PERIYAR UNIVERSITY
PERIYAR PALKALAI NAGAR
SALEM – 636 011

DEGREE OF BACHELOR OF SCIENCE
CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR BRANCH IV- B.Sc. CHEMISTRY

FOR THE STUDENTS ADMITTED FROM THE
ACADEMIC YEAR 2017 – 2018 ONWARDS
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**MAJOR PRACTICALS**

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### NON-MAJOR ELECTIVE COURSES

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

**Part - I**
- Tamil / Other languages

**Part - II**
- English

**Part - III**
- Core subjects
  - Allied subjects
    - Project / Elective with three courses

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

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

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

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

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

**I- SEMESTER:**
1. Language - Paper I
2. English - Paper I
3. Major Core - Paper I
4. Allied I - Paper I
5. 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. Major Core paper - VII
32. Elective Paper - I
33. Skill Based Elective course III
34. Skill Based Elective course IV
VI-SEMESTER

35. Major Core Paper - VIII
36. Elective Paper –II
37. Major core paper - IX
38. Elective Paper -III
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.

Requirement to appear for the examination

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

6. Passing Minimum

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

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

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

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

**Grading:**

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

<table>
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<tr>
<th>Range of marks</th>
<th>Grade Points</th>
<th>Letter Grade</th>
<th>Description</th>
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<tbody>
<tr>
<td>90-100</td>
<td>9.0-10.0</td>
<td>O</td>
<td>Outstanding</td>
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<tr>
<td>80-89</td>
<td>8.0-8.9</td>
<td>D+</td>
<td>Excellent</td>
</tr>
<tr>
<td>75-79</td>
<td>7.5-7.9</td>
<td>D</td>
<td>Distinction</td>
</tr>
<tr>
<td>70-74</td>
<td>7.0-7.4</td>
<td>A+</td>
<td>Very Good</td>
</tr>
<tr>
<td>60-69</td>
<td>6.0-6.9</td>
<td>A</td>
<td>Good</td>
</tr>
<tr>
<td>50-59</td>
<td>5.0-5.9</td>
<td>B</td>
<td>Average</td>
</tr>
<tr>
<td>40-49</td>
<td>4.0-4.9</td>
<td>C</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>00-39</td>
<td>0.0</td>
<td>U</td>
<td>Re-appear</td>
</tr>
<tr>
<td>ABSENT</td>
<td>0.0</td>
<td>AAA</td>
<td>ABSENT</td>
</tr>
</tbody>
</table>

Ci = Credits earned for course i in any semester

Gi = Grade point obtained for course i in any semester

n = refers to the semester in which such course were credited

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

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

GRADE POINT AVERAGE [GPA] = Σi Ci Gi / Σi Ci

Sum of the multiplication of grade points by the credits of the courses offered under each part

GPA=------------------------------------------------------------------------------------------------------------

Sum of the credits of the courses under each part in a semester
Calculation of grade point average (CGPA) (for the entire programme):
A candidate who has passed all the examinations under different parts (Part-I to V) is eligible for
the following partwise computed final grades based on the range of CGPA.

\[
\text{CUMULATIVE GRADE POINT AVERAGE } [\text{CGPA}] = \frac{\Sigma n \Sigma i Cni Gni}{\Sigma n \Sigma i Cni}
\]

\[
\text{Sum of the multiplication of grade points by the credits of the entire programme under each part}
\]

\[
\text{CGPA} = \frac{\text{Sum of the credits of the courses of the entire programme under each part}}{}
\]

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

<table>
<thead>
<tr>
<th>CGPA</th>
<th>GRADE</th>
<th>Classification of Final Result</th>
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</thead>
<tbody>
<tr>
<td>9.5-10.0</td>
<td>O+</td>
<td>First Class – Exemplary</td>
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<tr>
<td>9.0 and above but below 9.5</td>
<td>O</td>
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</tr>
<tr>
<td>8.5 and above but below 9.0</td>
<td>D++</td>
<td>First Class with Distinction</td>
</tr>
<tr>
<td>8.0 and above but below 8.5</td>
<td>D+</td>
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<td>7.5 and above but below 8.0</td>
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<td>7.0 and above but below 7.5</td>
<td>A++</td>
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<tr>
<td>6.5 and above but below 7.0</td>
<td>A+</td>
<td>First Class</td>
</tr>
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<td>6.0 and above but below 6.5</td>
<td>A</td>
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</tr>
<tr>
<td>5.5 and above but below 6.0</td>
<td>B+</td>
<td>Second Class</td>
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<td>5.0 and above but below 5.5</td>
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<td>4.5 and above but below 5.0</td>
<td>C+</td>
<td>Third Class</td>
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<td>4.0 and above but below 4.5</td>
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8. Ranking
Candidates who pass all the examinations prescribed for the course in the first
instance and within a period of three academic years from the year of admission to the
course only are eligible for University Ranking.

9. Maximum Duration for the completion of the UG Programme:
The maximum duration for completion of the UG Programme shall not exceed
twelve semesters.
10. Commencement of this Regulation:

These regulations shall take effect from the academic year 2017-2018, i.e. for students who are to be admitted to the first year of the course during the academic year 2017-2018 and thereafter.

11. Transitory Provision

Candidates who were admitted to the UG course of study before 2015-2016 shall be permitted to appear for the examinations under those regulations for a period of three years i.e. upto and inclusive of the examination of April / May 2022. 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)

Time : 3 Hours                                      Maximum:75 Marks

Part A : 10 x 2 =20
(Answer all questions)
(Two questions from each unit)

Part B : 5 x 5 = 25
(Answer all questions)
(One question from each unit with internal choice)

Part C : 3 x 10 = 30
(One question from each unit-any three Questions out of five)
## B.Sc. Chemistry Major (CBCS)

For students admitted from 2017-2018 onwards

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<th>Part</th>
<th>Course</th>
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<th>Exam Hours</th>
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Total Credit for I & II Semester = 42 credits
### B.Sc. Chemistry Major (CBCS)

**For students admitted from 2017-2018 onwards**

<table>
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<th>Part</th>
<th>Course</th>
<th>No. of Hours per week</th>
<th>Exam Hours</th>
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Total Credits for V Semester = 21 credits

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Total Credit for VI Semester = 35 credits

Total Credits for 3 years = 140 Credits
GENERAL CHEMISTRY – I (75 Hours)

UNIT – I HANDLING OF CHEMICALS AND VOLUMETRIC ANALYSIS

1.1. Handling of chemicals – Safety and hygiene in chemical laboratory-
storage and handling of chemicals, handling of acids, ethers, toxic and poisonous chemicals,
antidots. Threshold vapour concentration and first aid procedure.

1.2. 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 , iodimetric and complexometric titrations. Calibration of pipette, burette and
standard flask. Weighing principle in chemical balance and single pan balance.

UNIT-II ATOMIC STRUCTURE

2.1. Fundamental particles of matter – their composition – Comparison between Rutherford’s
model of atom and Bohr’s model- Outline of the Bohr-Sommerfeld model-its limitations - de
Broglie theory-Heisenberg’s uncertainty principle- Quantum numbers. Wave mechanical concept
of atom – Schrodinger’s wave equation (derivation not needed)-significance of Ψ and Ψ^2 –
Eigen functions and Eigen values-shapes of different orbitals – Differences between an orbit and
orbital.

UNIT-III ELECTRONIC STRUCTURE

3.1. Pauli’s Exclusion principle and its application- Hund’s rule- its basis and applications -
stability of half-filled and fully – filled orbitals- Aufbau principle and its limitations.
3.2. 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.
3.3. s, p, d and f block elements-classification and characteristic properties.
UNIT - IV  STRUCTURE AND BONDING & ALKENE AND ALKYNES

4.1. IUPAC Nomenclature - aliphatic and aromatic compounds with simple functional groups.
Hybridization- sp$^3$, sp$^2$, sp

4.2 Electron displacement effects:
Inductive, inductomeric and steric effects-their effect on properties of compounds Mesomeric,
resonance, hyperconjugation-localised and delocalized chemical bond.

4.3 Alkenes-preparation,electrophilic and free radical mechanism of addition – Markownikoff’s
rule-peroxide effect-mechanism of hydroboration and ozonolysis.

4.4. Alkynes-general methods of preparation, properties and uses.

UNIT –V  THE GASEOUS STATE

5.1. Behaviour of ideal gases: 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.

5.2. 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.
MODEL QUESTION PAPER  
Periyar University Salem  
SEMESTER-I  
B.Sc. Chemistry – Major core paper – I  
General Chemistry –I  Code : 17UCHO1

Time: 3 Hrs  
Max.Marks:75

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

1. How do you handle poisonous substances in the laboratory?
2. What are secondary standard substances? Give one example.
3. What is Heisenberg’s Uncertainty principle?
4. Define Orbit and Orbital
5. What is Hund’s Rule?
6. Define atomic radii and what is its variation along the period?
7. Define hyperconjunction.
8. What is Markownikoff’s rule?
9. What is Collision diameter?
10. State Boyle point.

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

11. a) How do you calibrate pipette burette and standard flask in the laboratory?  
     (or)  
     b) Write the theory of acid-base titration.
12. a) What are the similarities and differences between Rutherford’s model and Bohr’s model of an atom.  
     (or)  
     b) Discuss about Eigen functions and Eigen values?
13. a) What are the characteristic properties of d-block elements?  
     (or)  
     b) What is Aufbau principle and what are its limitations?
14. a) Write the mechanism of Ozonolysis.

(or)

b) Discuss the Hybridisation and structure of alkenes?

15. a) Discuss the kinetic molecular theory of gases.

(or)

b) How are real gases deviated from ideal behaviour?

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

*Answer any three questions*

16. Write the theory behind redox and complexometric titrations.

17. Explain quantum numbers.

18. Discuss the characteristic properties of f-block elements.

19. Write notes on

   (i) steric effect.
   (ii) inductive effect

20. Discuss Maxwells distribution of molecular velocities.
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 polarization of ions-Fajan’s rules and applications.

UNIT-II HYDRIDES AND CARBIDES

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 REACTION MECHANISM I

3.1. Reaction intermediates : carbocation, carbanion, free radicals-formation and stability .
3.2. Aliphatic nucleophilic substitution- SN₁, SN₂ and SNᵢ reactions – mechanism and stereochemistry. Relative reactivity of ethyl, isopropyl,tertiary butyl, vinyl and benzyl halides-competition between substitution and elimination.
3.3. Elimination reactions-mechanisms of E₁ and E₂ reactions- Hofmann and Saytzeff rule.
3.4. Dienes-isolated and conjugated dienes- 1,2 and 1,4-addition.
UNIT-IV CYCLOALKANES AND AROMATIC HYDROCARBONS

4.2. Aromatic hydrocarbons and aromaticity-reasonance in benzene-delocalised cloud in benzene-aromaticity-Huckel’s (4n+2) rule and its simple applications.
4.3. Electrophilic substitution reactions in aromatic compounds- general mechanism –Nitration, Halogenation, Sulphonation, Friedel- Crafts acylation and alkylation. Orientation and reactivity in monosubstituted benzene - nuclear and side chain halogenation.
4.4. Polynuclear aromatic hydrocarbons- naphthalene, anthracene -isolation, synthesis, properties and uses.

UNIT-V THE LIQUID STATE AND LIQUID CRYSTALS

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.

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
SEMESTER-II
B.Sc. Chemistry – Major core paper – II
General Chemistry –II Code : 17UCHO2

Time: 3 Hrs Max.Marks:75

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

1. State Fajan’s rule.
2. What is inert pair effect?
3. Why are silanes are unstable compare to alkanes?
4. Write the structure of NaH.
5. What are free radicals? Give one example.
7. What is Huckles rule?
8. What is Wurtzs reaction?
9. What is parachor?
10. What is cholesteric liquid crystal?

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

11. a) What are the postulates of Pauling- Slater’s theory?
   (or)
   b) Discuss about Born- Haber cycle.
12. a) Write a note on metallic hydrides.
    (or)
    b) How is LiA₃H₄ prepared? Explain its structure.
13. a) How are substitution and elimination reactions compete with each other?
    (or)
    b) Write the mechanism of E₁ and E₂ reactions with an example.
   (or)
   b) Discuss the orientation of mono substituted benzene.
15. a) Write a short note on vapour pressure.
   (or)
   b) Write a short note on molar volume and chemical constitution.

Section C (3x10=30)
Answer any three questions

16. a) Explain the molecular orbital picture of NO.
   b) What are different types of overlapping?
17. Write a note on preparation, properties and applications of carbides.
18. Explain SN₁ and SN₂ mechanisms and its stereochemistry.
19. a) Write the chemical properties of anthracene.
   b) Discuss the mechanism of nitration.
20. Write a brief account on liquid crystals.
B.Sc. CHEMISTRY-SECOND SEMESTER  
Skill Based Elective Course –I  
Paper Code: 17UCHS01  

Internal assessment Marks: 25  
External Marks :75

FOOD AND NUTRITION (30 Hours)

UNIT -I    FOOD SOURCES
1.1. Sources of foods, types, constituents of foods-carbohydrate, protein, fats.Oils, colours, 
flavours and natural toxicants.

UNIT -II    NUTRITION
2.1. Definition of nutrition, nutrients, functions. Nutritional status – Definition, signs of good and 
poor nutritional status .  
2.2. Mal nutrition- Definition, forms, causes and remedy.  
2.3. Health –Definition, guidelines for good health.

UNIT-III   FOOD POISONING AND ADULTERATION
3.1. Food poisoning- Sources, causes and remedy.  
3.2. Causes and remedies for acidity, gastritis, indigestion and constipation  
3.3. Food adulteration- Types of adulterants- intentional and incidental, effects and detection.

UNIT-IV    FOOD PRESERVATION AND PROCESSING
4.1. Food spoilage, causes of food spoilage, types of Food spoilage  
4.2. Food preservation-preservation and processing by heating - sterilization, pasteurization.

UNIT-V     VITAMINS AND MINERALS
5.1. Sources, requirement and deficiency diseases of A, C, K, E₁ and B₁, B₂.  
5.2. Mineral elements in food-source, function, deficiency diseases and daily 
requirements of Na, K, Mg, Fe, S and P

REFERENCE BOOKS:

1. Seema Yadav : —Food Chemistry , Anmol publishing (P) Ltd, New Delhi  
2. Car H. Synder : — The Extraordinary Chemistry for ordinary thing,  
3. B.Sivasankar - — Food Processing and Preservation – PHI Learning (P) Ltd,  
   New Delhi – 11001.  
   New Delhi, Chennai.
MODEL QUESTION PAPER
Periyar University Salem
SEMESTER-II
B.Sc. Chemistry – Skill Based Elective Course – I

FOOD and NUTRITION - Code: 17UCHS01

Time: 3 Hrs                                       Max.Marks:75

Section A (10 x 2 = 20)

Answer all questions

1. Name the constituents present in the food?
2. What are carbohydrates?
3. Define nutrients?
4. What is malnutrition?
5. How is acidity caused?
6. Name any two food adulterants.
7. Why do we preserve food?
8. What is pasteurisation?
9. Mention any two sources of vitamin A.
10. What are diseases caused by sodium deficiency?

Section B (5 x 5 = 25)

Answer all questions

11. a) Write a note on types of food.
    (or)
    b) Write an account of oils and fats.
12. a) What are the signs of good nutritional status?
    (or)
    b) List functions of nutrients.
13. a) Discuss bacterial food poisoning.
    (or)
    b) Describe types of food adulteration.
14. a) What are the causes of food spoilage.
   (or)
   b) Write an account of types of food spoilage.

15. a) What are the deficiency diseases caused by Vitamin C?
   (or)
   b) What is the source, function and deficiency effect of S?

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

**Answer any three questions**

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

17. List out guidelines for good health.

18. Write an account of effects and detection of food adulterants.

19. Write a brief account of food preservation.

20. Write a note on sources, biological functions and deficiency diseases of Vitamin B₂ and Iron.
UNIT-I Transition Elements and qualitative analysis
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. Chemistry of Titanium dioxide, Titanium tetrachloride, Vanadium pentoxide, Ammonium Vanadate, Zirconium dioxide, Zirconium halides, Ammonium molybdate and Molybdenum blue.
1.3 Principles of Qualitative analysis- Basic principles of inorganic semi micro analysis. Principles involved in Na₂CO₃ extract preparation, Common ion effect, Solubility product and their applications in Qualitative analysis. Separation of cations into Groups.

UNIT-II Reaction Mechanism II
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. Unsaturated acids-preparation and properties of acrylic, crotonic, oleic and cinnamic acids.
3.2. Hydroxy acids-classification – preparation and reactions of Glycolic acid, Malic acid and Citric acid-Action of heat on α,β,γ and δ acids.
3.3. Dicarboxylic acids-preparation and properties of oxalic, malonic, succinic, glutaric and adipic acids.
3.5. Tautomerism-definition-keto-enol and amido-imido tautomerisms.
UNIT IV  Solid State
4.2. Band theory and defects.

UNIT V  Thermodynamics and Thermochemistry
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: 17UCH03  
Time: 3 Hrs                                      Max.Marks:75

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

1. Why most of the transition metals are coloured?
2. What is common ion effect?
3. What is Grignard reagent? Write any one of its application.
4. Explain reduction of carbonyl group by NaBH₄
5. Write a method of preparation of malonic acid.
6. What is trans esterification?
7. Define space lattice and interfacial angle.
8. What are isotropy and anisotropy?
9. Give the statement of Zeroth law of Thermodynamics.
10. What are isothermal and adiabatic processes?

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

11. a) Write a note on solubility product and its applications.  
(or)  
   b) How is Titanium extracted from its ore?  
12. a) Explain the mechanism of Reimer –Tiemann reaction.  
     (or)  
   b) Give the mechanism of Stobbe reaction .  
13. a) Write a method of preparation of cinnamic acid and discuss its chemical properties.  
     (or)  
   b) Explain the amido-imido tautomerism.
14. a) Differentiate crystalline and amorphous solids.
   (or)
   b) Derive Bragg’s equation. What are its applications?

15. a) Derive an expression for work done during isothermal expansion of an ideal gas.
   (or)
   b) Explain absolute scale temperature.

Section C (3 x 10 = 30)

Answer any three questions

16. Explain the extraction, properties and uses of Molybdenum.

17. Explain the addition reactions of the following in Aldehydes and Ketones
   a) HCN
   b) NH₂CONHNH₂
   c) NH₂OH
   d) Grignard reagent

18. a) Give the mechanism of ester hydrolysis.
   b) Explain the action of heat on hydroxy acids.


20. a) Derive Kirchoff’s equation.
   b) Explain Joule-Thomson effect.
B.Sc. CHEMISTRY
THIRD and FOURTH SEMESTERS
SKILL BASED ELECTIVE COURSE – II
Paper Code: 17UCHS02

Internal assessment Marks: 25  External Marks :75

POLYMER CHEMISTRY (30 Hours)
(Note: The paper will be taught in third and fourth semesters, but the examination will be at the end of fourth semester)

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

UNIT-II
2.2. Properties of polymers: The crystalline melting point. The glassy state and glass transition temperature

UNIT-III
3.1. Molecular weight of polymers
Number average molecular weight and weight average molecular weight. Determination of molecular weight by Viscosity and Osmometry methods.
3.2. Polymer processing- calendaring, Die casting, blow moulding, and Wet spinning.
UNIT-IV
4.1. Preparation, properties and uses of Poly olefins-polythene, PTFE, Freons, PVC, polypropylene and polystyrene.

UNIT-V

REFERENCES:
MODEL QUESTION PAPER
Periyar University Salem
SEMESTER-IV
B.Sc. Chemistry – Skill Based Elective Course – II

Polymer Chemistry  - Code: 17UCHS02

Time: 3 Hrs                                           Max.Marks:75

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

1. Define polymerization.
2. Write any two differences between addition and condensation polymerisation.
3. What are homo and hetero polymers?
4. Define glass transition temperature.
5. Define weight average molecular weight.
6. What is wet spinning?
7. How are freons prepared?
8. What are uses of thiocol?
9. Define lubricants. What are its functions?
10. What are pigments? Mention its uses.

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

11. a) Write a note on ring opening polymerization.
    (or)
   b) Explain co-ordination polymerization.

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) Discuss blow moulding process.
    (or)
    b) How is molecular weight of a polymer determined by osmometry method?
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 plasticizers.

Section – C (3 x 10 = 30)

Answer any three questions

16. Write a note on classification of polymers.

17. Explain the structure of polymers.

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

   b) Describe Die casting process.

19. a) Write the preparation, properties and uses of polyethylene.

   b) Write note on Buna- N rubber.

20. Write note on the following

   i) Fillers

   ii) catalysts.
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. Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine.
2.2. Preparation, properties and uses of furan, pyrrole & thiophene.
2.3. Synthesis and reactions of pyridine. Comparative study of basicity of pyrrole, pyridine with amines.
2.4. Condensed five and six membered heterocyclics compounds- preparation of indole, quinolnin and isoquinoline-Fischer indole synthesis, Skraup synthesis and Bischer- Napieralski synthesis- Electrophilic substitution reactions.

UNIT III – Amines and their derivatives
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 - Second law of thermodynamics-I

UNIT V 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: 17UCH04

Time: 3 Hrs                                       Max.Marks:75

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

1. What is Geiger – Nuttal rule?
2. What is mass defect?
3. Why Furan is least aromatic when compared to pyrrole and thiophene?
4. What is Chichibabin reaction?
5. Write any two synthetic uses of diazoacetic ester.
6. How is hexamethylene diamine prepared?
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. What is partial molar free energy?

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

11. a) Discuss the Nuclear forces exchange theory?
   (or)
   b) Write a note on C-14 Dating.
12. a) Discuss the aromatic character of pyrrole.
    (or)
    b) How is isoquinoline synthesised? Write its electrophilic substitution reactions.
    How is it react with HONO and HCHO?
    (or)
    b) Explain the mechanism of diazotisation.
14. a) What are the limitations of the first law of thermodynamics?
   (or)
   b) Discuss the concept of entropy
15. a) Derive Gibbs-Helmholtz derivation.
   (or)
   b) Discuss the Nernst Heat theorem.

Section C (3x10=30)
Answer any three questions

16. Write note on Nuclear reactor.
17. Give the electrophilic substitution reactions of
   a) Furan
   b) Pyridine
18. How are aliphatic amines separated by Hinsbergs and Hofmann methods?
19. Discuss Carnot cycle and derive an expression for the efficiency of a Carnot engine?
20. a) Derive Clapeyron-Clasius 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, 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 liquid NH$_3$ and liquid SO$_2$-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.
3.2. Werner’s theory-conductivity and precipitation studies - Sidgwick’s theory-Effective Atomic Number concept.
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-Calculation of CFSE values of d¹ to d¹⁰ 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 its applications - estimation of metals, hardness of water and sequesterisation.
Inorganic Chemistry - Code: 17UCH05

Time: 3 Hrs                                       Max. Marks: 75

Section A (10 x 2 = 20)

Answer all questions

1. What is leveling effect?
2. What is protic and aprotic solvents?
3. Write electronic configuration of trivalent Lu and Gd.
4. Mention important ores of thorium.
6. Draw the possible isomers of the following complexes i) M(AB)$_3$ ii) M(AA)$_2$a$_2$
7. What is the hybridization involved and geometry of the following Complexes?
   (i) [Co(NH$_3$)$_6$]$^{3+}$
   (ii) [Cr(H$_2$O)$_6$]$^{2+}$
8. What is High Spin complex?
9. What are the uses of trans effect?
10. What is meant by sequesterisation?

Section B (5 x 5 = 25)

Answer All Questions

11. a) Discuss Arrhenius concept of acids and bases.
    (or)
    b) Write chemical reactions in liquid ammonia.
12. a) Write a note on Lanthanide contraction and its consequences.
    (or)
    b) Explain isolation of lanthanides by Ion-exchange method.
13. a) Write postulates of Werner’s Theory and give the structure of [Co(NH$_3$)$_5$Cl]Cl$_2$.
    (or)
    b) Explain Chelate effect.
14. a) Explain why splitting of d-orbitals in tetrahedral is reversed that of octahedral.
   (or)
   b) Compare VBT and CFT.

15. a) What are theories of Trans effect?
   (or)
   b) How do you estimate Hardness of water?

Section C (3 x 10 = 30)

Answer any three questions

16. a) Explain Bronsted Lowry theory.
   b) Discuss HSAB concept.

17. Discuss extraction, properties and uses of Uranium.

18. Discuss Geometrical isomerism in 4 and 6 co-ordinated complex.

19. Give applications of VBT.

20. Explain quantitative applications of co-ordination complex.
ORGANIC CHEMISTRY (60 Hours)

UNIT I Optical isomerism
1.1 Optical isomerism Definition, 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.
1.2. 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.
1.3. 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.
1.4. Optical activity of allenes, spiranes and biphenyls.

UNIT II Geometrical isomerism
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

UNIT- IV Ureides and nucleic acids
4.1. Ureides- Definition, classification- pyrimidines-thymine, uracil (Fischer and Roeder synthesis) and cytosine (Wheeler-Johnson method) -purines-adenine and guanine – Fischer’s synthesis (structural elucidation not necessary)
4.2. 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 Chemistry of natural products
5.2. Terpenes-classification-isolation-isoprene rule-synthesis and structural elucidation of citral, geraniol, alpha pinene.
MODEL QUESTION PAPER
Periyar University Salem
SEMESTER-V
B.Sc. Chemistry — Major core paper – VI

ORGANIC CHEMISTRY - Code: 17UCH06
Time: 3 Hrs                                       Max.Marks:75

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

1. What are optical isomers?
2. Assign R,S notation to the following compounds i) CH₃CHOHCOOH   ii) CH₃CHBrC₂H₅
3. What is meant by 1,3 diaxial interaction?
4. Differentiate between configuration and conformation.
5. How will you prepare tryptophan?
6. What is a Zwitter ion?
7. Outline the preparation of adenine.
8. Write the structure of i) Cytosine ii) Guanine.

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

11. a) Explain the necessary conditions for a molecule to be optically active. 
      (or)
      b) Describe the methods of resolution.
12. a) Discuss the cis-trans isomerism in maleic acid and fumaric acid. 
      (or)
      b) Write the various conformers of ethylene glycol and chlorohydrins and explain their stability.
13. a) How glycine will react with i)CH₃I ii)LiAlH₄. 
      (or)
      b) Discuss the secondary structure of proteins.
14. a) What are nucleic acids? Write the names and the structure of their components. 
   (or)
   b) Discuss the structure of RNA.
15. a) Explain the structure of piperine. 
   (or)
   b) Elucidate the structure of citral.

   Section C (3 x 10 = 30)
   Answer any three questions

16. a) Differentiate between enantiomers and distereoisomers 
   b) What is walden inversion? Give an example 
   c) Illustrate asymmetry synthesis with suitable example.
17. a) Explain the stability of conformers of cyclohexane 
   b) Mention the methods of distinguishing geometrical isomerism.
18. a) Discuss a general properties of amino acids 
   b) Explain denaturation of proteins.
19. a) Explain the structure of DNA. 
   b) Write a note on replication.
20. Write the synthesis of α-pinene.
B.Sc. CHEMISTRY - FIFTH SEMESTER
Major Core Paper – VII
Paper Code: 17UCH07

PHYSICAL CHEMISTRY (60 Hours)

Internal assessment Marks: 25

External Marks: 75

UNIT-I Chemical Equilibrium
1.1. 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 equilibrium constant - van’t Hoff isochore - Pressure dependance of equilibrium constant.
1.2. Adsorption - Physical and chemical adsorption - Types of adsorption isotherms - Freundlich adsorption isotherm - Derivation of Langmuir adsorption isotherm (BET isotherm (postulates only)) - BET equation (statement).

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

UNIT-III Chemical Kinetics-II
3.1. Collision theory of reaction rates - Derivation of rate constant of a bimolecular reaction from collision theory - Failures of CT.
3.2. Lindemann theory of Unimolecular reactions.

3.3. 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-IV Electro chemistry – I
4.1. Metallic and electrolytic conductance – Definitions of specific, equivalent and molar conductances – Relations between them – measurement of conductance and cell constant.
4.2. Variation of conductance with dilution – Qualitative explanation – Strong and weak electrolytes.

UNIT – V Theory of strong electrolytes
5.2. Activity and activity co-efficients of strong electrolytes – ionic strength.
5.5. 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.
MODEL QUESTION PAPER
Periyar University Salem
SEMESTER-V
B.Sc. Chemistry — Major core paper – VII

PHYSICAL CHEMISTRY - Code: 17UCH07

Time: 3 Hrs                                       Max.Marks:75

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

1. When Kp becomes equal to Kx ?
2. Explain the term adsorption.
3. What is order of a reaction.
4. Define activation energy. What happened when Ea becomes zero?
5. What is entropy of activation?
6. Give the failure of collision theory.
7. What are strong electrolytes? Give examples.
8. What is Walden’s rule for mobility of ions?
9. Calculate ionic strength of solution containing 0.1 Molal NaCl and 0.01Molal CaCl₂ assuming complete ionization.
10. State principle of solubility product.

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

11. a) Explain De-Donder’s treatment of chemical equilibria.
    (or)
    b) Explain Freundlich adsorption isotherm.

12. a) Derive the equation for half-life period of a second order reaction.
    (or)
    b) How will you experimentally determine the rate constants for acid hydrolysis of sucrose.

13. a) Discuss the Lindeman theory of unimolecular reactions.
    (or)
    b) Compare ARRT and Collision theory.
14. a) Define
   i) Specific conductance
   ii) Equivalent conductance
   iii) Molar conductance
       (or)
   b) How will you measure equivalent conductance of a solution.
15. a) Explain
   i) Wein effect
   ii) Debye-Falkenhagen effect.
       (or)
   b) State and explain Oswald’s dilution law.

Section C (3 x 10 = 30)
Answer any three questions
    b) Derive the relation between $K_P$, $K_c$ and $K_x$.
17. Derive rate constant of a second order reaction of reactants at different initial concentration.
18. Derive the rate constant of a bimolecular reaction from collision theory.
19. Describe the determination of transport number of Hittof’s method.
20. a) Derive Henderson’s equation.
    b) Calculate the pH of buffer solution containing 0.2 Moles NH$_4$OH and 0.5 Moles NH$_4$Cl per litre. Dissociation constant of NH$_4$OH is $1.81 \times 10^{-5}$. 
ANALYTICAL CHEMISTRY – I (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. Separation techniques- Precipitation, Solvent extraction, Extraction by chemically active solvents, Continous extraction- Soxhlet extraction.

UNIT – II Gravimetric Analysis
2.1 Principle- Theories of precipitation- Solubility product and precipitation- Factors affecting solubility. Conditions of precipitation – Co- precipitation & Post precipitation, Reduction of errors, precipitation from homogeneous solution- Washing and Drying of precipitate. 
2.2 Choice of the precipitant- Specific and Selective precipitants- Anthranilicacid, Cupferon, Dimethyl glyoxime, Ethylene diamine, 8-hydroxyquinoline, Salicylaldoxime-Use of Masking agent. 
2.3 Crucibles- Types, Care and uses. Calculation in gravimetric analysis- Use of Gravimetric factor.

UNIT – III U.V-Visible Spectroscopy
UNIT-IV I.R. Spectroscopy
4.1. I.R. Spectroscopy - Principles - modes of vibration of diatomic, triatomic linear (CO$_2$) and non-linear triatomic molecules (H$_2$O) - stretching and bending vibrations - selection rules. Expression for vibrational frequency (derivation not needed) - instrumentation - sampling techniques - Applications.

UNIT-V Raman spectroscopy
5.1. Raman spectroscopy - condition - Rayleigh and Raman scattering, stokes and antistokes lines – Instrumentation. Differences between Raman and I.R. Spectroscopy. Mutual exclusion principle (CO$_2$ and N$_2$O)
5.2. SEM, TEM Studies - Elementary idea and applications.
MODEL QUESTION PAPER
Periyar University Salem
SEMESTER-V
B.Sc. Chemistry — Elective paper – I

ANALYTICAL CHEMISTRY I - Code: 17UCHE01

Time: 3 Hrs                                      Max.Marks:75

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

1. Define accuracy and precision.
2. What is sublimation? Give example.
3. Define gravimetric factor. Give example.
4. Define Solubility product.
5. Define blue and red shift.
6. What is Beer-Lamberts law.
7. Draw the vibration modes of H₂O molecule.
8. Write the selection rule for IR spectroscopy.
9. What is Rayleigh Scattering?
10. Define the term SEM. Give any one of its use.

Section B (5 x 5 = 25)
Answer All Questions

11. a) What is determinate and indeterminate errors? Explain with examples.
    (or)
    b) Write a note on mean, median, mean deviation, standard deviation and confidence limit.
12. a) Write the applications of solubility product principle in gravimetric analysis.
    (or)
    b) Explain with example specific and selective precipitants.
13. a) Explain any two application of UV visible spectroscopy.
    (or)
    b) Write a note on Born-oppenheimer approximation.
14. a) Explain various types of vibrations.
    (or)
    b) Explain how hydrogen bond is detected by IR spectroscopy.
15. a) What are differences between IR and Raman spectra.
    (or)
    b) Explain the principle of TEM and its applications.

    Section C (3 x 10 = 30)
    Answer any three questions

16. a) Explain the methods used for minimization of errors.
    b) How is Soxhlet extraction method used for the separation of solids.
17. a) Write a note on precipitation from Homogeneous solution.
    b) Explain co-precipitation and post precipitation with examples.
18. a) Explain various types of electronic transitions.
    b) Explain the term chromophores and auxochromes.
19. Explain the instrumentation of IR spectrometer.
20. Write a note on
    i) Mutual exclusion principle
    ii) Stokes and antistokes lines.
UNIT – I FERTILIZERS

UNIT – II MANURES
Bulky organic manures – Farm yard manure – handling and storage-oil cakes- blood meal – fish manures.

UNIT – III PESTICIDES AND INSECTIDES
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
SEMESTER-V
B.Sc. Chemistry — Skill Based Elective Course – III

AGRICULTURAL CHEMISTRY - Code: 17UCHS03

Time: 3 Hrs                                       Max.Marks:75

Section A (10 x 2 = 20)

Answer all questions

1. Define fertilizer. Give one example.
2. What are complex fertilizers.
3. What are manures?
4. What is the use of oil cakes?
5. How are borates used as an insecticide?
6. Define toxicity.
7. What are attractants?
8. Name two rodenticides.
10. What are the minerals present in the soil?

Section B (5 x 5 = 25)

Answer all questions

11. a) Discuss the role of phosphorus in plant growth.
    (or)
    b) How is urea prepared?
12. a) What are differences between fertilizers and manures.
    (or)
    b) Write a note on farm yard manure.
13. a) What are the safety measures while using pesticides?
    (or)
    b) How is DDT prepared? How is it useful?
14. a) Discuss sulphur compounds used as a fungicide.
   (or)
   b) How is Bordeaux mixture prepared? What are its uses?
15. a) Write a note on soil water.
   (or)
   b) How is soil acidity tested?

Section C (3 x 10 = 30)

Answer any three questions

16. Discuss the role of micronutrients in plant growth.
17. Write notes on handling and storage of manures.
18. Discuss the classification of pesticides.
19. a) Discuss the methods to preserve seeds.
    b) What are repellants? What are its uses?
20. Discuss classification and properties of soils.
B.Sc. CHEMISTRY - FIFTH SEMESTER
Skill Based Elective Course –IV
Paper Code: 17UCHS04

Internal assessment Marks: 25
External Marks : 75

DYE STUFFS AND TREATMENT OF EFFLUENTS (30 Hours)

UNIT-I
1.1 Introduction, Definition- Dye, colour, chromophore, auxochrome, bathochromic effect and hypsochromic effect
1.2 Classification- acid, base, azo, vat and reactive dyes.

UNIT-II
2.1 Various methods of dyeing- Direct, vat, mordant and disperse.
2.2 Anthroquinone and Mordant Dyes- synthesis and applications of Alizarin.

UNIT III
3.1 Diphenylmethane Dyes- synthesis and application of Auramine-
3.2 Triphenylmethane Dyes- Malachite Green, Crystal Violet, Pararosaniline- Preparation and applications.
3.3 Indigo Dyes- Preparation and application of Indigo. Derivatives of Indigo-Synthesis and uses of Indigosol and tetrabromo indigo-(Ciba blue)

UNIT-IV
4.1 Phthalein Dyes- Phenolphthalein- Preparation and applications
4.2 Xanthein Dyes- Rhodamine B, Fluorescein - Preparation and applications.
4.3 Acridine dyes- synthesis and application of Acridine orange NO
4.4 Reactive dyes – synthesis and applications of Procion Blue HB.
UNIT-V

References:

1. B.K. Sharma, Industrial Chemistry, Goel Publishing co, 1997
3. R.S. Prayag, Dyeing of wool, Silk and man made fibres.
4. V.A. Shenai, Chemistry of Dyes and Principles of Dyeing.
MODEL QUESTION PAPER
Periyar University Salem
SEMESTER-V
B.Sc. Chemistry — Skill Based Elective Course – IV
Code: 17UCHS04
Dye stuffs and treatment of Effluents

Time: 3 Hrs                                       Max.Marks:75

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

1. What are dyes?
2. Define auxochrome. Give example.
3. What are anthroquinone dyes?
4. What is disperse dyeing?
5. How is crystal violet prepared?
6. What are Indigo dyes?
7. Define phthanlein Dye?
8. What are Reactive dyes?
9. What are degradable wastes?
10. What is photo oxidation process?

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

11. a) Discuss bathochromic and hypsochromic effects?

   (or)

   b) What are special characters of a good dye?

12. a) Give the preparation and application of Alizarin.

   (or)

   b) Discuss vat dyeing?

13. a) Give the preparation and uses of Indigo.

   (or)

   b) How is Auramine prepared? Mention its uses?
14. a) How is acridine orange NO prepared? Mention its uses?  
   (or)  
   b) Write the preparation and uses of phenolphthalein. 
15. a) Give the characteristics of textile effluent. 
   (or)  
   b) What are the effect of untreated effluent? 

Section C (3 x 10 = 30)  
Answer any three questions 

16. Discuss classification of dyes? 
17. Write a note on various methods of dyeing? 
18. Give the preparation and uses of Pararoseaniline and tetrabromo Indigo? 
19. Give the preparation and uses of Fluorescein & Procion Blue HB. 
20. Explain the various process of treatment of textile effluents.
B.Sc. CHEMISTRY- SIXTH SEMESTER  
Core Chemistry Major Paper –VIII  
Paper Code: 17UCH08  
Internal assessment Marks: 25  
External Marks :75  

INORGANIC CHEMISTRY (60 Hours)

UNIT-I Bioinorganic Chemistry

1.1. Essential and trace elements in Biological processes- Biological role of Haemoglobin and Chlorophyll (elementary idea of structure and function)
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.

UNIT II 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 –Zeise’s salt –synthesis and structure
2.5. Cyclopentadienyl complexes -Ferrocene- preparation, properties, structure and uses.
2.6. Uses of organometallic compounds.

UNIT-III Nano Science

3.1. Introduction- Definition- types- quantum dots, Nano rods, Fullerenes and Carbon nanotubes-nano wires and crystals, nano composites and cliusters-properties of nano materials – Plasmon resonance.
3.2. Preparation of Nano structured materials- Bottom up and Top down Approaches- Methods of preparation of nanomaterial - Plasma arcing, Chemical vapour deposition, Electro deposition, Sol-gel synthesis, Ball-milling, Chemical reduction.

3.3. Application of nano materials - Use of natural nano particles(elementary treatment only)- Catalysis, Environmental and Bio medical (Drug delivery) applications.

UNIT IV - Some Special compounds

4.1. Classification and structure of carboranes.
4.2. Boron Nitride-Borazole-metal Borides (elementary idea)
4.3. Interhalogen Compounds-Naming of the compounds-Types, Preparation, properties, structure and uses of ICl, BrF₃, IF₅, IF₇. Basic properties of Iodine.
4.4. 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
SEMESTER-VI
B.Sc. Chemistry — Major core paper – VIII
INORGANIC CHEMISTRY - Code: 17UCH08

Time: 3 Hrs                                           Max.Marks:75

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

1. Write the structure and functions of Haemoglobin.
2. Give the composition and uses of Mica.
3. How do you prepare t-butyl Lithium.
4. List any two uses of organometallic compounds.
5. Define nanocomposites.
6. What are quantum dots?
8. What are carboranes?
9. Write point group of \( \text{NH}_3 \) and \( \text{CO}_2 \).
10. Define magnetic susceptibility.

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

11. a) Write the preparation, structure and properties (any two) of \( \text{Fe}_2(\text{CO})_9 \).
   (or)
   b) Explain the bonding in Metallic carbonyls.

12. a) Describe synthesis and structure of Zeise’s salt.
   (or)
   b) What are organometallic compounds? How are classified?

13. a) Give an account of fullerenes and carbon nano tubes.
   (or)
   b) Discuss any four applications of nano materials.
14. a) Write a note on boron nitrides.
   (or)
   b) Write the basic property of Iodine.
15. a) Distinguish between ferromagnetism and antiferromagnetism.
   (or)
   b) What are symmetry elements and symmetry operations.

Section C (3 x 10 = 30 Marks)

Answer any three questions

16. How are silicates classified? Give structure for each type.
17. Write the preparation, properties and structure of ferrocene.
18. Write various methods of preparation of nanomaterials.
19. What are interhalogen compounds? Write preparation, properties and structure of IF$_7$ and BrF$_3$.
20. a) How is magnetic moment of a material is determined with Guoy Balance?
   b) Write the symmetry elements present in H$_2$ and H$_2$O molecule.
B.Sc. CHEMISTRY - SIXTH SEMESTER
Elective Paper – II
Paper Code: 17UCHE02

Internal assessment Marks: 25
External Marks: 75

ORGANIC CHEMISTRY (75 Hours)

UNIT I Carbohydrates
1.2. Interconversion of monosaccharides- conversion of pentose to hexose and vice-versa, aldose to ketose and vice-versa
1.3. Disaccharides- structural elucidation of sucrose and maltose, Polysaccharides-structure of starch and cellulose - derivatives of cellulose.

UNIT II Vitamins and antibiotics
2.1. Vitamins- occurrence and biological importance of Vitamin A, Thiamine, Riboflavin, Pyridoxin and Ascorbic acid. – Synthesis and structural elucidation of ascorbic acid.
2.2. Antibiotics- structural elucidation of penicillin G and chloromycetin.

UNIT III Molecular rearrangements
3.1. Classification as anionotropic, cationotropic, intermolecular and intramolecular.

UNIT IV 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.
UNIT V Green Chemistry

5.1. Green Chemistry- Principle & Greener Reactions- Definition, need of green chemistry, Twelve basic principles of green chemistry- Planning a green synthesis in a chemical laboratory- Solvent-less reactions, Selection of appropriate solvent.

5.2. Use of microwaves- Fundamentals of closed-vessel heating and sonication- Water as green solvent- reactions in ionic-liquid, Solid support organic synthesis, Phase transfer catalyst (PTC) (Simple treatment only).
MODEL QUESTION PAPER
Periyar University Salem
SEMESTER-VI
B.Sc. Chemistry — Major Elective paper – II
Organic Chemistry - Code: 17UCHE02

Time: 3 Hrs                                       Max.Marks:75

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

1. Define mutarotation.
2. What is epimerization?
3. Write the structure and uses of Vitamin A.
4. Name the sources and deficiency diseases of Vitamin C.
5. What is Cope rearrangement?
6. Illustrate intramolecular rearrangement with an example.
7. Mention two applications of alcoholic KOH.
8. Write the reducing properties of LiAlH₄.
9. What is green chemistry?
10. Mention the tools for materializing green reaction.

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

11. a) What is the action of fructose with i) HNO₃ ii) HCN iii) AC₂O
    (or)
    b) Write the conformation of glucose and fructose.

12. a) Elucidate the structure of chloromycetin.
    (or)
    b) Discuss the biological importance of pyridoxine.

13. a) Write the mechanism of pinacol-pinocolone rearrangement.
    (or)
    b) Explain Beckmann rearrangement.

14. a) Write the oxidative properties of Osmium tetroxide
    (or)
    b) Mention the applications of anhydrous aluminium chloride and phosphorous pentoxide.
15. a) How will you use microwave as a green chemical tool in the laboratory.
   
   (or) 
   
   b) What is the need for green chemistry.

Section C (3 x 10 = 30)
Answer any three questions

16. Discuss the constitution of maltose.
17. a) Write the sources and biological importance of Riboflavin
   
   b) Write the structural elucidation of ascorbic acid.
18. Bring out the relationship between Hofmann, Curtius, Lossen and Schmidt rearrangements.
19. Give the functions of the following reagents and their use in organic chemistry.
   
   1) PCl$_5$  2) Zn/Hg-HCl  3) HIO$_4$  4) H$_2$/Pd – BaSO$_4$
20. Enumerate the basic principle of green chemistry.
PHYSICAL CHEMISTRY (60 Hours)

UNIT-I Solutions
1.1. Solutions of gases in liquids – Henry’s law- solutions of liquids in liquids-Raoult’s law-
Binary liquid mixture-ideal solution- deviation from ideal behaviour-Thermodynamics of ideal
solutions- curves,(V-P-temperature curves) Azeotropic distillation.
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 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 – III Electro chemistry – II
Standard cell – types of reversible single electrodes – standard Hydrogen electrode – calomel
electrode – Derivation of Nernst equation both for emf of cells and single electrode potentials –
Nernst theory for single electrode potential – standard reduction potentials – electro chemical
series – significance.
3.2. Application of emf measurements – Application of Gibbs – Helmholtz equation to galvanic
cells – calculation of thermodynamic quantities – pH using hydrogen, quinhydrone and glass
electrodes – potentiometric titrations.
UNIT – IV

UNIT – V 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  
SEMESTER-VI  
B.Sc. Chemistry — Major Core Paper — IX  
Physical Chemistry  - Code: 17UCH09  

Time: 3 Hrs  
Max.Marks:75  

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

1. Under what condition Roult’s law is obeyed by solution of liquid in liquid.  
2. Find the molal elevation constant of water, evaporates at 100ºC with absorption of 40669.2 Joule per mole. ( R= 8.314 J/K).  
3. What is congruent melting point?  
4. Give an example each for a) efflorescence b) deliquescence.  
5. Write the Nernst equation for EMF of cells.  
6. Write the cell reaction for the following cells. Zn/ZnSO₄ (aq) /AgNO₃ (aq) / Ag  
7. Give the example each for concentration cell with and without transference.  
8. Define overvoltage.  
9. What is Grotthus-Draper law?  
10. What is Chemiluminescence?  

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

11. a) Derive thermodynamically Nernst distribution law.  

(or)  
b) Discuss Azeotropic distillation.  
12. a) Explain phase diagram of Zinc - Magnesium system.  

(or)  
b) Explain Phenol-Water system and the effect of impurity on CST.  
13. a) Explain the function of Weston standard cell.  

(or)  
b) Give an account of Potentiometric titrations.
14. a) Derive LJP expression at the junction of two electrolytic solutions.  
   (or) 
   b) Explain construction and working of Lead storage battery. 
15. a) Explain Jablonski diagram for radiative and nonradiative transitions.  
   (or) 
   b) What are Lasers? Give its uses. 

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

   **Answer any three questions**

16. Derive an expression connecting molality of dilute solution with its freezing point depression. 
17. Explain Sulphur system using Clausius-Clapeyron equation. 
18. a) How will you determine the $p^H$ of a solution using quinhydrone electrode?  
   b) Discuss working of Calomel electrode. 
20. a) Discuss the kinetics of reaction between $H_2$ and $Br_2$.  
   b) Write notes on Photosensitisation.
UNIT I  CHROMATOGRAPHIC TECHNIQUES
1.1 Column Chromatography- principle, types of adsorbents, preparation of the column, elution, recovery of substances and applications.
1.2 TLC- principle, choice of adsorbent and solvent, preparation of chromatoplates, Rf -values, factors affecting the Rf-values. Significance of Rf-values.
1.3 Paper Chromatography- principle, solvents used, development of chromatogram, ascending, descending and radial paper chromatography.
1.4 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.
1.5 Gas Chromatography (GC)-principle- experimental techniques-instrumentation and applications.

UNIT II - THERMOANALYTICAL METHODS
2.1. 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 H₂O-Simultaneous DTA-TGA curves of SrCO₃ in air and CaC₂O₄.H₂O in air and in CO₂- factors affecting TGA & DTA curves.
2.2 Thermometric titrations-principle- apparatus- applications.

UNIT-III - ELECTRO ANALYTICAL METHOD
3.1 Polarography- principle, concentration polarization, dropping mercury electrode (DME)-advantages and disadvantages- migration, residual, limiting and diffusion currents- Use of supporting electrolytes-Ilkovic equation (derivation not required) and significance- experimental assembly- current voltage curve- oxygen wave-influence of temperature and agitation on diffusion layer. Half wave potential (E½)- Polarography as an analytical tool in quantitative and qualitative analysis.
3.2 Amperometric titrations Basic principle – titrations- advantages, disadvantages – applications.

UNIT IV NMR SPECTROSCOPY
4.1. NMR Spectroscopy- principle of nuclear magnetic resonance, 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 MASS SPECTROSCOPY
5.1 Mass spectroscopy- Basic principles- instrumentation- molecular ion peak, base peak, metastable peak, isotopic peak- their uses. Nitrogen rule- ring rule-fragmentation.

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.
MODEL QUESTION PAPER
Periyar University Salem
SEMESTER-VI
B.Sc. Chemistry — Elective Paper –III
Analytical Chemistry – II - Code: 17UCHE03

Time: 3 Hrs                                       Max.Marks:75

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

1. What is chromatography?
2. What is elution in chromatography?
3. What are the Principles of TGA?
4. What are the factors that influence thermogram?
5. Write three types of current in polarography?
6. Write Ilkovic equation?
7. Write the Resonating conditions of NMR?
8. Define chemical shift?
9. What is base peak?
10. What is Ring rule?

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

11. a) Explain the types of adsorbents used in adsorption chromatography?
   (or)
   b) Define Rf value? Write the factors affecting it?

12. a) Write application of TGA?.
   (or)
   b) Draw and explain TG curve of calcium oxalate monohydrate

13. a) Write the advantages of DME?
   (or)
   b) Explain concentration polarization?

14. a) Explain the coupling constant in NMR.
   (or)
   b) What are advantages of TMS as internal standard?
15. a) Write a note on metastable peak. 
      (or) 
      b) Explain McLafferty rearrangement.

Section C (3 x 10 = 30)
Answer any three questions

16. Explain the principle techniques and separation of TLC
17. Explain Thermometric Titrations and its applications
18. a) Discuss the application of Polarography in Qualitative and quantitative analysis
      b) what are advantages of Amperometric titrations?
19. a) write interpretation of NMR spectra of i) ethyl acetate ii) ethyl amine
      b) Explain factors affecting chemical shift
20. Write in detail
      i) Molecular ion peak
      ii) Isotopic peak
      iii) Nitrogen rule
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.
MODEL QUESTION PAPER
Periyar University Salem
SEMESTER-VI
B.Sc. Chemistry — Skill Based Elective Course - V
Pharmaceutical Chemistry - Code: 17UCHS05

Time: 3 Hrs                                       Max.Marks:75

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

1. Define the term Pharmacophore and give one example.
2. What are the differences between virus and fungus?
3. How is sulphapyridine prepared?
4. Write the structure of ampicillin.
5. Define analgesics and give one example.
6. How is methyl salicylate prepared?
7. What are the disadvantages of ether?
8. Mention any two advantage of nitrous oxide.
9. Define Hypoglycemic agents & give one example.
10. Write the uses of adadodai.

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

11. a) Write a note on 1) Fungus 2) Actinomyces
    (or)
    b) Discuss metabolites and antimetabolites
12. a) Define antibiotics. How is it classified?
    (or)
    b) Explain the mode of action of pencilin.
13. a) How is aspirin prepared? What are its disadvantages?
    (or)
    b) How are analgesics classified? Give examples.
14. a) What are the advantages and disadvantages of chloroform.
    (or)
    b) Discuss the mode of action of folic acid.
15. a) Write a note on hypoglycemic drugs.

(or)

b) Discuss the medicinal uses of Kilanelli and thoothuvalai.

Section C (3 x 10 = 30)

Answer any three questions

16. a) Write a note on therapeutic index

b) Pharmacodynamic and pharmacopoea

17. a) How is sulphadiazine prepared? What are its uses?

b) Discuss the mode of action of sulpha drugs.

18. Write a note on

i) Morphine

ii) Heroin

19. Describe intravenous and local anaesthetics.

20. Write the causes, prevention and control methods of AIDS.
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 & Cleansing Agents
Paints & Varnishes: Primary constituents of paints, Dispersion medium (solvent), binder, Pigments, formulation of paints and varnishes. Requirements of a good paint, manufacture.
Cleansing Agents: Preparation of toilet and washing soaps, synthetic detergents-alkyl aryl sulphonate and cleansing action of soaps.

UNIT V Cement & Glass
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
SEMESTER-VI
B.Sc. Chemistry — Skill Based Elective Course - VI

INDUSTRIAL CHEMISTRY - Code: 17UCHS06
Time: 3 Hrs                                       Max.Marks:75

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

1. What is TNT?
2. Give the preparation of picric acid?
3. What is curing in leather industry?
4. Mention the toxic metals present in tannery effluents?
5. What are primary cells?
6. Write the uses of caustic soda and sodium chlorate.
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)
Answer all questions

11. a) Explain rocket propellants.
   (or)
   b) Write notes on i) cordite ii) RDX
12. a) How are hides and skins of animals preserved in Tanning Industry?
   (or)
   b) Explain process of dehairing 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 wet process?
   (or)
   b) How is optical glass prepared?

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

   Answer any three questions

16. Give the preparation of the following explosives.
   i) Gun powder
   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) Explain cleansing action of soap.

20. Explain the setting of cement with equation.
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
      Estimation of ferrous iron. Standard Oxalic acid.
   3. Dichrometry
      Estimation of ferrous iron using diphenylamine internal indicator std FeS0₄.
   4. Iodometry and iodimetry
      Estimation of potassium dichromate std K₂Cr₂O₇
   5. Complexometric Titrations
      a) Estimation of Zn and Mg using EDTA.
      b) Estimation of hardness of water

II. INORGANIC PREPARATIONS.
   a) Ferrous ammonium sulphate.
   b) Tetraammine copper(II) Sulphate.
   c) Microcosmic salt
   d) Bis (acetyl acetonato) Nickel (II) or Copper (II)
   e) Tris (Thiourea) copper(II) sulphate dihydrate
   f) Potassium tri (oxalato) ferrate-III
Name of the Course : B.Sc.Chemistry       Major Core Practical I-17UCHP01

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.
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.

2. 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.
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.
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.
   c) Rate constant for the reaction between persulphate -KI


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. Phase rule: Simple Eutectic system – Naphthalene-Biphenyl

5. Electrochemistry:
   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
Major Core Practical III-17UCHP03
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 Kf 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 for Iodination of acetone.
6. Determine the molar depression constant Kf 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.
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
6. Estimation of Nickel as Nickel DMG

II. A. ORGANIC QUALITATIVE ANALYSIS
Analysis of organic compounds. Characterisation of organic compounds by their functional groups and confirmation by preparation of derivative. The following functional groups may be studied:

Aldehydes, Ketones, carboxylic acids, aromatic primary amines, phenol, aromatic ester, amide, diamide, anilide, nitro compounds and monosaccharides.

b. ORGANIC PREPARATIONS
1. Preparations involving the following:
   a) Oxidation of benazldehyde.
   b) Hydrolysis of Methyl salicylate or ethyl benzoate.
   c) Nitration – p-nitroacetonilide and m-dinitrobenzene
   d) Bromination – p- bromoacetanilide and tribromophenol
   e) Benzoylation — β-naphthylbenzoate
2. Determination of boiling point of liquids.
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.
7. Madan R.D., Inorganic Chemistry, 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.,

II. Organic Chemistry
11. Agarwal and Manivasagam -Reactions and Reagents- Pragati Prakashan

III. Physical Chemistry
10. Glasstone, Thermodynamics for Chemists, Van Nostrand and Co.,
17. Kuriacose and Rajaram, Chemical Thermodynamics, S. Nagin .
20. Physical Chemistry G. K. Vemulapalli.,(PHI) ( Eastern Economy Editions)

IV. Analytical Chemistry
5. William Kemp, Organic Spectroscopy – ELBS.
10. Walter E Harris

V. Pharmaceutical Chemistry
2. Bentley and Drivers, Pharmaceutical Chemistry.
3. Allion Chidambaram, 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

**VIII. Nano science**
2. Nano science and technology – K.K. Chowdhry
3. Nano Technology, Nano material and nano devices – G.Mohankumar
ALLIED CHEMISTRY  
Paper Code : 17UCHA 01  
FIRST/THIRD SEMESTER PAPER-I

Internal Assessment Marks: 25  
External Marks: 75

INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY-I (60 HOURS)

UNIT-I Chemical Bonding

1.1 Types of Bonding- Ionic Bond, covalent Bond and coordinate bond Molecular Orbital Theory-bonding, antibonding and nonbonding orbitals. M.O. diagrams of Hydrogen, Helium, Nitrogen, discussion of bond order and magnetic properties.

1.2. Hydrides-classification and characteristics - preparation, properties and uses of Borazole, NaBH$_4$ and LiAlH$_4$.

UNIT-II Nuclear Chemistry

2.1. Natural radioactivity-radioactive series including Neptunium series-Group displacement law.
2.2. Nuclear Binding energy, mass defect-Calculations.
2.3. Nuclear Fission and Nuclear Fusion-differences – Stellar energy.
2.4. Nuclear reactors, Applications of radioistopes-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 Aromatic compounds

4.1. Aromatic compounds-Aromaticity-Huckel’s rule

4.2. Electrophilic substitution in Benzene-Mechanism of Nitration, Halogenation-Alkylation, Acylation.

4.3. Isolation, preparation,properties and structure of Naphthalene Haworth’s synthesis.

4.4. Heterocyclic compounds:- Preparation, properties and uses of Furan, Thiophene, Pyrrole.
UNIT-V Solutions & Chromatography

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 : 17UCHA01

Time : Three hours. Maximum : 75 Marks

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

1. Define Ionic bond ?
2. How is NaBH4 prepared?
3. What is Binding energy?
4. What are radioisotopes?
5. What is meant by Hybridisation?
6. What is optical activity?
7. State Huckel’s rule.
8 Give Diels –Alder reaction shown by Furan.
10. State principle of TLC?

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 Nuclear fission and Nuclear fusion.
   (or)
   b) Explain mass defect?.
13. a) Explain Resonance and steric effect?
   (or)
   b) Explain Elements of symmetry?
14. a) What is aromaticity? explain with examples.
   (or)
   b) Explain Haworth synthesis of Napthalein?
15. a) Describe separation of liquids by fractional distillation.
   (or)
   b) Explain column chromatography?

Section C (3 x 10 = 30)

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 Borazole and indicate three of its chemical properties.

17. a) What is natural radioactivity? Explain with examples?
   b) Discuss application of radioisotope?

18. a) Discuss the geometrical isomerism in Maleic acid and fumaric acid.
   b) Explain resolution methods.

19. a) Write mechanism of acylation in benzene
   b) How is pyrrole prepared? Explain five of its chemical properties

20. Give the principle, method and applications of paper chromatography.
UNIT-I Co-ordination chemistry
1.2. Werner's theory-conductivity and precipitation studies. Sidgwick's theory-Effective Atomic Number concept.
1.4. Biological role of Haemoglobin and Chlorophyll (Elementary idea of structure and functions).

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

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


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

UNIT-V

5.1. **Electro Chemistry**: Kohlrausch law -measurement of conductance, pH determination. Conductometric titrations.

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 : 17UCHA02

Time : Three hours.                                                                                   Maximum : 75 Marks

Section – A (10 x 2 = 20)

Answer all the questions

1. Write the formula of HexachloroPlatinum (IV) Chloride and Potassium hexacyanoferrate (III)
2. What are ligands? Give example.
3. How are carbohydrates classified?
4. How do you prepare glycine by Gabriel’s phthalimide synthesis.
5. What are antibiotics? Give examples.
6. What are tranquilizers? Give one example.
7. State Grotthus- Draper law.
8. Define the terms a) phase b) component.
9. Draw conductometric titration curve between NaOH and CH₃COOH.
10. Define standard electrode potential.

Section B(5 x 5 = 25)

Answer all questions

11. a) Explain EAN concept.
     (or)
     b) Explain the biological importance of Haemoglobin.
12. a) How is fructose converted to glucose?
     (or)
     b) Discuss the preparation and properties of alanine
13. a) What are different types of analgesics? Give examples.
     (or)
     b) Write an account of cause and treatment of AIDS.
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)
    Answer any three questions
16. a) What are the postulates of Pauling’s theory?
    
    b) What are the biological functions of chlorophyll?
17. Write 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 Pb-Ag system.
20. i) What is pH? How would you determine it?
    
    ii) State Kohlrausch law and explain its applications.
I. TITRIMETRY

a) Estimation of Sodium hydroxide - Standard sodium carbonate.
b) Estimation of Hydrochloric acid - Standard Oxalic acid.
c) Estimation of Ferrous sulphate – Standard Mohr’s Salt.
e) Estimation of Ferrous iron using diphenylamine as internal indicator.

II. Organic Analysis:

a) Detection of elements- nitrogen, sulphur and halogens.
b) Detection of aliphatic or aromatic.
c) Detection of whether saturated or unsaturated compounds.
d) 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.Allied Chemistry Practical
(PAPER CODE: 17UCHAP01)
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  - 17UCHN01
2. Textile Chemistry - 17UCHN02
3. Industrial Chemistry - 17UCHN03
4. Biological Chemistry - 17UCHN04
5. Medicinal Chemistry - 17UCHN05
6. Food Chemistry  - 17UCHN06
7. Agro Chemistry   - 17UCHN07
8. Polymer & Plastics - 17UCHN08

NOTE:

Any two papers from the above eight papers may be choosen for all B.A/B.Sc. students except B.Sc.Chemistry major students for NMEC in semester III and IV and the same must be communicated to the University for Examination purpose.
DEPARTMENT OF CHEMISTRY
NON MAJOR ELECTIVE COURSE I
PAPER CODE: 17UCHN 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
2. Milk proteins: Physical properties of milk proteins-Electrical properties and hydration,
solubility. Reaction of milk proteins with formaldehyde and ninhydrin.
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
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 I

Diary Chemistry - Code :17UCHNO1

Time : Three hours  Maximum : 75 Marks

Section – A (10 x 2 = 20)

1. What are the composition of milk?
2. Write any two factors affecting gross composition of milk.
3. Define milk lipids.
4. What are the vitamins present in milk?
5. Define creams.
7. What is the need for making milk as powder?
8. What are composition of Ice Cream?
10. Write two examples for dairy detergents.

Section B (5 x 5 = 25)

11. a) What is meant by pasteurization 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 quality of 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)**

**Answer any three questions**

16. a) Write a note on
    i) Sterilisation
    ii) Homogenization.

17. a) Write reaction of milk protein with formaldehyde and ninhydrin.
    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.
TEXTILE CHEMISTRY (30 Hours)

UNIT - I
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 :17UCHN02

Time : Three hours                                                                                   Maximum : 75 Marks

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

1. Write any two 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 is meant by scouring process?
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)
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) What are impurities of raw wool and silk?
    (or)
    b) How are the impurities removed from wool and silk?
14. a) Write a note on dyeing of wool and silk 
(or) 
  b) Write about the properties of dyed synthetic material .
15. a) Write the mechanical finishes on wool and silk. 
(or) 
  b) What is meant by anticrease and anti shrink finishes?

Section C (3 x 10 = 30) 
Answer any three questions

16. a) Write a note on Natural cotton fibres. 
   b) Explain the Natural protein fibres.
17. a) Write a note on modified cellulose fibres. 
   b) Discuss 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) Discuss the methods of Mercerizing. 
   b) Write a note on water proofing.
INDUSTRIAL CHEMISTRY (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  Code:17UCHN03

Time : Three hours.                                                                                     Maximum: 75 marks

Section – A (10 x 2 = 20)

Answer all the questions

1. What are advantages of urea?
2. Mention the names of any two fertilizers containing phosphorous.
3. Name any two sugar industries in India.
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 COD.
10. What is reverse osmosis?

Section B (5 x 5 = 25)

Answer all questions

11. a) Write notes on triple superphosphate.
    (or)
   b) Write fertilizers industries in India.
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)  
Answer any three questions  

16. Discuss the main feature of  
   i) Nitrate salts  
   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
BIOLOGICAL CHEMISTRY (30 HOURS)

UNIT I Amino acids and Nucleic acids
Amino acids- classification, essential and nonessential aminoacids and functions.
Nucleic acids-DNA,RNA-constituents, structure and functions.

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

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

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

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


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

Model Question Paper  
Periyar University Salem  
B.Sc., Chemistry Non – Major Elective Course IV  

BIOLOGICAL CHEMISTRY  Code : 17UCHN04  

Time : Three hours  
Maximum: 75 marks  

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

1. What are amino acids?  
2. Name the nitrogenous bases present in DNA.  
3. Mention any two functions of lipids.  
4. Name any two monosaccharides.  
5. Mention any two diseases caused by the deficiency of Vitamin K.  
6. What are the sources of Vitamin B6?  
7. Give any two diseases caused by the deficiency of Selenium.  
8. What are the sources of Copper?  
10. What are Hormones?  

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

11. a) What are the functions of RNA?  
(or)  
   b) What are essential and non essential amino acids? Give examples.  
12. a) Write notes on classification of lipids.  
(or)  
   b) Write notes on difference between oils and fats.  
13. a) Describe the functions, sources and deficiency disorder of Vitamin A  
(or)  
   b) Describe the functions, sources and deficiency disorder of Vitamin C.
14. a) What are the biological functions of calcium.
   (or)
   b) Mention the deficiency disease caused by Phosphorous and Magnesium.

15. a) Write notes on classification of enzymes
   (or)
   b) What are the biochemical functions of oxytocin?

Section C (3 x 10 = 30)
Answer any three questions

16. Write note on the structure of DNA.
17. Define and classify carbohydrates.
18. Classify vitamins and briefly discuss functions, sources and deficiency disorders of
   Vitamin K and E.
19. Discuss the sources, biochemical functions and deficiency diseases of Na, K and Ca.
20. Write note on the biochemical functions Adrenaline and Thyroxine.
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 rofile – HDL, LDL cholesterol lipid lowering drugs. (Structure not required)
UNIT V-Health promoting drugs

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

RECOMMENDED TEXT BOOKS:

1. S. Lakshmi Pharmaceutical Chemistry, S. Chand & Sons, New Delhi, 2004
2. V.K. Ahluwalia and Madhu Chopra, — Medicinal Chemistry, Ane Books, New Delhi, 2008

RECOMMENDED REFERENCE BOOKS

3. Romas Nogrady, Medicinal Chemistry, Oxford Univ. Press
MODEL QUESTION PAPER
Periyar University Salem
DEPARTMENT OF CHEMISTRY
NON MAJOR ELECTIVE COURSE V
MEDICINAL CHEMISTRY PAPER CODE-17UCHN05

Time : Three hours                                                                                Maximum: 75 marks

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

1. Define Pharmacology.
2. What is therapeutic index?
3. Write the medicinal uses of Thulasi.
4. Mention any two factors affecting metabolism of drugs
5. What is an antipyretics? Give example.
6. What are antivirals? Give example.
7. Define blood pressure.
8. What are Hypoglycemic drugs? Give example.
9. What are the uses of amino hippuric acid?
10. What are the biological functions of Zinc?

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

11. a) Explain some hereditary diseases.
    
    (or)

    b) Write a note on air borne diseases.

12. a) Write briefly on the classification of drugs.
    
    (or)

    b) Write a note on drug receptors and biological responses.

13. a) Discuss causes of cancer.
    
    (or)

    b) Discuss analgesics drugs.
14. a) What are LDL and HDL? Discuss their functions.
   (or)
   b) Describe hypertensive drugs.

15. a) Define antioxidants. How are they useful?
   (or)
   b) Write the medicinally important compounds of Iron.

Section C (3 x 10 = 30)
Answer any three questions

16. Write a detailed account on adsorption of drugs.
17. Write a detailed account on sources of drugs and metabolism of drugs.
18. Write notes on symptoms, prevention and treatment of Cancer.
19. Write an account on Cardiovascular drugs.
20. What are the deficiency diseases of Vitamins A, C and K.
FOOD CHEMISTRY (30 Hours)

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

UNIT-II Food Poisoning & Adulteration
Food poisoning, Sources, causes and remedy.
Adulteration-intentional, unintentional – common adulterants in food.
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)
4. Srilakshmi: Food science
MODEL QUESTION PAPER
Periyar University Salem
B.Sc. Chemistry Non – Major Elective Course VI
FOOD CHEMISTRY  Code :17UCHN06

Time : Three hours.                                                                 Maximum : 75 Marks

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

1. What are proteins?
2. Mention any two sources of food.
3. Name some metals which cause food poisoning.
4. What are the remedies of constipation?
5. Why do we preserve food?
6. What is canning?
7. What are the deficiency disease caused by Vitamin E₁?
8. Mention the sources of Vitamin A.
9. Name the deficiency diseases caused by Sodium.
10. Write any two functions of Sulphur.

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

11. a) Write an account of colours used in food.
    (or)
    b) Write an account of natural toxicant.

12. a) Mention the causes and remedy for indigestion.
    (or)
    b) How is food contaminated by microorganism?

13. a) Discuss preservatives used for food preservation.
    (or)
    b) How do you preserve food by freezing methods?

14. a) Mention the source and deficiency disease of Vitamin K.
    (or)
    b) Write an account on Vitamin B6.
15. a) Write an account of biological functions of Iron.
   (or)
   b) What is the source, function and deficiency effect of potassium?

Section C – (3 x 10 = 30)
Answer any three questions

16. Write note on biological functions of proteins and carbohydrates
17. Write an account on food poisoning.
18. Write a brief account of food preservation.
19. Write the sources and deficiency diseases of Vitamin C.
20. Write briefly on biological functions of Phosphorous and diseases caused by its deficiency.
AGRO CHEMISTRY (30 Hours)

UNIT – I

UNIT – II

UNIT – III

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 VII
AGRO CHEMISTRY Code: 17UCHNO7

Time: Three hours Maximum: 75 Marks

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

1. Define fertilizer. Give one example.
2. What are complex fertilizers?
3. What are manures?
4. What is the use of oil cakes?
5. How are borates used as an insecticide?
6. Define toxicity.
7. What are attractants?
8. Name two rodenticides.
10. What are the minerals present in the soil?

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

11. a) Discuss the role of phosphorus in plant growth.
   (or)
   b) How is urea prepared?
12. a) What are differences between fertilizers and manures.
    (or)
    b) Write a note on farm yard manure.
13. a) What are the safety measures while using pesticides?
    (or)
    b) How is DDT prepared? How is it useful?
14. a) Discuss about sulphur compounds used as a fungicide.
    (or)
    b) How is Bordeaux mixture prepared? What are its uses?
15. a) Write a note on soil water.
    (or)
    b) How is soil acidity tested?

Section C (3 x 10 = 30)

Answer any three questions

16. Discuss the role of micronutrients in plant growth.
17. Write notes on handling and storage of manures.
18. Discuss the classification of pesticides.
19. a) Discuss the methods to preserve seeds.
    b) What are repellants? What are its uses?
20. Discuss classification and properties of soils.
POLYMER & PLASTICS (30 Hours)

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

UNIT-II
2.2. Properties of polymers: The crystalline melting point. The glassy state and glass transition temperature

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

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


REFERENCES:
MODEL QUESTION PAPER
Periyar University Salem
SEMESTER-IV
B.Sc. Chemistry
NON MAJOR ELECTIVE COURSE – VIII
Polymer and Plastics Code 17UCHN08

Time: 3 Hrs Max.Marks:75

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

1. Define polymerization.
2. Write any two differences between addition and condensation polymerisation.
3. What are homo and hetero polymers?
4. Define glassy transition temperature.
5. Define weight average molecular weight.
6. What is wet spinning?
7. How are freons prepared?
8. What are uses of thiocol?
9. Define lubricants. What are its functions ?
10. What are pigments? Mention its uses.

Section B ( 5 X 5 = 25)
Answer all questions

11. a) Write a note on ring opening polymerization.
   (or)
   b) Explain co-ordination polymerization.
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) Discuss blow moulding process.
    (or)
    b) How is molecular weight of a polymer determined by osmometry method?
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 plastisicizers.  

Section – C (10 x 3 = 30)  
Answer any three questions  

16. Write a note on classification of polymers.  
17. Explain the structure of polymers.  
18. a) How is Molecular weight of a polymer is determined by viscosity method?  
   b) Describe Die casting process.  
19. a) Write the preparation, properties and uses of polyethylene.  
   b) Write note on Buna-N rubber.  
20. Write note on the following  
   i) Fillers  
   ii) Catalysts.
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## DEPARTMENT OF CHEMISTRY

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COMMON PAPER FOR ALL UNDER GRADUATE PROGRAMME

CHOICE BASED CREDIT SYSTEM SYLLABUS FOR ENVIRONMENTAL STUDIES

FOR THE STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2017 – 2018 ONWARDS
ENVIRONMENTAL STUDIES

UNIT – I:

UNIT – II
Natural resources: Renewable – Air, water, soil, land and wildlife resources. Non-renewable – Mineral coal, Oil and gas. Environmental problems related to the extraction and use of natural resources.

UNIT – III
Biodiversity – Definition – Values – Consumption use, productive social, ethical, aesthetic and option values threats to biodiversity – Hotspots of biodiversity – Conservation of Bio-diversity: In-situ, Ex-situ, Bio-wealth – National and global level.

UNIT – IV
Environmental Pollution Definition – Causes, effects and mitigation measures – Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution – Nuclear Hazards – Solid wastes acid rain – Climate change and global warming environmental laws and regulations in India - Earth summit.

UNIT – V