) of Fe(CO)₅.
   (or)
   b) Explain the bonding in Metallic carbonyls.
12. a) How is ferrocene prepared? Mention some of its physical properties.
   (or)
   b) Write the applications of organometallic compounds.
13. a) Explain the Band theory of conductors.
   (or)
   b) Explain Frenkel defects.
14. a) Deduce the point group for NH₃ molecule.
   (or)
   b) Distinguish Ferromagnetism and Antiferromagnetism.

15. a) Write the basic property of Iodine.
   (or)
   b) Write the preparation, properties and structure of IF₅.

   **Section C (3 x 10 = 30 Marks)**

   **Answer any three questions**

16. How are silicates classified? Give example and structure for each type.

17. a) Write the preparation, properties, structure and uses of Lithium organometallic compounds.
   b) How is zeisel salt synthesized?

18. a) Give a brief account on n and p-type semi conductors.
   b) Write short note on Nano materials.

19. a) Distinguish pseudo halogen and Interhalogen compounds.
   b) How is diborane prepared and explain its structure?

20. a) How is magnetic moment of a material is determined with Guoy Balance?
   b) Write the symmetry elements present in CO₂ and H₂O molecule.
B.SC.CHEMISTRY-SIXTH SEMESTER
Core Chemistry Major Paper –VIII
Paper code : 12UCH08
Internal assessment :25 marks External Marks :75
ORGANIC CHEMISTRY - (60 Hours)

UNIT I

1. Carbohydrates-I

1.1. Classification.


1.3. Constitution of glucose and fructose-open chain structure-Configuration and ring structure-mutarotation-determination of ring size.

1.4. Haworth’s projection formulae and conformation of monosaccharides.

UNIT II

2. Carbohydrates II

2.1. Interconversions of monosaccharides-epimerisation-conversion of pentose to hexose and vice versa-aldoose to ketose and vice versa.

2.2. Disaccharides-structural elucidation of sucrose and maltose.

2.3. Polysaccharides-structure of starch and cellulose - derivatives of cellulose.
UNIT III

3. Vitamins and antibiotics

3.1. Vitamins-occurrence and biological importance of Vitamin A, Thiamine, Riboflavin, Pyridoxin and Ascorbic acid. – Synthesis and structural elucidation of ascorbic acid.


UNIT IV

4. Molecular rearrangements.

4.1. Classification as anionotropic, cationotropic, intermolecular and intramolecular.


UNIT V

5. Important reagents and their applications in organic chemistry – AlCl3, BF3, LiAlH4, NaBH4, PCl5, P2O5,Na/ethanol, alcoholic KOH, H2/Ni, H2/Pd-BaSO4, Zn/Hg-HCl, H2N-NH2/C2H5ONa, Ag2O, HIO4, Lead tetra acetate and Osmium tetroxide.
MODEL QUESTION PAPER
Periyar University Salem
B.Sc. Degree Examination
Sixth Semester
B.Sc. Chemistry – Major core paper – VIII
Organic Chemistry Code : 12UCH08

Time : Three hours.                      Maximum : 75 Marks

Section – A (10 x 2 = 20 Marks)

Answer all the questions

1. Mention the number of asymmetric carbons in the open chain of glucose.
2. What is mutarotation?
3. Show that sucrose is a non-reducing sugar.
4. What are polysaccharides? Give one example.
5. What are antibiotics? Write any two antibiotics.
6. Write the structures of ascorbic acid and Penicillin -G.
7. Give any one thermal rearrangement. Mention its type.
8. Give any two rearrangements in which 1:2 shift occurs.
9. What is the use of H₂/Ni in Organic reactions?
10. What happens when naphthalene is heated with sodium and ethanol?

Section B (5 x 5 = 25 Marks)

Answer All Questions

11. a) Write a detailed account on the classification of carbohydrates.
   (or)
   b) Write any five reactions of fructose.

12. a) What are epimers? Give example with their structure.
   (or)
   b) What are the important industrial applications of cellulose?
    (or)
    b) i) Why is it that penicillin is not administered orally?
       ii) Write the occurrence and biological importance of
           Riboflavin.
14.  a) Write notes on Schmidt rearrangement.
    (or)
    b) Explain Hofmann rearrangement.
15.  a) Write any five reactions with PCl$_5$ as a reagent.
    (or)
    b) Explain the mechanism of LiAlH$_4$ reduction and compare
       it with NaBH$_4$ reduction.

Section C (3 x 10 = 30 Marks)

Answer any three questions

16.  a) Discuss the constitution of glucose.

17.  a) How is glucose converted to fructose?
    b) Discuss the structure of Starch.

18.  a) Briefly explain the biological importance of pyridoxine.
    b) How is chloromycetin structure established?

19.  a) Discuss the Pinacol – Pinacolone rearrangement.
    b) Give the mechanism of Benzidine rearrangement.

20.  Give the functions of the following reagents and their use in
     organic chemistry.
     1. P$_2$O$_5$
     2. Zn/Hg-HCl
     3. Ethanolic KOH
     4. H$_2$/Pd – BaSO$_4$
     5. Osmium tetroxide.
UNIT-I

Phase Rule

Definition of terms-Derivation of phase rule -One component systems-H2O system, Sulphur system – explanation using Clausius -Clapeyron equation-supercooling and sublimation.

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.

C.S.T-phenol water system only. Effect of impurities on CST.

UNIT - II

2.1. Electro chemistry

2.2.1. Metallic and electrolytic conductance -Definitions of specific, equivalent and molar conductances – Relations between them – measurement of conductance and cell constant.

2.2.2. Variation of conductance with dilution – Qualitative explanation – Strong and weak electrolytes.


2.2.4. Ionic mobilities and Ionic conductances.Diffusion and ionic mobility- molar ionic conductance and viscosity- Walden rule.
UNIT – III


3.1.1. Activity and activity co-efficients of strong electrolytes – ionic strength.


3.2.2. 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.

UNIT – IV


UNIT - V


MODEL QUESTION PAPER
Periyar University Salem
B.Sc. Degree Examination
Sixth Semester
B.Sc. Chemistry – Elective Paper-III
Physical Chemistry Code : 12UCH09

Time : Three hours. Maximum : 75 Marks

Section – A (10 x 2 = 20 Marks)

Answer all the questions:

1. How many components are present in the systems
   a) KCl-NaCl-H₂O
   b) KCl-NaBr-H₂O
2. Give an example each for the substance which can undergo
   a) efflorescence     b) deliquescence
3. The resistance of 0.01M solution of an electrolyte was found to be 210 ohm at 25°C. Calculate molar conductance of the solution at 25°C? Cell constant is 0.88cm⁻¹.
4. What is Walden’s Rule for the mobility of an ion?
5. Calculate ionic strength of a solution which is 0.1 molal in NaCl and 0.01 molal in CaCl₂ assuming complete ionization.
6. Calculate the pH of 3.2x10⁻³m Ba(OH)₂ in water at 25°C?
7. Write the cell reaction for the cell Zn, Zn²⁺(1M) || Fe²⁺(1M) Fe³⁺(1M): pt.
8. Give an example each for reversible and irreversible cells.
9. Give an example each for concentration cell with and without transference.
10. What is over voltage?

Section B (5 x 5 = 25 Marks)

Answer All Questions

11. a) Explain silver-lead simple eutectic system.
( or )
   b) Explain phenol- water system and the effect of impurity on CST.
12. a) How will you measure equivalent conductance of a solution by Wheatstone bridge method? 

(or) 

b) How will you determine transport number of H⁺ in HCl using moving boundary method?


(or) 

b) Define Henderson’s equations for calculating pH for acidic and basic buffer?

14. a) Explain the function of Weston standard cell. 

(or) 

b) How will you determine pH of a solution using quinhydrone electrode?

15. a) Derive LJP expression at the junction of two electrolytic solution. 

(or) 

b) Write notes on a) polarization 

b) decomposition voltage

Section C (3 x 10 = 30 Marks)

Answer any three questions:

16. Explain sulphur system using clausius clapeyron equation.

17. Explain types of conductometric titrations and draw the corresponding titration curves.

18. Derive the expression for hydrolysis constant, degree of hydrolysis and pH for salt of weak acid and weak base.

19. a) Derive expressions for ΔG, ΔH and ΔS of a cell reaction thermo dynamically. 

b) Derive Nernst equation.

20. Explain the working of a) Lead-storage battery. 

b) Hydrogen-oxygen fuel cell.
B.Sc.CHEMISTRY
SIXTH SEMESTER
Elective Paper – IV

Paper code: 12UCHE03

Internal assessment marks: 25  External Marks: 75

Analytical chemistry (75 Hours)

UNIT-I

1.1 Data analysis- idea of significant figures- its importance-accuracy- methods of expressing accuracy- error analysis- types of errors- minimizing errors- precision- methods of expressing precision-mean, median, mean deviation, standard deviation and confidence limits.

1.2 Chemical and single pan balance- precautions in using balance-sources of error in weighing-correction for buoyancy, temperature effects - calibration of weights.

UNIT – II Gravimetric Analysis


2.2. Choice of the precipitant- Specific and Selective precipitants-, Anthranilicacid, Cupferon, Dimethylglyoxime, Ethylenediamine, 8-Hydroxyquinoline, Salicyldoxime, - Use of masking agent.

2.3. Crucibles- types, care and uses. Calculations in gravimetric analysis- use of gravimetric factor.

UNIT – III Chromatographic Techniques

3.1 Column Chromatography- principle, types of adsorbents, preparation of the column, elution, recovery of substances and applications.

3.2 TLC- principle, choice of adsorbent and solvent, preparation of chromatoplates, Rf-values, factors affecting the Rf-values. Significance of Rf-values.
3.3 Paper Chromatography- principle, solvents used, development of chromatogram, ascending, descending and radial paper chromatography.

3.4 Ion-exchange chromatography- principle- types of resins- requirements of a good resin- action of resins- experimental techniques- separation of Na-K, Ca-Mg, Co-Ni, and Chloride-bromide.

3.5 Gas Chromatography (GC)- principle- experimental techniques- instrumentation and applications.

UNIT IV Thermoanalytical Methods

4.1 Principle - thermogravimetric analysis and differential thermal analysis-discussion of various components with block diagram- TGA & DTA curves of CuSO₄·5H₂O, MgC₂O₄·H₂O and Ca(OOCCH₃)₂·2H₂O-Simultaneous DTA-TGA curves of SrCO₃ in air and CaC₂O₄·H₂O in air and in CO₂ factors affecting TGA & DTA curves.

4.2 Thermometric titrations-principle- apparatus- applications.

UNIT V Electro Analytical Method

5.1 Polarography- principle, concentration polarization, dropping mercury electrode (DME)- advantages and disadvantages- migration, residual, limiting and diffusion currents- Use of supporting electrolytes-Illkovic equation (derivation not required) and significance- experimental assembly- current voltage curve- oxygen wave-influence of temperature and agitation on diffusion layer. Half wave potential (E₁/₂)- Polarography as an analytical tool in quantitative and qualitative analysis.

5.2 Amperometric titrations Basic principle –titrations- advantages, disadvantages – applications.
MODEL QUESTION PAPER
Periyar University
B.Sc. Chemistry
Sixth Semester
Elective paper – IV
Analytical chemistry: 12UCHE04

Time: Three hours. Maximum: 75 marks

Section – A (10 x 2 = 20 Marks)

Answer all the questions

1. Define significant numbers and give one example.
2. What are the requirements for a good balance
3. Define gravimetric factor and give one example.
4. What are the types of crucibles?
5. What is adsorption chromatography?
6. What is Rf-value?
7. What are the factors that influence thermogram?
8. What are the principles of TGA?
9. Define migration current?
10. Write Ilkovic equation.

Section B (5 x 5 = 25 Marks)

Answer All Questions

11. a) Explain single pan balance.
    (or)
    b) Write a note on error analysis

12. a) Write application of solubility product principle in
    gravimetric analysis.
    (or)
    b) What are conditions of precipitation?

13. a) Write the principle of TLC?
    (or)
b) Write the importance of solvents in chromatography techniques.

14. a) What are applications of TGA?
   (or)

   b) Draw and explain TG-curve for calcium oxalate monohydrate.

15. a) What are the advantages of DME?
   (or)

   b) Explain concentration polarisation.

Section C (3 x 10 = 30 Marks)

Answer any three questions

16. What are the types of errors in analytical measurements?

17. Discuss the choice of precipitant in gravimetric analysis.
   b) Give the conditions for precipitation.

18. Explain the separation technique in Ion-exchange chromatography

19. Explain Thermometric Titrations and its applications.

20. a) Discuss the applications of polarography in qualitative and quantitative analysis.

   b) What are the advantages of Amperometric titrations?
SIXTH SEMESTER
SKILL BASED ELECTIVE COURSE - V
PAPER CODE - 12UCHS05

Internal assessment : 25 marks  External Marks : 75

PHARMACEUTICAL CHEMISTRY (30 Hours)

UNIT-I

1.1. Definition of the terms-drug, pharmacophore, pharmacodynamics, pharmacopoea, pharmacology, bacteria, virus, fungus, actinomycetes, metabolites, antimetabolites, LD50, ED50. Therapeutic index.

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 and mode of action only (no structural elucidation, preparation, assay)

UNIT-III

3.1. Analgesics-definition and actions-narcotic and non narcotic-morphine, Heroin.

3.2. Antipyretic analgesics-salicylic acid derivatives-methyl salicylate, aspirin

UNIT-IV


4.2. Antianaemic drugs-iron, vitamin B12 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. Indian medicinal plants and uses-tulasi, kilanelli, mango, semparuthi, adadodai and thoothuvalai.
Periyar University
B.Sc. Chemistry
Sixth Semester
SKILL BASED ELECTIVE COURSE -V
PAPER CODE -12UCHS05
Pharmaceutical chemistry

Time : Three hours.                                       Maximum:75 marks

Section – A (10 x 2 = 20 Marks)

Answer all the questions

1. Define the term drug and give one example.
2. What are the differences between virus and fungus?
3. Define antibiotics and give one example.
4. What are sulpha drugs?
5. Define analgesics and give one example.
6. Write uses of Heroin.
7. Define anaesthetics with an example.
8. Mention any two antianaemic drugs.
9. Define Hypoglycemic agents & give one example.
10. Write the uses of Tulasi.

Section B ( 5 x 5 = 25 Marks)

Answer All Question

11. a) Note on 1) Pharmacophore 2) Pharmacopoea
    (or)
    b) 1) LD 50 2) ED 50

12. a) Write uses of different Sulpha Drugs.
    (or)
    b) Write about classifications of broad and narrow spectrum antibiotics.
13. a) Write about actions of narcotic and non-narcotic morphines.
    (or)
    b) Write about action and uses of Heroin and Codinine.

    (or)
    b) Write a note on uses and disadvantages of non-volatile anaesthetics.

15. a) What are the uses of kilanelli and thoothuvalai.
    (or)
    b) Mention the causes of AIDS.

Section C (3 x 10 = 30 Marks)

Answer any three questions

16. a) Write in detail about therapeutic index and their use in selecting drugs.

17. Note on
    a) Penicillin.
    b) Ampicillin
    c) Sulphapyridine.

18. Explain Antipyretic analgesics and its uses.

19. Write a note on
    a) Antianaemic drugs-iron.
    b) Vitamin B12
    c) Folic acid.

20. Note on Indian Medicinal Plants.
SIXTH SEMESTER
SKILL BASED ELECTIVE COURSE - VI
PAPER CODE - 12UCHS06

Internal assessment : 25 marks
External Marks : 75
INDUSTRIAL CHEMISTRY (30 Hours)

UNIT I

Chemical Explosives: Preparation and chemistry of lead azide, nitroglycerine, nitrocellulose, TNT, RDX, Dynamite, cordite, picric acid, gunpowder, introduction to rocket propellants.

UNIT II

Leather Industry: Curing, preservation and tanning of hides and skins, process of dehairing and dyeing. Treatment of tannery effluents.

UNIT III

Electrochemical Industries: Production of materials like chlorine, caustic soda, sodium chlorate, Batteries – primary and secondary cells, solar cells, fuel cells.

UNIT IV

Paints & Varnishes: Primary constituents of paints, Dispersion medium (solvent), binder Pigments, formulation of paints and varnishes. Requirements of a good paint.

Cleansing Agents: Preparation of toilet and washing soaps, synthetic detergents-alkyl aryl sulphonate and cleansing action of soaps.

UNIT V

Cement: Manufacture – Wet Process and Dry process, types, analysis of major constituents, setting of cement, reinforced concrete. Cement industries in India.

Glass: Composition and manufacture of glass. Types of glasses- optical glass, coloured glasses and lead glass.
Note: Industrial visit for 2-5 days is recommended under the guidance of teachers.

Reference:

Model Question Paper
Periyar University Salem
B.Sc. Chemistry Skill Based Elective Course - VI
Industrial Chemistry-I Code: 12UCHS06

Time: Three hours. Maximum: 75 marks

Section - A (10 x 2 = 20 Marks)

Answer all the questions

1. What is RDX?
2. Give the preparation of picric acid?
3. Which chemical is used in dehairing from hides and skins?
4. Mention the toxic metals present in tannery effluents?
5. How is impure aluminium refined?
6. Write the uses of caustic soda and sodium perchlorate
7. Mention some solvents used for making paints.
8. Define a paint.
9. Write the composition of Lead glass.
10. What are the main constituents of cement?

Section B (5 x 5 = 25 Marks)

Answer All Questions

11. a) Explain rocket propellants.
    (or)
    b) Write notes on
    i) cordite
    ii) gun powder

12. a) How are hides and skins of animals preserved in Tanning Industry?
    (or)
    b) Explain curing of hides and skins of animals in tannery industry.

13. a) How is chlorine produced in large scale?
    (or)
    b) How is caustic soda prepared in large scale?
14.  a) Distinguish varnish and paint.
    (or)
    b) What are the requirements of a good paint?

15.  a) How is cement prepared by dry process?
    (or)
    b) How is optical glass prepared?

Section C (3 x 10 = 30 Marks)

Answer any three questions

16.  Give the preparation of the following explosives.
    i) TNT
    ii) Dynamite
    iii) Nitroglycerine

17.  a) How are the treated tannery hides dyed?
    b) Discuss the effluent treatment of tannery industry.

18.  a) Write note on solar cells.
    b) Write note on fuel cells.

19.  a) Write the preparation of washing soaps.
    b) Write a note on corrosion inhibitors.

20.  Explain the setting of cement with equation.
B.Sc. DEGREE BRANCH
IV-CHEMISTRY CORE
PRACTICAL-I
PAPER CODE: -12UCHP 01

Internal Assessment Marks:40 External marks :60

PRACTICAL – I VOLUMETRIC ESTIMATIONS
and INORGANIC PREPARATIONS

I. 1. Acidimetry – Alkalimetry :
   a) Estimation of sodium hydroxide – standard sodium
      carbonate.
   b) Estimation of Oxalic acid – Std Oxalic acid.

2. Permanganometry

3. Dichrometry
   a) Estimation of ferrous iron using diphenylamine internal
      indicator std FeSO₄.

4. Iodometry and iodimetry
   a) Estimation of potassium dichromate std K₂Cr₂O₇
   b) Estimation of Arsenious oxide std As₂O₃

5. Complexometric Titrations
   a) Estimation of Zn and Mg using EDTA.

II. Inorganic Preparations.
   a) Ferrous ammonium sulphate.
   b) Potassium trioxalato chromate(III)
   c) Tetraammine copper(II) Sulphate.
   d) Microcosmic salt.
PERIYAR UNIVERSITY
B.Sc.DEGREE EXAMINATIONS
PRACTICAL MODEL QUESTION PAPER
Name of the Course : B.Sc.Chemistry
Major Core Practical I-12UCHP01
Name of the Title : VOLUMETRIC ESTIMATIONS and INORGANIC PREPARATION
Time : 3 hours Maximum Marks : 60

Volumetric Estimates :40
Inorganic Preparation :10
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 quality of ___________ from the given simple salts. Submit the dried sample for evaluation.
B.Sc. DEGREE BRANCH IV-
CHEMISTRY CORE
PRACTICAL-II
PAPER CODE: -12UCHP02

Internal Assessment Marks:40  External marks :60

PRACTICAL – II INORGANIC QUALITATIVE ANALYSIS

1. Inorganic qualitative analysis: Analysis of a mixture containing two cations and two anions of which one will be an interfering ion. Semimicro methods using the conventional scheme with hydrogen sulphide may be adopted.

Anions to be studied: Carbonate, sulphide, 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.
PERIYAR UNIVERSITY B.Sc.DEGREE
EXAMINATIONS
PRACTICAL MODEL QUESTION PAPER

Name of the Course : B.Sc.Chemistry-Major

Core Practical II - 12UCHP02

Name of the Title : Inorganic Qualitative Analysis

Time : 3 hours

Maximum Marks : 60

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.
B.Sc. DEGREE BRANCH
IV-CHEMISTRY
CORE CHEMISTRY MAJOR PRACTICAL-III
PAPER CODE: -12UCHP03

Internal Assessment Marks:40       External marks :60

PHYSICAL CHEMISTRY PRACTICALS

1. Kinetics
   a) Determination of rate constant – Acid catalysed hydrolysis
      of an ester (methyl acetate or ethyl acetate)
   b) Iodination of acetone zero order kinetics.


3. Heterogenous Equilibrium
   a) Effect of impurity on CST of phenol – water system and
      determination of concentration of sodium chloride.
   b) Determination of transition temperature of hydrated salts:
      sodium thiosulfate, sodium acetate, strontium chloride.

4. Electrochemistry :
   a) Conductivity
      i) Determination of cell constant
      ii) Equivalent conductance of strong
           electrolyte.
      iii) Conductometric titration- acid base
           titration

PERIYAR UNIVERSITY
B.Sc.DEGREE EXAMINATIONS
PRACTICAL MODEL QUESTION PAPER
Name of the Course: B.Sc.Chemistry
MajorCorePractical III-12UCHP 03
Name of the Title -Physical Chemistry practicals
Time : 3 hours Maximum Marks : 60

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 $K_t$ value is ____________

3. Determine the transition temperature of the hydrated salt by 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 rate constant Iodination of acetone.

6. Determine the molar depression constant $K_t$ of the given solvent. You are provided with a solute of known molecular weight.

7. Determine the strength of the given Hydrochloric acid solution conductometrically using a standard Sodium Hydroxide solution.

8. 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.
B.Sc. DEGREE BRANCH IV-CHEMISTRY
CORE CHEMISTRY MAJOR PRACTICAL-IV
PAPER CODE: -12UCHP04
Internal Assessment Marks:40 External marks :60

GRAVIMETRIC ESTIMATIONS and ORGANIC PRACTICALS

I. GRAVIMETRIC ESTIMATIONS

1. Estimation 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.

II A. ORGANIC QUALITATIVE ANALYSIS

1. 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 and
  secondary amines, phenol, aromatic ester, amide, diamide,
  anilide, nitro compounds and monosaccharides.

b. ORGANIC PREPARATIONS

1. Preparations involving the following:
   a) Oxidation of benazldehyde.
   b) Hydrolysis of Methyl salicylate or ethyl benzoate.
   c) Nitration - p-nitroacetanilide and m-dinitrobenzene
   d) Bromination - p- bromoacetanilide and tribromophenol
   e) Benzylation — β-naphthylbenzoate

2. Determination of boiling point of liquids.

(Not for Examination 1.a, 1.c, 2)
B.Sc.DEGREE EXAMINATIONS
PRACTICAL MODEL QUESTION PAPER
Name of the Course : B.Sc.Chemistry
Major Core Practical IV-12UCHP 04
Name of the Title : Gravimetric estimations and
Organic Practicals
Time : 6hours Maximum Marks : 60

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. Prepare maximum quantity of _______ from _______.
Recrystallise a portion of it and submit the crude and recrystallised
sample for evaluation.

3. 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.
TEXT BOOKS AND REFERENCE BOOKS

1. Inorganic Chemistry

1) Philips and Williams, Inorganic Chemistry, Oxford University press, Vol I and II.
3) Lee Von Nastrand J.D. Concise Inorganic Chemistry.
4) Manku.G.S., Inorganic Chemistry Tata Mcgraw Hill.
6) Puri and Sharma, Text book of Inorganic Chemistry-Vishal publishing co.
7) Madan.R.D., Inorganic Chemistry, S. Chand & Co.,
9) Dara.S.S, A text book of Environmental Chemistry and Pollution control- S.Chand & Co.,
10) Dr. C.Murthy, A Text book of Environmental Sciences, Sultan Chand & Sons
11) Anil Kumar De, Text Book of Environmental Chemistry, New Age International Ltd.,
12) Starley E. Manahan, Environmental Chemistry Brooks / Cole publishing company, Monterey, California.
II. Organic Chemistry
11. Agarwal and Manivasagam -Reactions and Reagents- Pragati Prakashan
III. Physical Chemistry

10. Glasstone, Thermodynamics for Chemists, Van Nostrand and Co.,
15. Text –book of physical chemistry, Vishal Publishing Co


IV. Analytical Chemistry

Book of Quantitative Inorganic Analysis ELBS – Longman.
3. Douglas A, Skoog and Donal M. West Hort, Fundamentals of
II – Asian Publishing House Bombay.
5. William Kemp, Organic Spectroscopy – ELBS.
Practical Chemistry.
7. Sharma.Y.R, Elementary Organic Spectroscopy, Principles and
applications- S. Chand & Co.,
Analytical Chemistry – Sultan Chand & Sons.
10. Walter E Harris Brgron Kratochvil-An introduction to Chemical
Analysis.
V. Pharmaceutical Chemistry

2. Bentley and Drivers, Pharmaceutical Chemistry.
3. Allion Chidambararam, Pharmaceutical Chemistry.
7. Wealth of India Raw materials (all volumes)- CSIR Publications

VI. Agricultural Chemistry


VII. Polymer Chemistry

2. Text-Book of Polymer Science-F.N. Billmeyer-New Age International
ALLIED CHEMISTRY
Paper Code: 12UCHA 01
FIRST/THIRD SEMESTER
PAPER-I
Internal Assessment Marks: 25   External Marks: 75
INORGANIC, ORGANIC AND
PHYSICAL CHEMISTRY-I (60 HOURS)

UNIT-I

1.1. Chemical Bonding

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. Applications of radioisotopes-C-14 dating, rock dating.
UNIT-III


3.2. Electron displacement Effects: Inductive, Resonance, Hyper conjugative & steric effects. Their effect on the properties of compounds.


UNIT-IV

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

5.1. Solutions: Liquid in liquid type-Raoult’s law for ideal solutions. positive and negative deviation from Raoult’s law-Reasons and examples, Fractional distillation and Azeotropic distillation.

5.2. Chromatography: principle and application of column, paper and thin layer chromatography.
Periyar University Salem
B.Sc. Degree Examination
First/Third Semester
Allied Chemistry Paper – I Code: 12UCHA01

Time: Three hours. Maximum: 75 Marks

Section – A (10 x 2 = 20 Marks)

Answer all the questions

1. Define bond order.
2. What is inorganic benzene? How is it prepared?
3. What is radioactivity?
4. What are radioisotopes?
5. What is meant by resonance?
6. What is racemisation?
7. State Huckel’s rule.
8. Give Diels–Alder reaction shows by Furan.
10. What are the Characteristics of ideal solutions?

Section B (5 x 5 = 25 Marks)

Answer All Questions

11. a) Explain the diamagnetism of nitrogen molecule on the basis of M.O. theory.

   (or)

   b) What are hydrides? How are they classified? Give one example.

12. a) Define and explain the term mass defect.

   (or)

   b) Write a note on Binding energy.

13. a) How are sigma and pi bonds formed? How many \( \sigma \) and \( \pi \) bonds are there in ethyne and ethylene molecule?

   (or)

   b) Explain inductive effect with an example.
14. a) Write the mechanism of alkylation of benzene. (or)  
b) How is pyrrole prepared? Indicate two of its chemical properties.

15. a) Describe separation of liquids by fractional distillation.  
     (or) 
b) Why is thin layer chromatography grouped under partition chromatography?

Section C (3 x 10 = 30 Marks)

Answer any three questions

16. a) What do you understand by the terms bonding and non-bonding molecular orbitals?
     Why are they so called? Illustrate with one example.
     b) Discuss in detail any two methods of preparation of NaBH₄
     and indicate three of its chemical properties.

17. a) What are the differences between nuclear fission and nuclear fusion?
     b) Discuss the applications of radioactive isotopes.

18. a) Discuss the optical isomerism in tartaric acid.
     b) Explain Steric effect with an example.

19. a) Give one method of preparation of furan and thiophene.
     b) How is naphthalene prepared? Write a short note on electrophilic substitution in naphthalene.

20. Give the principle, method and applications of paper chromatography.
ALLIED CHEMISTRY
Paper Code : 12UCHA 02
SECOND/ FOURTH SEMESTER
PAPER-II
Internal Assessment Marks :25    External Marks-75
INORGANIC, ORGANIC AND PHYSICAL
CHEMISTRY-II (60 HOURS)

UNIT-I


1.2. Werner’s theory-conductivity and precipitation studies. Sidgwick’s theory-Effective Atomic Number concept.

1.3. 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.

1.4. Biological role of Haemoglobin and Chlorophyll (Elementary idea of structure and mechanism of action).

UNIT-II

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.

UNIT-III

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


Galvanic cells-EMF-standard electrode potentials, reference electrodes.

5.2. Corrosion: Methods of prevention.
Reference books :

2. Puri and Sharma, Text book of Inorganic Chemistry-Vishal publishing
5. Kundu and Jain, Physical Chemistry, S. Chand.
**Periyar University Salem**

**B.Sc. Degree Examination**

**Second/ Fourth Semester**

**Allied Chemistry Paper – II Code : 12UCHA02**

Time : Three hours.  Maximum : 75 Marks

**Section – A (10 x 2 = 20 Marks)**

**Answer all the questions**

1. Write the formula of HexammineCobalt (III) Chloride and Potassium hexafluoroferrate (III)
2. What do you mean by chelation?
3. How are carbohydrates classified?
4. How do you prepare glycine by Gabriel’s phthalamide synthesis.
5. What are antibiotics? Give examples.
6. What are hypnotics? Give one example.
7. State the law of photochemical equivalence.
8. Define the terms a) phase b) component.
9. What is Kohlrausch’s law?
10. Define standard electrode potential.

**Section B ( 5 x 5 = 25 Marks)**

**Answer All Questions**

11.a) Distinguish between co-ordination number and EAN with suitable examples.
   (or)
   b) Explain the biological importance of chlorophyll.

12.a) How is glucose converted to fructose?
    (or)
    b) Discuss Bergmann’s method of synthesis of peptides.

13.a) What are different types of analgesics? Give examples.
    (or)
    b) Write an account of cause and treatment of diabetes.
14.a) Write a note on Quantum yield.
    (or)
    b) Discuss the salient features of phase diagram of water.

15.a) Explain the Galvanic cell.
    (or)
    b) Define corrosion. Indicate any three methods to prevent it.

**Section C** (3 x 10 = 30 Marks)

**Answer any three questions**

16.a) What are the postulates of Werner’s theory?
    b) What are the biological functions of haemoglobin?

17. Compare the physical and chemical properties of glucose and fructose

18. What are sulpha drugs? Write names and formulae of any two sulpha drugs. Give the preparation of one of these. Discuss the mode of action of sulpha drugs.

19.i) Explain a) Fluorescence b) phosphorescence
    ii) Define Phase rule and apply it to a simple eutectic system.

20. i) What is pH? How would you determine it.
    ii) Draw conductometric titration curves between
        1) NaOH-CH₃COOH 2) HCl – KOH and explain.
ALLIED CHEMISTRY SECOND/
FOURTH SEMESTER ALLIED
CHEMISTRY PRACTICAL PAPER
CODE: -12UCHAP 01
VOLUMETRIC and ORGANIC ANALYSIS

Internal Assessment Marks :40       External marks :60

I. TITRIMETRY

1. Estimation of Sodium hydroxide - Standard sodium carbonate.
2. Estimation of Hydrochloric acid-Standard Oxalic acid.
5. Estimation of Ferrous iron using diphenylamine as internal indicator.

II. Organic Analysis :

1. Detection of elements- nitrogen, sulphur and halogens.
2. Detection of aliphatic or aromatic.
3. Detection of whether saturated or unsaturated compounds.
4. Preliminary tests and detection of functional groups, phenols, aromatic amines, aromatic acids, Urea, benzamide & carbohydrate.
PERIYAR UNIVERSITY
B.Sc.DEGREE EXAMINATIONS
PRACTICAL MODEL QUESTION PAPER
B.Sc.AlliedChemistryPractical

Name of the Title : VOLUMERIC AND ORGANIC ANALYSIS

Time : 3 hours                          Maximum Marks : 60

1. Estimate the amount of _______ present in the whole of the given solution. You are provided with _______ N solution of _______ and a suitable link solution.

2. Analyse systematically the given organic compound and report on the following:
   Whether the compound is
   a. Aliphatic or Aromatic
   b. Saturated or Unsaturated
   c. Special Elements present in the compound
   d. Functional Group present in the compound.

Record your observations then and there.
DEPARTMENT OF CHEMISTRY
NON MAJOR ELECTIVE COURSES
(THIRD and FOURTH SEMESTERS)

1. Dairy Chemistry - 12UCHN01
2. Textile Chemistry - 12UCHN02
3. Medicinal Chemistry - 12UCHN03
4. Industrial Chemistry I - 12UCHN04
5. Industrial Chemistry II - 12UCHN05
6. Food Chemistry - 12UCHN06
7. Chemistry in Agriculture - 12UCHN07
8. Polymer & Plastics - 12UCHN08

NOTE:

Any two papers from the above eight papers may be chosen 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.
DEPARTMENT OF CHEMISTRY
NON MAJOR ELECTIVE COURSE I
PAPER CODE -12UCHN 01
Internal assessment marks :25         External Marks :75

DAIRY CHEMISTRY (30 Hours)

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 :
1. Milk lipids-terminology and definitions
properties and hydration, solubility. Reaction of milk proteins with
formaldehyde and ninhydrin.
4. Milk vitamins-water and soluble vitamins, effect of heat and light
on vitamins.
5. Ash and mineral matters in milk.

UNIT III :
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.
2. Butter : Definition-% composition-manufacture-Estimation of fat,
acidity, salt and moisture content-Desi butter.
UNIT IV :
1. Milk powder: Definition-need for making powder-drying process-spraying, drum drying, jet drying and foam drying-principles involved in each.
Manufacture of whole milk powder by spray drying process-keeping quality of milk powder.
2. Ice cream: Definition-percentage composition-types-ingredients needed-manufacture of ice-cream stabilizers-emulsifiers and their role.

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

Reference Books
1. Outlines of Diary Technology-Sukumar De
MODEL QUESTION PAPER
Periyar University Salem
B.Sc. Chemistry Non – Major Elective Course
Diary Chemistry Code: 12UCHNO1

Time: Three hours.  Maximum: 75 Marks

Section – A (10 x 2 = 20 Marks)

Answer all the questions

1. What are the sources of milk?
2. What are the composition of milk?
3. Define milk lipids.
4. What are the vitamins present in milk?
5. Define creams.
7. Define milk powder.
8. What are composition of Ice Cream?
10. Write two examples for dairy detergents.

Section B (5 x 5 = 25 Marks)

Answer All Questions

11. a) What are factors affecting gross composition of milk? (or)
    b) What are physico-chemical changes taking place on boiling milk?

12. a) What are physical properties of milk protein? (or)
    b) Write a note on milk carbohydrate.

13. a) Explain composition of creams. (or)
    b) Write methods of separation of creams.
14. a) What are principle involved in milk powder preparation?  
 (or)  
b) Write a note on need for milk powder.

15. a) What are characteristics of Dairy detergent?  
 (or)  
b) Write a note on classification of Dairy detergent?  

Section C (3 x 10 = 30 Marks)

Answer any three questions

16. a) Write a note on a) Sterilisation b) Homogenization

17. a) Write reaction of milk protein with formaldehyde and ninhydrin.  
 (or)  
b) How is milk lactose estimated?

18. What are the composition of butter? How are they estimated?

19. Write in detail about Ice Cream.

20. Write about washing procedure involving dairy detergent.
DEPARTMENT OF CHEMISTRY
NON MAJOR ELECTIVE COURSE II
PAPER CODE -12UCHN 02

Internal assessment marks :25 External Marks :75

TEXTILE CHEMISTRY (30 Hours)

UNIT I :
1. General classification of fibres-chemical structure, production, properties and uses of the following natural fibres (a) natural cellulose fibres (cotton and jute) (b) natural protein fibre (wool and silk).

UNIT II :
Chemical structure, production, properties and uses of the following synthetic fibres.
(i) Man made cellulosic fibres (Rayon, modified cellulose fibres) (ii) Polyamide fibres (different types of nylons) (iii) Poly ester fibres.

UNIT III :

UNIT IV :
Dyeing - Dyeing of wool and silk – Fastness properties of dyed materials – dyeing of nylon, terylene and other synthetic fibres.

UNIT V :
Finishing- Finishes given to fabrics- Mechanical finishes on cotton, wool and silk, method used in process of mercerizing – Anti-crease and Anti-shrink finishes – Water proofing.
Reference

2. The Identification of Textile Fibres – Bruno Nuntak.
7. Scouring and Bleaching E.R.Trotman, Charles Griffin & Co Ltd.
MODEL QUESTION PAPER
Periyar University Salem
B.Sc. Chemistry Non – Major Elective Course II
Textile Chemistry Code : 12UCHNO2

Time : Three hours. Maximum : 75 Marks

Section – A (10 x 2 = 20 Marks)

Answer all the questions

1. What are the sources of Natural fibres?
2. Give examples for protein fibres.
3. What are synthetic fibres?
4. Give example for polyester and polyamide fibre.
5. What are general impurities in raw cotton?
6. What are the principles in removing impurities in cotton?
7. What are the dyes used for dyeing cotton?
8. What are the dyes used for dyeing synthetic fibres?
10. What is mechanical finishing on cotton?

Section- B ( 5 x 5 = 25 Marks)

Answer All Questions

11. a) Explain the chemical structure of cotton fibres.
    (or)
    b) How is natural fibres produced?
12. a) How is synthetic fibres produced?
    (or)
    b) What are the properties of synthetic fibres?
13. a) Write a note on dyeing of wool and silk
    (or)
    b) Write about the properties of dyed synthetic material
14. a) What are impurities of raw wool and silk?
    (or)
    b) How are the impurities removed from wool and silk?
15. a) Write the mechanical finishes on wool and silk.
   (or)
   b) What is mercerizing?

Section C (3 x 10 = 30 Marks)

Answer any three questions

16. a) Write a note on Natural cotton fibres.
   
   b) Write a note on Natural protein fibres.

17. a) Write a note on modified cellulose fibres.
   
   b) Write a note on polyester fibres.

18. a Write a note on bleaching.
   
   b) Write a note on Desizing.

19. a) Write a note on Dyeing of nylon.
   
   b) Write a note on Dyeing of Terylene.

20. a) Write a note on methods of Mercerizing.
   
   b) Write a note on water proofing.
DEPARTMENT OF CHEMISTRY NON

MAJOR ELECTIVE COURSE III

PAPER CODE -12UCHN 03

Internal assessment marks :25       External Marks :75

INDUSTRIAL CHEMISTRY – I( 30 Hours)

UNIT I

Fertilizers : Fertilizer industries in India, Manufacture of ammonia, ammonium salts, urea, superphosphate, triple superphosphate and nitrate salts.

UNIT II

Sugar : Cane sugar manufacture, recovery of sugar from molasses, sugar estimation-sugar industries in India.

UNIT III

Chemical Explosives : Preparation and chemistry of lead azide, nitroglycerine, nitrocellulose, TNT, RDX,Dynamite, cordite, picric acid, gunpowder, introduction to rocket propellants.

UNIT IV

Leather Industry : Curing, preservation and tanning of hides and skins, process of dehairing and dyeing. Treatment of tannery effluents.

UNIT V

Water Industry: Pollution of water by fertilizers, detergents, pesticides and industrial wastes, BOD,COD, thermal pollution.
Water Treatment – Ion exchange, electrodialysis, reverse osmosis, softening of hard water.
Model Question Paper
Periyar University Salem
B.Sc. Chemistry Non-Major Elective Course III
Industrial Chemistry-I Code: 12UCHN03

Time: Three hours. Maximum: 75 marks

Section – A (10 x 2 = 20 Marks)

Answer all the questions

1. Name any two fertilizer industries in India.
2. Mention the names of any two fertilizers containing phosphorous.
3. What do you mean by molasses?
4. What is cane sugar chemically?
5. What is RDX?
6. Give the preparation of picric acid?
7. Which chemical is used in dehairing from hides and skins?
8. Mention the toxic metals present in tannery effluents?
9. Define BOD.
10. What is reverse osmosis?

Section B (5 x 5 = 25 Marks)

Answer All Questions

11. a) Write notes on triple superphosphate.
    (or)
    b) Explain the role of nitrate salts as fertilizers.

12. a) How is sugar recovered from molasses?
    (or)
    b) How is sugar estimated?

13. a) Explain rocket propellants.
    (or)
    b) Write notes on
       i) cordite
       ii) gun powder
14. a) How are hides and skins of animals preserved in Tanning Industry?
    (or)
    b) Explain curing of hides and skins of animals in tannery industry.

15. a) Explain thermal pollution of water.
    (or)
    b) Mention any two methods of softening of hard water.

Section C (3 x 10 = 30 Marks)

Answer any three questions

16. Discuss the main feature of
    i) Urea
    ii) Super phosphate

17. How is sugar manufactured from sugar cane?

18. Give the preparation of the following explosives.
    i) TNT
    ii) Dynamite
    iii) Nitroglycerine

19. a) How are the treated tannery hides dyed?
    
    b) Discuss the effluent treatment of tannery industry.

20. Discuss water treatment by
    a) Ion-exchange
    b) Reverse osmosis
    c) Electro dialysis
DEPARTMENT OF CHEMISTRY NON
MAJOR ELECTIVE COURSE IV
PAPER CODE -12UCHN 04

Internal assessment marks :25       External Marks :75
INDUSTRIAL CHEMISTRY – II (30 HOURS)

UNIT I

Electrochemical Industries: Production of materials like chlorine, caustic soda, sodium chlorate, perchlorates, Batteries – primary and secondary cells, solar cells, fuel cells.

UNIT II

Agrochemical industries: Important categories of insecticides, fungicides, herbicides, rodenticide, Mode of action and synthesis of common pesticides like gammexane, DDT, aldrin, Parathion, Malathion, Baygon,

UNIT III

Petroleum: Origin, refining, Cracking, reforming, knocking and octane number, LPG, synthetic gas, synthetic petrol.

Fuel Gases: Large scale production, storage, hazards and uses of coal gas, water gas, producer gas, and oil gas.

UNIT IV

Paints & Varnishes: Primary constituents of paints, Dispersion medium (solvent), binder Pigments, formulation of paints and varnishes. Requirements of a good paint.

Cleansing Agents: Preparation of toilet and washing soaps, synthetic detergents-alkyl aryl sulphonates, ethanolamines, nonionic detergents, builders, additives, corrosion inhibitors.
UNIT V

**Cement**: Manufacture – Wet Process and Dry process, types, analysis of major constituents, setting of cement, reinforced concrete. Cement industries in India.

**Ceramics**: Important clays and feldspar, glazing and vitrification.

**Glass**: Composition and manufacture of glass. Types of glasses—optical glass, coloured glasses and lead glass.

**Reference**:

Model Question Paper
Periyar University Salem
B.Sc., Chemistry Non – Major Elective Course IV
Industrial Chemistry – II  Code : 12UCHN04

Time : Three hours.  Maximum: 75 marks

Section – A (10 x 2 = 20 Marks)

Answer all the questions

1. How is impure aluminium refined?
2. Write the uses of caustic soda and sodium perchlorate.
3. How is gammexane prepared?
4. Mention any two fungicide.
5. Define octane number of petrol.
6. What is water gas?
7. Mention some solvents used for making paints.
8. Define a paint.
9. Write the composition of Lead glass.
10. What are the main constituents of cement?

Section B ( 5 x 5 = 25 Marks)

Answer All Questions

11.a) How is chlorine produced in large scale?  
    (or)
    b) How is caustic soda prepared in large scale?

12.a) How is DDT prepared? Mention its uses.  
    (or)
    b) How is parathio prepared? Mention its uses.

13.a) How is synthetic petrol produced by cracking?  
    (or)
    b) Write note on coal gas.

14.a) Distinguish varnish and paint.  
    (or)
    b) What are the requirements of a good paint?
15.a) How is cement prepared by dry process? (or)
   b) How is optical glass prepared?

Section C (3 x 10 = 30 Marks)

Answer anythree questions

16.a) Write note on solar cells.
   b) Write note on fuel cells.

17. a) Write note on a) insecticide b) Herbicide c) Baygon

18. Write briefly about a) the storage and hazards of fuel gases
   b) knocking of petrol.

19.a) Write the preparation of washing soaps.
   b) Write a note on corrosion inhibitors.

20. Explain the setting of cement with equation.
DEPARTMENT OF CHEMISTRY
NON MAJOR ELECTIVE COURSE V
PAPER CODE -12UCHN 05
Internal assessment marks :25  External Marks :75
MEDICINAL CHEMISTRY ( 30 Hours)

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

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 A1, P, As, Hg and Fe, Examples and applications, Agents for kidney function (Aminohippuric acid). Agents for liver function (Sulfo bromophthalain), antioxidants, treatment of ulcer and skin diseases. (Structure not required)

**RECOMMENDED TEXT BOOKS:**

1. S.Lakshmi Pharmaceutical Chemistry, S.Chand & Sons, New Delhi, 2004

**RECOMMENDED REFERENCE BOOKS**

1. Ashutosh Kar, “Medicinal Chemistry”, Wiley Eastern Ltd., New Delhi, 1993,
3. Romas Nogrady, Medicinal Chemistry, Oxford Univ. Press
Model Question Paper

Periyar University Salem

B.Sc., Chemistry Non – Major Elective Course V

Medicinal Chemistry – II  Code : 12UCHNO5

Time : Three hours.  Maximum : 75 Marks

Section – A (10 x 2 = 20 Marks)

Answer all the questions

1. Define antimetabolite. Give example
2. What is therapeutic index ?
3. Write the names of any four Indian medicinal plants.
4. Mention any two factors affecting metabolism of drugs
5. What is an anaesthetic? Give example.
6. What are the uses penicillin?
7. Give the names of any two hypoglycemic drugs.
8. What is normal blood pressure?
9. Give the sources and deficiency disease of Vitamin A.
10. What is the name of the dye used to test liver function?

Section B ( 5 x 5 = 25 Marks)

Answer All Questions

11. a) Explain the factors affecting absorption of drugs.  
    (or)
    b) Write a note on air borne and waterborne diseases.

12. a) Write briefly on the medicinal uses of tulsi and keezhanelli.  
    (or)
    b) Write a note on drug receptors and biological responses.

13. a) What are analgesics? How are they classified.  
    (or)
    b) What are antibiotics? Mention the uses of streptomycin.

14. a) Write an account on cardiovascular drug.  
    (or)
    b) What are LDL & HDL? Explain their function.
15. a) Mention the sources and deficiency disease of any two of the vitamins.

(or)

b) Write an account on antioxidants.

**Section C** (3 x 10 = 30 Marks)

**Answer any three questions**

16. Write a detailed account on infective diseases and hereditary diseases.

17. Write a detailed account on sources of drugs, active constituents in plants and classification of drugs.

18. Write notes on symptoms, prevention and treatment of AIDS.

19. Write an account on diabetes and hypoglycemic agents.

20. Write an account on any four medicinally important inorganic compounds (Al, P, As, Hg and Fe)
DEPARTMENT OF CHEMISTRY NON MAJOR
ELECTIVE COURSE VI PAPER
CODE -12UCHN 06

Internal assessment marks :25       External Marks :75
FOOD CHEMISTRY ( 30 Hours)

UNIT-I   FOOD ADULTERATION
Sources of foods, types, advantages and disadvantages, constituents of foods, carbohydrate, protein, fats and, oils, colours, flavours, natural toxicants.

UNIT-II   FOOD POISONING
Sources, causes and remedy- Causes and remedies for acidity, gastritis, indigestion and constipation

UNIT-III   FOOD PRESERVATION AND PROCESSING
Food spoilage , courses of food spoilage, types of Food spoilage, food preservation , preservation and processing by heating- sterilisation, pasteurization.

UNIT-IV   VITAMINS
Sources , requirement deficiency diseases of A, C, K, E1 and B6

UNIT-V   MINERALS
Mineral elements in food-Principal mineral elements-source.
Function-Deficiency and daily requirements-Na, K, Mg, Fe, S and P

REFERENCE BOOKS:
1. Seema Yadav : “Food Chemistry” ,Anmol publishing (P) Ltd,New Delhi
   3. Sivasankar – Food Processing and Preservation PHI.(Eastern Economy Editions)
MODEL QUESTION PAPER
Periyar University Salem
B.Sc. Chemistry Non – Major Elective Course
Food Chemistry Code : 12UCHNO6

Time : Three hours. Maximum : 75 Marks

PART – A – (10 X 2 = 20)

Answer All Questions

1. Define food.
2. Mention any two sources of food.
3. Mention any two toxicants in pulses.
4. Mention any four metals that cause food poisoning.
5. Mention any two methods of food preservation.
6. Mention any two causes of food spoilage.
7. Mention the sources of Vitamin A.
8. What is the source and deficiency disease caused by the lack of Vitamin C?
9. Mention any two micronutrients.
10. What the disease caused by IRON deficiency? How can it be rectified?

PART – B – (5x5=25)

Answer all questions

11. a) Write an account of carbohydrates.
    (or)
    b) Write an account of oils and fats.

12. a) Mention the causes and remedy for acidity.
    (or)
    b) What is the cause and make a note on the remedy for constipation?

13. a) Mention the types of food spoilage.
    (or)
    b) Describe any one method of food preservation.

14. a) Mention the source and deficiency disease of Vitamin A. Give the remedy.
b) Write an account on Vitamin B6.

15. a) Write an account of mineral elements in food.
   (or)
   b) What is the source, function and deficiency effect of potassium?

   **PART C – (3 x 10 = 30)**

   **Answer any three questions**

   16. Write note on (i) flavours and (ii) natural toxicants.

   17. Write an account on (i) gastritis and (ii) indigestion.

   18. Write a brief account of food preservation and food spoilage.

   19. Write briefly on Vitamin K, & Vitamin E.

   20. Write briefly on micronutrients.
DEPARTMENT OF CHEMISTRY NON

MAJOR ELECTIVE COURSE VII

PAPER CODE -12UCHN 07

Internal assessment marks :25       External Marks :75

CHEMISTRY IN AGRICULTURE(30 Hours)

UNIT – I


UNIT – II


UNIT – III

Pesticides and Insecticides :

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 :

Fungicide : Sulphur compounds, Copper compounds, Bordeaux mixture.


UNIT – V

SOILS -Classification and properties of soils –soil water, soil temperature, soil minerals, soil acidity and soil testing.
MODEL QUESTION PAPER
Periyar University Salem
B.Sc. Chemistry- Non Major Elective Course
Chemistry in Agriculture Code: 12UCHNO7

Time: Three hours. Maximum: 75 Marks

Section – A (10 x 2 = 20 Marks)

Answer all the questions

1. Give any two properties of soil.
2. How the acidity of the soil can be tested?
3. What are fertilizers?
4. Mention any four nitrogen fertilizers.
5. Mention any four micro nutrients for plant growth
6. What are blood meal & fish manures?
7. Define pesticides.
8. Mention any two herbicides.
10. Define acaricides and mention one example.

Section B (5 x 5 = 25 Marks)

Answer All Questions

11. a) Write the properties of soil.
    (or)
    b) Write a note on soil testing.

12. a) Explain the uses of nitrogen on plant growth.
    (or)
    b) Write the preparation of urea.

13. a) Write a note on bulky organic manure.
    (or)
    b) What are the functions of micro nutrients in plants?

14. a) Write the differences between fertilizers and manure.
    (or)
    b) Describe the handling practices of manures.
15. a) Explain briefly about toxicity.  
   (or)  
   b) Give the preparation of Bordeaux mixture.  

   **Section C** (3 x 10 = 30 Marks)  

   **Answer any three questions**  

   16. Write a brief account on the characteristics of soil.  

   17. a) Write a detailed account on primary and secondary nutrients.  
   
   b) how is of triple superphosphate prepared?  

   18. a) How are insecticides and fungicides useful in plant growth.  
   
   b) Give the preparation of DDT and mention its uses.  

   19. a) What are the safety measures in handling pesticides?  
   
   b) Give the preparation of BHC and mention its uses.  

   20. Write a detailed account on preservation of seeds.
DEPARTMENT OF CHEMISTRY NON
MAJOR ELECTIVE COURSE VIII
PAPER CODE -12UCHN 08

Internal assessment marks :25 External Marks :75
POLYMER & PLASTICS (30 Hours)

UNIT-I

1.1. Basic concepts : An introduction to polymers and macro molecules.
Natural and synthetic polymers. Classification of Polymers-addition and condensation polymers.
Coordination polymerization.

UNIT-II

2.1. Structure of polymers- linear, branched and cross linked
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

3.2. Molecular weight of polymers.
Number average molecular weight and weight average molecular weight. Determination of molecular weight by Viscosity and Osmometry methods.

UNIT-IV

4.1. Poly olefins-polythene , PTFE , Freons ,PVC ,polypropylene and polystyrene.
Butyl, Buna, Buna-S , Buna-N, Neoprene , SBR, Thiocol, Polyurethane and silicone rubbers.
UNIT-V

5.1. Plastics and Resins

REFERENCES:
MODEL QUESTION PAPER
Periyar University Salem
B.Sc. Chemistry Non – Major Elective Course
Polymer & Plastics - Code: 12UCHNOS

Time: 3 Hrs
Max. Marks: 75

Section – A (10 x 2 = 20)

Answer all questions:

1. What is high polymer? Give two examples.
2. Give two examples for Natural and addition polymer.
3. How can you distinguish linear and cross linked polymers?
4. What is glass transition temperature of a polymer?
5. Define copolymerization.
6. What is number average molecular weight of a polymer?
7. What are the monomers used in the preparation of polystyrene and PVC and give their structural formula?
8. What is the special feature of polyurethane?
9. What is the function of fillers in plastics?
10. Mention any four uses of thermoplastic resins.

Section B (5 X 5 = 25)

Answer all questions:

11. a) Write a note on co-ordination polymerization.
    (or)
    b) How is Nylon-6, 6 synthesised? Write any two uses of it.

12. a) Classify the polymers on the basis of their stereochemistry.
    (or)
    b) Explain how the crystallinity affects the properties of a polymer.

13. a) Distinguish Block and Graft copolymers.
    (or)
    b) Distinguish homo and hetero polymers.

14. a) Write the preparation, properties (any two) and uses of polypropylene.
    (or)
    b) Write note on silicone rubbers.
15. a) Differentiate thermosetting and thermoplastic resins. 
   (or) 
   b) Write a short note on pigments used as constituent in plastics.

Section – C (10 x 3 = 30)

Answer any three questions.

16. Write any one method of preparation of a condensation polymer and addition polymer. Mention some of their uses.

17. How is Molecular weight of a polymer is determined by viscosity method?

18. a) Write the preparation, properties and uses of polyethylene. 
   b) Write note on Buna- S rubber.

19. Write note on the following 
   i) Dyes ii) Plasticizers iii) Lubricants iv) catalysts

20. How glass transition temperature of a polymer is determined and how it affects the various properties of a polymer?
**PERIYAR UNIVERSITY**  
**B.Sc. CHEMISTRY (CBCS)-- PAPER CODES**

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