BHARATHIAR UNIVERSITY, COIMBATORE.

REGULATIONS FOR UNDER GRADUATE DEGREE COURSE IN CHEMISTRY WITH
COMPELLSORY DIPLOMA IN TEXTILE CHEMISTRY (COLLEGES)
(SEMESTER SYSTEM WITH EFFECT FROM 2007-2008)

1. Eligibility for Admission to the Course
   The eligibility condition for admission to the B. Sc. Degree course in Chemistry are as follows
   The students who have passed Higher Secondary course examination with CHEMSTRY as Subject conducted by government of Tamil Nadu only are eligible for admission.

2. Duration of the Course
   The course shall extend over a period of three years comprising of six semesters with two semesters in one academic year. There shall not be less than 90 working days for each semester. Examination shall be conducted at the end of every semester for the respective subjects.

3. Course of Study
   The course of study for the UG degree courses of all branches shall consist of the following
   a) Part-I
      Tamil or any one of the following modern/classical languages i.e. Telugu, Kannada, Malayalam, Hindi, Sanskrit, French, German, Arabic & Urdu.
      The subject shall be offered during the first four semesters with one examination at the end of each semester.
   b) Part-II
      The subject shall be offered during the first four semesters with one examination at the end of each semester. During third semester part II English will be offered as communication skills.
   c) Foundation Course
      The Foundation course shall comprise of two stages as follows:
      Foundation Course A: General Awareness (I &II semesters)
      Foundation Course B: Environmental Studies (III &IV semesters)
      1. The syllabus and scheme of examination for the foundation course A. General awareness shall be apportioned as follows.
         From the printed material supplied by the University - 75%
         Current affairs & who is who? - 25%
         The current affairs cover current developments in all aspects of general knowledge which are not covered in the printed material in this subject issued by the University.
      2. The Foundation course B shall comprise of only one paper which shall have Environmental Studies.
   d) Part -III
      Group A: Core subject – As prescribed in the scheme of examination.
      Examination will be conducted in the core subjects at the end of every semester.
      Group –B: allied subjects -2 subjects-4 papers
      Examination shall be conducted in the allied subjects at the end of first four semesters.
      Group-C: application oriented subjects: 2 subjects -4 papers.
The application-oriented subjects shall be offered during the last two semesters of study viz., V and VI semesters. Examination shall be conducted in the subjects at the end of V & VI semesters.

Group-D: field work/institutional training

Every student shall be required to undergo field work/institutional training, related to the application-oriented subject for a period of not less than 2 weeks, conveniently arranged during the course of 3rd year. The principal of the college and the head of the department shall issue a certificate to the effect that the student had satisfactorily undergone the field work/institutional training for the prescribed period.

Diploma Programme:
All the UG programmers shall offer compulsory diploma subjects and it shall be offered in four papers spread over each paper at the end of III, IV, V and VI semesters.

e) Co-Curricular activities: NSS/NCC/physical education

Every student shall participate compulsorily for period of not less than two years (4 semesters) in any one of the above programmes. The above activities shall be conducted outside the regular working hours of the college. The principal shall furnish a certificate regarding the student’s performance in the respective field and shall grade the student in the five point scale as follows.

A-Exemplary
B-very good
C-good
D-fair
E-Satisfactory

This grading shall be incorporated in the mark sheet to be issued at the end of the appropriate semester (4th or 5th or 6th semester).
(Handicapped students who are unable to participate in any of the above activities shall be required to take a test in the theoretical aspects of any one of the above 3 field and be graded and certified accordingly).

4. Requirement to appear for the examinations
   a) a candidate will be permitted to appear for the university examinations for any semester if
      i) He/she secures not less than 75% of attendance in the number of working days during the semester.
      ii) He/she earns a progress certificate form the head of the institution, of having satisfactory completed the course of study prescribed in the subjects as required by these regulations, and
      iii) His/her conduct has been satisfactory.

   Provided that it shall be open to the syndicate, or any authority delegated with such power by the syndicate, to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed, for valid reasons, subject to usual conditions.
b) A candidate who has secured less than 65% but 55% and above attendance in any semester has to compensate the shortage in attendance in the subsequent semester besides, earning required percentage of attendance in that semester and appear for both semester papers together at the end of the latter semester.

c) A candidate who has secured less than 55% of attendance in any semester will not be permitted to appear for the regular examinations and to continue the study in the subsequent semester, He/she has to rejoin the semester in which the attendance is less than 55%.

d) A candidate who has secured less than 65% of attendance in the final semester has to compensate his/her attendance shortage in a manner as decided by the concerned head of the department after rejoining the same course.

5. Restriction to appear for the examinations

a) Any candidate having arrear paper(s) shall have the option to appear in any arrear paper along with the regular semester papers.

b) “Candidates who fail in any of the papers in Part I, II & III of UG degree examinations shall complete the paper concerned within 5 years form the date of admission to the said course, and should they fail to do so, they take the examination in the texts/revised syllabus prescribed for the immediate next batch of candidates. If there is no change in the texts/syllabus they shall appear for the examination in that paper with the syllabus in vogue until there is a change in the texts or syllabus. In the event of removal of that paper consequent to change of regulation and /or curriculum after 5 years period, the candidates shall have to take up an equivalent paper in the revised syllabus as suggested by the chairman and fulfill the requirements as per regulation/curriculum for the award of the degree.

6. Medium of Instruction and examinations

The medium of instruction and examination for the papers of Part I and II shall be the language concerned. For part III subjects other than modern languages, the medium of instruction shall be either Tamil or English and the medium of examinations is in English/Tamil irrespective of the medium of instructions. For modern languages, the medium of instruction and examination will be in the languages concerned.

7. Submission of Record Note Books for practical examinations

Candidates appearing for practical examination should submit their bonafide Record Note Books prescribed forth practical examination otherwise the candidates will not be permitted to appear for the practical examinations only those candidates who have performed seventy five percent of the experiments prescribed in the syllabus are eligible to get their records bonafide However in genuine case where the students who could not submit their bonafide record note books, they may be permitted to appear for the practical examination provided the concerned Head of the department from the institution of the candidate certifies that the candidate has performed the required number of experiments prescribed in the syllabus-For such candidate who do not submit Record Note, Books Zero (0)marks will be awarded for record note books.
8. Passing Minimum
a) A candidate who secures not less than 40% of the total marks in any subject including the Diploma and Foundation courses (theory or Practical) in the University examination shall be declared to have passed the examination in the subject (theory or Practical).
b) A candidate who passes the examination in all the subjects of Part I, II and III (including the Diploma and Foundation courses) shall be declared to have passed, the whole examination.

9. Improvement of Marks in the subjects already passed
Candidates desirous of improving the marks awarded in a passed subject in their first attempt shall reappear once within a period of subsequent two semesters. The improved marks shall be considered for classification but not for ranking. When there is no improvement, there shall not for any change in the original marks already awarded.

10. Classification of Successful candidates
a) A candidate who passes all the Part all the Part II examination in the First attempt within a period of three years securing 75% and above in the aggregate of Part III marks shall be declared to have passed B.A/ B.Sc./ B.Com./ B.B.M. degree examination in **First Class with Distinctions**
b) (i) A candidate who passes all the examinations in Part I or Part II or Part III or Diploma securing not less than 60 per cent of total marks for concerned part shall be declared to have passed that part in **First Class**
(ii) A candidate who passed all the examination in Part I or Part II or Part III or Diploma securing not less than 50 per cent but below 60 per cent of total marks for concerned part shall be declared to have passed that in **Second Class**
(iii) All other successful candidates shall be declared to have passed the Part I or Part II or Part III or Diploma examination in **Third Class**

11. Conferment of the Degree
No candidate shall be eligible for conferment of the Degree unless he/she
(i) Has undergone the prescribed course of study for a period of not less than six semesters in an institution approved by/a affiliated to the University or has been exempted from in the manner prescribed and has passed the examination as have been prescribed therefore.
(ii) Has satisfactory participates in either NSS or NCC or physical Education as evidenced by a certificate issued by the Principle of the institution.
(iii) Has successfully completed the prescribed Field Work/ Institutional Training as evidenced by certificate issued by the Principal of the College.

12. Ranking
A candidate who qualifies for the UG degree course passing all the examinations in the first attempt, within the minimum period prescribed for the course of study from the date of admission to the course and secures I or II class shall be eligible for ranking and such ranking will be confined to 10% of the total number of candidates qualified in that particular branch of study, subject to a maximum of 10 marks
The improved marks will not be taken into consideration for ranking.
13. Additional Degree
Any candidate who wishes to obtain an additional UG degree not involving any practical shall be permitted to do so and such candidate shall join a college in the III year of the course and he/she will be permitted to appear for par III alone by granting exemption from appearing part I, part II and common allied subject (if any), already passed by the candidate. And a candidate desirous to obtain an additional UG degree involving practical shall be permitted to do so and such candidate shall join a college in the II year of the course and he/she be permitted to appear for part III alone by granting exemption from appearing for part I, part II and the common allied subjects. If any, already passed. Such candidate should candidate should obtain exemption from the university by paying a fee of Rs.500/-.

15. Evening College
The above regulations shall be applicable for candidates undergoing the respective courses in Evening College also.

16. Syllabus
The syllabus for various subject shall be clearly demarcated into five viable units in each paper/subject.
## Scheme of Examination

<table>
<thead>
<tr>
<th>Subject Title</th>
<th>Instruction Hours / Week</th>
<th>University Exam Duration in Hours</th>
<th>Max. Marks</th>
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<tr>
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<tr>
<td>Language : Language Paper I</td>
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<tr>
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<td>Chemistry Practical I (Inorganic Quality Analysis)</td>
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<td>Chemistry Paper V (Computer Applications in Chemistry)</td>
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<td>Chemistry Paper XI</td>
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* For subjects without practical
** For subjects with Practical

**Note**: Any two application oriented subjects from Group A may be offered in V Semester and any two application oriented subjects from Group B may be offered in VI Semester.

<table>
<thead>
<tr>
<th>Group A (V Semester)</th>
<th>Group B (VI Semester)</th>
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<tbody>
<tr>
<td>1</td>
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<tr>
<td>Analytical Chemistry – I Basic Principles</td>
<td>Analytical Chemistry II Lab. Techniques</td>
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<td>2</td>
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<tr>
<td>Polymer Chemistry</td>
<td>Chemistry of Plant Based Products</td>
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<td>Agro Industrial Chemistry</td>
<td>Dye Chemistry</td>
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<td>Pharmaceutical Chemistry</td>
<td>Leather Chemistry</td>
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<td>Dairy Chemistry</td>
<td>Environmental Chemistry</td>
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<td>6</td>
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<tr>
<td>Forensic Science and rime Investigation</td>
<td>Textile Chemistry</td>
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</table>

**ALLIED SUBJECTS**
1. Mathematics
2. Physics
3. Botany
4. Zoology
5. Biochemistry
CORE CHEMISTRY PAPER I

Teaching hours: 60 hours per semester (4 hours per week)

Subject Description: This paper presents the basic principles of Chemistry.

Goals: To enable the students to learn about the basic principles of Chemistry.

Objective: To understand the important concepts of Chemistry.

CONTENTS

UNIT I
Ionic bonding - ionic crystals, NaCl and CsCl crystal structure, Lattice energy and its determination using Born-Haber cycle, factors affecting crystal lattice energy, properties of ionic crystals (high melting point, hardness, electrical conductivity in molten condition and in solution) – ion polarization - Fajan’s rule-solubility of ionic compounds in polar solvent.

UNIT II
Structure and shape of molecules: VSPER Theory and geometry of molecules. Hybridization and geometry of sp, sp$^2$, sp$^3$, dsp$^2$, dsp$^3$, d$^2$sp$^3$, sp$^3$d$^2$ and sp$^3$d$^3$. Bonding, shapes and structures of the following molecules: Molecules with Sigma bonds only – BeCl$\_2$, SnCl$\_2$, BF$\_3$, CH$\_4$, SiF$\_4$, XeF$\_4$, PCl$\_5$, IF$\_5$, SF$\_6$, and IF$\_7$.

UNIT III
Polar effects – inductive effect, mesomeric effect, electromeric effect, hyperconjugation and steric effects. Classification of reagents: Electrophiles, Nucleophiles and Free radicals. Types of reaction: Polar reactions involving carbonium ions and carbanions with simple examples.

UNIT IV
Aliphatic Hydrocarbons: Restricted rotation about single bond preferred rotational conformations.

Alkenes: Preparation by Witting reaction – Mechanisms of beta elimination – E1, E2 and cis elimination – Hoffmann’s rule and Saytzeff’s rule. Addition reactions with hydrogen, halogen, hydrogen halide (Markownikoff’s rule) and hydrogen bromide (Peroxide effect).

UNIT V
2. Cycloalkanes: Preparation by Dickmann ring closure and by reduction of aromatic hydrocarbons – ring opening reactions of cyclopropane with H$_2$, Br$_2$ and HI.
CORE CHEMISTRY PAPER II

Teaching hours: 60 hours per semester (4 hours per week)

Subject description:
This paper presents the concept of resonance and wave mechanical treatment of electrons.

Goals:
To enable the students to learn about the basic concept of resonance and wave theory.

Objectives:
To study the resonance in benzene and quantum theory.

Contents

Unit I:
Ozone and hydrogen peroxide – preparation, properties, structure, uses comparison between the two.
Selenium and Tellurium – Extraction, properties and Uses. Oxides and oxyacids of Se and Te. A comparative study of Sulphur, Selenium, Tellurium and their compounds (hydrides, oxides, halides)

Unit II:
Alkynes: Acidity of Alkynes – formation of acetylides-addition of water with HgSO₄ catalyst-hydroboration.

Unit III:
Liquid crystals–the concept of mesomorphic state-typical liquid crystalline substances and their properties.
Properties of liquids like surface tension and viscosity – Review of structural differences between solids, liquids and gases.
Condensed phases-Coefficients of thermal expansion and compressibility of liquids and solids.

Unit IV:
Failure of classical theory in explaining black body radiation- plancks theory of quantization of energy – Einstein theory of photoelectric effect-compton effect.
De Broglie theory of wave-particle dualism-Heisenberg’s uncertainty principle.

Unit V:
An elementary treatment of Schrodinger wave equation – quantum numbers concept of orbitals-significance of $\psi$ & $\psi^2$ free particles and particle in a box (one and three dimensional)
The covalent bonds-the hydrogen molecule – the vlaance bond method hydrogen molecule ion-molecular orbital method-molecular orbitals for homonuclear and heteronuclear diatomic molecules.
CORE CHEMISTRY PAPER III
Teaching hours: 60 hours per semester (4 hours per week)
Subject description:
This paper presents the concept of coordination chemistry, aromaticity and thermodynamics.
Goals:
To enable the students to learn about aromaticity, thermodynamics and coordination chemistry.
Objectives:
To study the principles of thermodynamics and coordination chemistry.

Contents
Unit I:

Unit II:
Chemistry of Boron family – Group discussion – Electron acceptor behaviour and electron deficiency of boron hydrides; bonding in diboranes; NaBH₄, LiBH₄ preparation, properties, structure and uses- borozoels, borides. Classification of silicate- simple silicates chain silicates and sheet silicates only.

Unit III:
Aromaticity-Huckel’s rule Non-benzenoid aromatic compounds like cyclopentadienyl anion. Toluene and Isoprophyl benzene and side chain substitution – polymerization of styrene. Vinyl chloride Relative reactivity of methyl, ethyl and vinyl chlorides. Gringanard reagents and synthetic applications-Nucleophilic substitution reaction – S_N1, S_N2 and S_Ni reactions – Effect of solvent-nucleophile, structure of substrate and neighbouring group participation, elimination versus substitution-Benzene mechanism and intermediate complex mechanism.

Unit IV:

Unit V:
TEXTBOOKS FOR REFERENCE:

CORE CHEMISTRY PRACTICAL I
   Inorganic Qualitative Analysis
   I & II Semesters (3 hours per week)

   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 adapted.

   CATIONS TO BE STUDIED: Lead, Copper, Bismuth, Cadmium, Iron, Aluminum, Zinc, Manganese, Cobalt, Nickel, Barium, Calcium, Strontium, Magnesium and Ammonium.
   ANION TO BE STUDIED: Carbonate, Sulphate, Nitrate, Chloride, Bromide, Fluoride, Borate, Oxalate, and Phosphate.

CORE CHEMISTRY PAPER IV
(INORGANIC AND ORGANIC CHEMISTRY)

Teaching hours: 45 hours per semester (3 hours per week)

Subject description:
This paper presents the principle in the extraction of metals and mechanism of some important organic reactions.

Goals:
To enable the students to learn about the extraction principles and mechanism of some addition reaction.

Objectives:
To understand the mechanism and synthetic uses of important organic reactions.

Contents:

Unit I:
Occurrence, extraction, properties and uses of Gallium, Thallium, Germanium, Titanium and Tin - their important compounds such as GeCl$_4$, GeO$_2$, TiO$_2$, TiCl$_4$, and SnCl$_2$. 
Unit II:
Occurrence, extraction, properties and uses of Zirconium, Vanadium, Molybdenum and Tungsten - their important compounds such as V\textsubscript{2}O\textsubscript{5}, ZrOCl\textsubscript{2}, ammonium molybdate, molybdenum blue, WO\textsubscript{2}, and tungsten bronzes.

Unit III:
Chemistry of Carbonyl Compounds – I:
Reaction mechanisms: Nucleophilic addition of Grignard reagent, NH\textsubscript{3}, primary amine- Aldol condensation, Cannizzaro reaction, Perkin reaction, Knoevenagel reaction and Claisen-Schmidt reaction.

Unit IV:
Chemistry of Carbonyl Compounds – II
Reaction mechanisms – Reformatsky reaction, benzoin condensation, Wittig reaction, halofom reaction – Reaction with LiAlH\textsubscript{4} and NaBH\textsubscript{4} – Clemmensen reduction, Wolff Kishner reduction, MPV reduction – reducing properties of Carbonyl compounds.

Unit V:
Malonic ester, acetoacetic ester and cyanoacetic ester-their preparation and synthetic applications Tautomerism of acetoacetic ester.

Geometrical isomerism – Cis & Trans, E & Z notations – Geometrical isomerism in maleic acid and fumaric acid - physical and chemical properties of geometrical isomers.

CORE CHEMISTRY PAPER V
(COMPUTER APPLICATIONS IN CHEMISTRY AND PHYSICAL CHEMISTRY)
Teaching hours: 45 hours per semester (3 hours per week)

Subject description
This paper presents the basic things of computer, C programming and its applications in chemistry. This paper also deals with second and third law of thermodynamics.

Goals
To enable the students to understand computer, its application in chemistry and laws of thermodynamics.

Objectives
To study the applications of computer programming in chemistry and importance of second and third law of thermodynamics.

Contents
UNIT I: Introduction:

Hardware components of a computer - Input unit, processing unit.
UNIT II  C Language (part I)

UNIT III  some important C programs for Chemistry
Programs: To calculate the $P^H$ of solution and find that it is basic, acidic or neutral. Calculation of $P^H$ of a solution using Henderson equation. To compute the order of a reaction. To compute half-life period of a reaction. To compute the rate constant of a 1st order reaction. To compute the energy of activate of a reaction.

UNIT IV
Introduction to second law of thermodynamics - Carnot cycle - entropy - Definition - entropy changes in isothermal transformation - Trouton’s rule. Entropy as function of T and V - Entropy as a function of T and P - Changes of entropy with T, Entropy changes in ideal gas - entropy of mixing of ideal gases.

UNIT V
General conditions of equilibrium and spontaneity - conditions of equilibrium and spontaneity under constants - definition of A and G-physical significance of - dA and dG. Temperature and pressure dependence of G - Gibbs - Helmholtz equation. Chemical equilibrium - The concept of chemical potential - chemical equilibrium in a mixture of ideal gases - Vant Hoff Isotherm and isochore - Third law of thermodynamics statement and applications exception to third law.

Ref:
Computer for Chemists - By PUNDIR BANSAL - Pragati Prakasam Pubs.

CORE CHEMISTRY PAPER VI
Teaching hours : 60 Hours per semester (4 hours per week)

Subject description
This paper presents the chemistry of phenols, amines and phase rule.

Goals
To enable the students to learn about the reactions of phenol and amines.

Objectives
To study the reaction of phenol and amines and applications of phase rule.

Contents
UNIT I :
General methods of Extraction: Concentration – Gravity separation, Froth Floatations magnetic separation, Extraction – Chemical and Electrolytic methods of refining, Zone refining, Van Arkel refining and Electrolytic refining.
UNIT II:

UNIT III:
Amine: Amines preparation & reaction- primary secondary and tertiary amines – their separation, comparison of their basicity – ring substitution, diazotiazation and coupling reaction of aromatic amines.
Diazomethane and diazoacetic ester – preparation, structure and their synthetic applications.

UNIT IV:

UNIT V:
Solutions: ideal and non ideal – Raoult’s law, Henry’s law – Nernst distribution law and its applications.
Colligative properties- relative lowering of vapour pressure, elevation of boiling point depression of freezing point and osmotic pressure- their applications.

CORE CHEMISTRY PAPER VII
(INORGANIC CHEMISTRY)

Teaching hours : 60 hours per semester (4 hours per week)

Subject description
This paper presents the principle of radio activity, acids and bases and solvents.

Goals
To enable the students to know about the radio activity, acid and bases, the role of solvent in chemical reactions.

Objectives
To understand the principles of radio activity.

Contents
UNIT I:
Principle of Gravimetric analysis – Precipitation methods – conditions of precipitation – factors influencing the precipitation and solubility – Co precipitation and Post precipitation, digestion, washing and drying and ignition of the precipitate.
UNIT II:

UNIT III:

UNIT IV:

UNIT V:

CORE CHEMISTRY PAPER VIII
(ORGANIC CHEMISTRY)

Teaching hours : 60 hours per square (4 hours per week)

Subject description
This paper presents the chemistry of carbohydrate, molecular rearrangements, amino acids and hetero cyclic compound.

Goals
To enable the students to learn about carbohydrates, amino acids and hetero cyclic compounds.

Objectives
To understand the importance of carbohydrate, amino acids in chemistry.

Contents
UNIT I:
UNIT II:

UNIT III:
Carbohydrates: Chemistry and structure of Glucose, Fructose, Sucrose and Maltose (cyclic structure as well.). Starch and Cellulose. An elementary account. (Elucidation of structure not necessary)
Inter conversion of sugars-mutarotaion – Epemerisation.

UNIT IV:
Aminoacids and proteins
Amino acids-Classiffication –Preparation and properties peptides and poly peptides-proteins classification based on physical properties and biological functions-primary secondary and tertiary structure – properties and uses.

UNIT V:
Heterocyclic compounds
Chemistry of Furan, Pyrrole, Thiophene, Quinoline, IsoQuinoline, Benzofuran, Indole, Isatin and Indigo.

CORE CHEMISTRY PAPER IX
(ELECTRO CHEMISTRY)

Teaching hours : 60 hours per semester (4 hours per week)

Subject description
This paper presents the principles of conduction Electro Motive Force, fuel cells.

Goals
To enable the students to know about electro chemistry.

Objectives
To study EMF, pH and their applications.

Contents
UNIT I:

UNIT II:
 Ionic Equilibria-Solubility and solubility product-determination of solubility product-Applications of solubility product principles. Dissociation of weak acids and bases-
Dissociation constants—pH scale—common ion effect—buffers—solutions— Determination of pH values of Buffer mixtures—Henderson’s equation—Hydrolysis of salts—Degree of hydrolysis.

UNIT III:
Electrochemical cells. Electrode potentials—The standard hydrogen electrode kinds of electrodes and their potentials—Nernst equation. EMF—computation and measurement of cell EMF single electrode potential—Determination and significance of electrode potentials—electro chemical series—temperature dependence of the cell EMF—Thermodynamic quantities of cell reactions.

UNIT IV:

UNIT V:

CORE CHEMISTRY PAPER X
(SPECTROSCOPY AND NATURAL PRODUCTS)

Teaching hours : 75 Hours per semester (5 hours per week)
Subject description
This paper represents the principles of spectroscopy and The chemistry of natural products.

Goals
To enable the students to know about terpenoids, vitamins, alkaloids and harmones.

Objectives
To study the spectroscopy and natural products

Contents
UNIT I:
Spectroscopy absorption spectra – fundamental concepts electromagnetic Spectrum—the various regions of the spectrum and the relative energies of the radiation in each region-type of changes induced by the interaction of radiation with matter. Theory of rotations spectra—Molecular rotation-diatomic molecule as rigid rotor-diatomic molecule as non-rigid rotor-intensities of spectral lines. Applications of rotation spectra bond length-isotopic substitution.

Theories of IR spectra—simple harmonic oscillator model—An harmonic oscillator model of diatomic molecules information on molecular constitution from IR spectra; Application of IR spectra.
NMR SPECTRA— Basic principles – chemical shift—NMR spectra of simple molecules (high resolution details not expected)
UNIT II:
Theory of Raman spectra-comparison of IR and Raman spectra, Theory of UV and visible spectra-Frank Condon principle-Pre dissociation-determination of dissociation energies—Applications of UV spectra to simple molecules.

UNIT III:
Terpenoids; Introduction-Classification-General methods of isolation-isoprene rule-structural elucidation and synthesis of gernaiol, terpineol, dipentene and alpha pinene.
Vitamins-introduction-importance of vitamins-structural elucidation and synthesis of Retionl, Thiamine, Riboflavin, Ascorbic acid.

UNIT IV:
Harmones; Introduction-Structural elucidation and synthesis of adrenaline and thyrroxine.

UNIT V:
Chemotheraphy; Introduction-Classification of drugs-applications of sulpha drugs, anti malerials Ambecidal, Antiseptics, Analgesics and Antibiotics (Pencilin, Streptomycin, Chloromycetin, tetracycline-structure and uses only).

CORE CHEMISTRY PAPER XI
(PHYSICAL PROPERTIES AND CHEMICAL KINETICS)

Teaching hours : 75 Hours per semesters (5 hours per week)

Subject description
This paper presents magnetic properties of molecules and kinetics of chemical reaction.

Goals
To enable the students to learn about the kinetic of reaction.

Objectives
To study the magnetic properties of molecules, chemical kinetics and photo chemistry.

Contents
UNIT I:
Electrical properties of molecules: Molar polarization, Orientation polatization and Distortion polarization polar and non-polar molecules. Determination of dipole moments of polar gases, liquids and solids-Applications of dipole moment in the study of simple molecules.

UNIT II:
Magnetic properties of molecules; Meaning of the terms magnetic susceptibility, magnetic moment, diamagnetism, paramagnetism and ferromagnetism, Determination of
magnetic susceptibility by Gouy’s method. Application of magnetic properties in solving structural problems involving simple and complex ions.

UNIT III:

UNIT IV:
Experimental techniques involved in the following kinetics of reaction. Volumetry, manometry, polarimetry and colorimetry, typical examples for each of the techniques. Theoretical aspects. Effects of temperature on the rate constant. The activation energy. The collision theory of reaction rates and its limitation. Lindemann theory of unimolecular reactions. The theory of Absolute reaction rates. Comparison of the collision theory with the Absolute reaction rate theory.

UNIT V:
Thermal chain reaction H2/Br2 reaction.

TEXT BOOKS AND REFERENCES
Inorganic Chemistry
2. Inorganic chemistry, P.L.Soni, Sultan Chand & Sons
5. A text book of inorganic chemistry, A.K.De, Wiley
6. Concise inorganic chemistry, J.D.Lee.
7. Inorganic chemistry, Shriver and Atkins

Organic chemistry
4. Stereosomism of carbon compounds, RaviBhusanm, CBS Publishers
5. Sterochmistry, Conformation and mechanisms, Kalsi, Wiley- Eastern Ltd.,
7. Organic chemistry, Vol 1 and 2, I.L. Finar, Addison-Wesly Longman
11. Introduction to Organic Chemistry, Andrew Streitwisher, Jr. C.H. Heathcock

Physical Chemistry
1. Essentials of Physical Chemistry, B.S. bahl and G.D. Tuli, S. Chand & Co.,
2. Text book of physical Chemistry, P.L. Soni, Dharmarke; Sultan Chand & Sons
5. Physical Chemistry, R.a. alberty, John-Wiley & Sons
6. Elements of physical Chemistry, s. Glasstone and D. Lewis, McMillan
7. Physical chemistry, G.W. Castelan, Narosa publishers

Computer Application
5. Unique features of Basic, Pascal and Raman K.V. Chemistry Education june 1996
7. V. Balsgurusamy basic programming TMH Company New Delhi (1980)
8. Ramkumar Programming in Fortran tmh company (1985)
9. Computer and their applications to chemistry- Ramesh kumari –Narosa Publishing house

APPLICATION ORIENTED SUBJECTS
Group A-V Semester
1. ANALYTICAL CHEMISTRY I : BASIC PRINCIPLES

Teaching hours : 45 Hours per semester (3 hours per week)

UNIT I :
Basic principles and applications of Analytical techniques : Such as Precipitation, filtration, sample drying, transfer of precipitates. Distillation, vacuum distillation fractional distillation and steam distillation. Sublimation, crystallization, fractional crystallization M.P., B.P., and Refractive Indices.

UNIT II :
Evaluation of Analytical date : Accuracy and precision, methods for their expression, classification of errors, detection and correction of determination and intermediate errors. The normal law of Distribution of Intermediate errors.

UNIT III :
Statistical texts and date : The F test and the T test, rejection of data the method of least squares, propagation of errors in computation, significant figures.

UNIT IV :
Theory of Quantitative Analysis ; Applications of Chemical equilibrium to analytical separations and estimations : The equilibrium constants, activity co-efficients. Acid-Base equilibria, solubility equilibria, distribution equilibria, Complex ion equilibria and stability constant Separations and estimations : illustrated with examples.

UNIT V :
Gravimetric methods : Theory of indicators, Theory of precipitation, Co-precipitation, Post-precipitation, theory of purifying the precipitates, Acid-Base, redox, Complexometric and precipitation Titrations, Volumetric analysis.

BOOKS FOR REFERENCE :

1. Quantitative Chemical Analysis, A.I. Vogel.
2. Instrumental Methods of Analysis, Skoog.
3. Instrumental Methods of Analysis, Willard, Dean, Merrit and Settle, CBS.
2. POLYMER CHEMISTRY

Teaching hours : 45 Hours per semester (3 hours per week)

UNIT I :
Classification of polymers-natural polymers and synthetic polymers. Synthetic polymers-Addition polymers, condensation polymers-Mechanism of polymerization, step reaction polymerization, chain reaction polymerization, -ionic, radical and coordination polymerization-one example each.

UNIT II :
Molecular weight of polymers-Number average and weight average molecule weight methods.
1. Osmometry (membrane) 2. Cryoscopy & ebulloscopy
3. Osmometry (Vapour pressure) 4. Viscometry
5. End Group Analysis-number average

Weight average Mw (i) Light scattering (ii) Ultra centrifugation Molecular weight distribution.

UNIT III :
Primary and secondary bond forces in polymers-coherence energy-structure property relationship
(i) Mechanical properties (ii) Thermal stability-glass transition temperature
(iii) Flame resistance (iv) Chemical resistance
(v) Degradability (vi) Electrical Conductivity

UNIT IV :
Important industrial polymers, preparation and applications
(i) Polyethylene, polypropylene (ii) Polyamides
(iii) Polyvinyl chloride, polymethylmethacrylate
(iv) Polyesters, polycarbonates (v) Polyurethaeas
(vi) Phenol-formaldehyde, melamine-formaldehyde
(vii) Polysilanes, polysiloxanes (viii) Polyaniline

UNIT V :
Rubber, Cellulose, starch, wool, silk, collagen, coal, nucleic acids, general structure-importance-applications.

Reference
1. Polymer chemistry an introduction-M.P.Stevens, Oxford-1990
3. AGRO INDUSTRIAL CHEMISTRY

Teaching hours : 45 Hours per semester (3 hours per week)

UNIT I:

Water source for agriculture- Water Treatment & Water Analysis


UNIT II:

Chemistry of soil-soil classification and soil analysis


UNIT III:

Fertilizers

1. Effect of N, P, K, secondary nutrients and micro nutrients on plant growth and development.
2. Importance of nitrogenous fertilizers. Nitrogen cycle and fixation of atmospheric nitrogen. principle and manufacture of ammonium nitrate, ammonium sulphate, and urea
3. Phosphate fertilizers. preparation and uses of mono and diammonium phosphates, super phosphate and triple super phosphate.

Pesticides

Classification-Insecticides, fungicides and herbicides. general methods of preparation, application and toxicity. Insect attractants and repellants-fluorine compounds, boron compounds, arsenic compounds, organomercuric compounds, DDT, BHC, 2,4-D compounds, pyridine compounds.

UNIT IV:

Chemistry of sugar and fermentation

1. Details of manufacture of sucrose from cane sugar-extraction of juice, purification, concentration, crystallization, separation and refining of crystals, recovery of sucrose from molasses. Manufacture of sucrose from beetroot. Estimation of sucrose and inversion sugar by polarimetry.
2. Manufacture of alcohol from molasses and starch by fermentation process.
UNIT V:

OILS, fats and Waxes


References
1. Nature and properties of soils-Harry, O Buckman N Yle C. Brandy
2. Soils Science-A.Sankara
3. Insecticides, Pesticides and Agro based Industries – R.C.Palful, K.Goel, R.K.Gupta
5. Industrial Chemistry-B.N Chakrabarty

4. PHARMACEUTICAL CHEMISTRY

Teaching hours : 45 Hours per semester (3 hours per week)

UNIT I:
1. Important terminologies used in pharmaceutical chemistry-Definition of the following terms-drug, pharmacology, pharmacognosy, pharmacy, therapeutics, toxicology, chemotherapy, pharmacopoeia (BP, IP, USP), National formulary, pharmaeophore, bacteria, virus, vaccines, toxoids, primary immunization, additive effect, synergism, antagonism, plaubo, LD$_{50}$, ed$_{50}$ and therapeutic index
2. Routes of drug administration-local, enema, oral or external, parental-advantages and disadvantages oral and parental routes-inhalation, intradermal, subcutaneous, intramuscular, intravenous-intrathecal-intraarticular-transcutaneous-transmuscusal.
3. Clinical chemistry-A Diagnostic test and one method of estimation bilirubin and cholesterol in serum or plasma or urine. Biuret test for urea.
4. First aid to prevent bleeding and maintain breathing
6. Causes, symptoms and treatment of anemia, diabetis, tuberculosis, asthma, jaundice, piles, leprosy, typhoid, malaria, cholera and filarial.
7. Indian medicinal plants and their importance. Spices and their medicinal uses.

UNIT II:
1. Alkaloids- definition-general methods of isolation-colour tests for identification-source, isolation, structure and use of atropine-source, extraction, structure, SAR and uses of morphine and quinine.
2. Analgessics-definition different types of pain (superficial, deep non visceral, visceral, referred and psychogeneic), classification - morphine and its derivatives. Synthesis assay and uses of pethidine and methadone-antipyretic
analgesics—salicylic acid derivatives—paracetamol, phenacetin—propanoic acid derivative—ibuprofen.

3. Antibiotics: definition—microbial synthesis structure, assay and uses of chloramphenicol and pencillin—structure and use of streptomycin and tetracyclines.


UNIT III:

1. Antiseptics and disinfectants: Definition and distinction—phenol coefficient—examples—phenolic compounds, dyes, cationic surfactants and chloro compounds. Tranquilizers—definition and examples. Psychodelic drugs LSD and marijuana.


4. Definition of cancer and antineoplastic drugs—examples—antimetabolite, natural substances—hormones, alkylating agents, inorganic complexes and other compounds—definition of hypoglycemic drugs—types and cause for diabetics—examples (Sulphonyl ureas and biguanides).

UNIT IV:

1. Medicinally important compounds of Al₂P₂As, Hg and Fe. Uses of the following MgSO₄·7H₂O, milk of magnesia, magnesium trisilicate—Aluminium hydroxide gel, dihydroxy aluminium amino acetate, Aluminium acetate and aluminium monostearate—paroxon—phosphorine, cyclophosphamide—tricyclophos—preparation and use of thiotepa—sodium and copper cacylates—preparation and uses of aromatic aresericals (carbospone, triparasomide, acetasone, neoarsphenamine, oxophenaricine)—HgCl₂, Hgl₂ and Hg(CN)₂ as disinfections—importance of organic mercury compounds—structure and uses of thiomersal, netromersal—merbromine and mersalyl acid—Ferrous gluconate, FeSO₄, scale preparation (ferric ammonium acetate), ferrous fumarate, ferrous succinate and ferrous chlorinate.

2. Organic pharmaceutical aids—Definition—agents for kidney function (aminophippuric acid)—liver function (sulphobrophthalein sodium, rose Bengal)—corneal ulcer detection (Fluorescein sodium)—blood volume determination (Evans Blue)—pituitary function (metrapone)—ointment bases—preservatives—antioxidants—sequeshants, colouring, sweetening, flavouring, emulsifying and stabilizing agents.


UNIT V:


2. Coagulants and anticoagulants—definitions and examples.

3. Antianemic drugs (iron, vitamin B₁₂, folic acid).
4. Cardiovascular drugs: definition and names of to drugs for each of the following-carduitibue agents-antiarrythmic drugs-antihypertensive drugs-antianginal agents-vasodilators-lipid lowering agents-scelrosing agents.

Text and References

5. DAIRY CHEMISTRY

Teaching hours: 45 Hours per semester (3 hours per week)

UNIT I:
Milk: Definition-General composition of milk-physical properties of milk- colour, odour, acidity-natural and developed, specific gravity-Decker effect viscosity and conductivity, factors affecting the gross competition of milk, physico-Chemical change taking place in milk due to processing parameters-boiling pasteurization- sterilization and homogenization. Adulterants, preservatives and neutralizers-example and their detection. Estimation of fat, specific gravity, acidity and total solids in milk.

UNIT II:
1. Milk lipids-terminology and definitions classification – saponifiable (triglycerides) and unsaponifiable matters (sterols and cholesterol) phospholipids-structure and properties (Lecithin and Cephalin) Milk fat constants-refractive index-saponification number, Iodine number, R.M.number, R.M number and polenske number.
5. Ash and mineral matters in milk.

UNIT III:


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

UNIT V:

Reference Books
1. Outlines of Diary Technology—Sukumar De

6. FORENSIC SCIENCE AND CRIME INVESTIGATION

Teaching hours: 45 Hours per semester (3 hours per week)

UNIT I:
Criminology—Definition—nature and scope—types of crimes—penology—Indian penal code—Indian Evidence Act—Indian Criminal Procedure Code.

UNIT II:
1. Forensic Science—Definition, principles and uses in crime investigation.
UNIT III :
1. Arson-Natural fires and arson-Nature of action of fire-drifts and air supply-burning characteristics and chemistry of combustible material-Nature of combustion.
2. Explosives-Definition-Classification-Composition and mechanism of explosion-bombs.
3. Ballistics-Classification-Internal external and terminal ballistics and overall view. Small arms-Classification and characteristics. Laboratory examination of the barrel washing and detection of powder residues by chemical tests.

UNIT IV :

UNIT V :
Poisons-Types and classification-Diagnosis of poisoning in the living and in the dead-clinical symptoms-post-mortem appearances –treatment in cases of poisoning-use of antidotes.

Reference

APPLICATION ORIENTED SUBJECTS
GROUP-B-VI SEMESTER
1. ANALYTICAL CHEMISTRY II-LAB TECHNIQUES

Teaching hours : 60 Hours per semester (4 hours per week)

UNIT I :
Chromatography: Classification of the chromatographic methods, principles of differential migration, Adsorption phenomenon, nature of the adsorbent, solvent systems. Rf. values column Chromatography. Partition chromatography, paper chromatography, TLC, Electrophores-theory and techniques.

UNIT II :
Spectroscopy: theory, Instrumentation and application of
(i) UV and visible spectrophotometry (ii) IR spectrophotometry
(iii) Flame Photometry (iv) NMR spectroscopy

UNIT III :
Polarimetry: Theory Instrumentation, experimental procedure and application.

UNIT IV :
Electro chemical methods of Analysis, polarography, cyclic voltametry, differential pulse polarography, calorimetry: Theory, techniques and applications.
UNIT V:
Preparation and purification of organic and inorganic compounds like:
(i) Aspirin from salicylic acid  
(ii) Acetanilide from aniline  
(iii) Benzanilide from aniline  
(iv) Iodoform from ethanol/acetone  
(v) Meta di nitro benzene  
(vi) Methyl orange/methyl red  
(vii) Preparation of Nylon 666  
(viii) Caffeine from tea leaves  
(ix) Caesin and lactose from milk  
(x) Nicotine and Nicotine sulphate  
From tobacco waste  
(xi) Bakelite from phenol and formaldehyde  
(xii) \( \text{As}_2\text{O}_3 \) Sol, \( \text{Fe} (\text{OH})_3 \) Sol  
(xiii) Tetramine-copper sulphate  
(xiv) Tetramine Cobalt carbonate  
(xv) Sodium thiosulphate and dithionate

Books for Reference
1. Physical methods of chemistry-R.S.Drago  
2. Spectroscopy in Inorganic chemistry-C.N.R Rao and JR Ferraro  
3. Analytical Chemistry-R.V.Dills  
4. Fundamentals of Analytical Chemistry-D.A.Skoag and D.M.West  
5. Instrumental methods of Chemical Analysis-Ewing  

2. CHEMISTRY OF PLANT BASED PRODUCTS  
(STARCH, CELLULOSE, PROTEINS)
Teaching hours : 60 Hours per semester (4 hours per week)

UNIT I:
Chemistry of starch: Structure, physical and chemical properties. Manufacture and uses of unmodified and modified starch, dextrin, sugar syrup, hydrolysis of starch to edible and industrial glucose applications of starch in textile sizing and in fermentation industries.

UNIT II:
Chemistry of cellulose: Structure physical and chemical properties general reactions, major sources and uses of cellulose, chemical and enzymatic hydrolysis of cellulose. Statistics and economics and cellulose. Chemistry of minor products of wood like lignin, pentosans, resins etc, laboratory preparation, manufacture and uses of chemical cellulose.

UNIT III:

UNIT IV:
Cellulose derivatives like cellulose nitrate, cellulose acetate, ethyl and methyl cellulose, sodium cellulose sulphate, sodium, carboxy, hydroxyl, methyl, cellulose, regenerated cellulose, major cellulose-plastics-sodium carboxy methyl cellulose.

UNIT V:
Different methods of pulping, manufacture and uses of different quality of paper products like card-board, newsprint, writing paper, tissue piper and filter paper. A short
discussion of the pollution problems and by-products utilization of industries based on starch cellulose and proteins.

Reference

3. **DYE CHEMISTRY**

Teaching hours : 60 Hours per semester (4 hours per week)

**UNIT I :**
Colour and constitution-Relationship of colour observed to wave length of light absorbed-Terms used in colour chemistry-Chromophores, Auxochromes, Bathochromic shift, Hypsochromic shift. Colour of a substance-Quinonoid theory molecular orbital approach.

**UNIT II :**
Classification of Dyes-chemical classifications-classification according to their applications-Acid dyes-Basic dyes. Azoic dyes, mordant dyes, vat dyes, Sulphur dyes, Disperse dyes, Nitro dyes-and Nitroso dyes process of dyeing (simple treatment).
Azo dyes-Principles governing azo coupling-mechanism of diazotization-Coupling with amines, coupling with phenols Classification according to the number of azo group & application-Tauthmerism in azo dyes.

**UNIT III :**

**UNIT IV :**
Azine, Oxazine and Triazine Dyes. Synthesis and applications of quinonoid dyes including vat dyes based on anthraquinone.

**UNIT V :**
Pigments-requirements of a pigment: Typical Organic and Inorganic pigments-application and their uses in paints. Reaction of dyes with fibres and water-Fluorescent Brightening agents. Application of dyes in other areas-medicine, chemical analysis, cosmetics, colouring agents, food and beverages.

Reference
4. LEATHER CHEMISTRY

Teaching hours : 60 Hours per semester (4 hours per week)

UNIT I :
1. Hides, Skins, Leather-An elementary knowledge of the structure and composition of hides and skins. Proteins and their characteristics, Anatomy and histology of protein constituents of leather (an elementary concept).
2. Basic principle involved in pre-tanning such as soaking, liming, deliming, bating, pickling involved in pre-tanning such as soaking, liming, deliming, bating, pickling and depickling.

UNIT II :
1. Types of tanning-vegetable and mineral tanning, Different types of vegetable tanning-materials classification and chemistry of vegetable tanning. Facts and Physio-chemical principle involved in vegetable tanning, Fixation of vegetable tanning.
2. Synthetic tannings-their classifications, general methods of manufacture and use.

UNIT III :
1. The preparation and chemistry of chrome tanning liquids, Olation, Oxolation and hydrolysis of chrome liquids. Effect of adding tanning agents-Role of pH in the reaction of chromium complexes with hide proteins. Factors governing chrome tanning-chemistry of neutralization process. A brief survey of chemistry of other tanning like Al, Zr and Te salts and their relative merit in contrast with chrome tanning.
2. Chemistry of combination of tannages involving vegetable tanning aldehydes, chrome and other mineral tanning agents.

UNIT IV :
1. Chemical methods of curing and preservation of hides and skins in acid and alkaline solution.
3. Process of dyeing leather-Use of mordants, dyeing auxillaries such as leveling, wetting and dispersing agents-Dye fixations.

UNIT V :
1. Animal bye-products-their collection, handing and preservation methods (such as hair, blood, bones, glands, Keratous materials and their utilization).

Books for Reference
1. Chemical technology of Leather (ISI).
3. Tanning processes-Crthmann.
5. ENVIRONMENTAL CHEMISTRY

Teaching hours : 60 Hours per semester (4 hours per week)

UNIT I:
1. Concept and scope of environmental chemistry-Nomenclature: Pollutant, contaminant, receptor, sink, pathways of a pollutant, speciation, dissolved oxygen, chemical oxygen demand (COD), biochemical oxygen demand (BOD)-Environmental segments.

2. Composition of the atmosphere-atmospheric structure-earth’s radiation balance – particles, ions and radicals in the atmosphere-formation of inorganic particulate matter- formation of organic particulate matter-ions and radicals-photochemical reactions in the atmosphere-formation of NO$_2$, SO$_2$, organic compounds, green house effect.

UNIT II:
Biological cycles & their significance-Gaseous and sedimentary cycles.
(a) Oxygen cycle and ozone chemistry (b) Carbon cycle (c) Nitrogen cycle (d) Sulphur cycle (e) Phosphours cycle

UNIT III:

2. Eutrophication-sewag treatment-primary and secondary treatments. Industrial waste water treatment by 1) activated charcoal/synthetic resins 2) membrane techniques.

UNIT IV:


UNIT V:

3. Radioactive pollution: Sources of radioactive pollution-environmental threat of nuclear reactors-breeder reactors-environmental conflicts between nuclear powers Methods of control and prevention.

Reference

6. TEXTILE CHEMISTRY

Teaching hours : 60 Hours per semester (4 hours per week)

UNIT I:
2. General classification of fibres-chemical structure, production, properties and uses of the following natural fibres (a) natural cellulosic 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 cellulosic fibres) (ii) Man made protein fibres (Azions) (iii) Poly amide fibres (different types ofnylons) (iv) Poly ester fibres (v) Acrylic fibres and (vi) Olefin fibres.

UNIT III:
Impurities in raw cotton and grey cloth, wool and silk- general principles of the removal – Scouring – bleaching – Desizing – Kierboiling- Chemicking –Chemical and machinery use- Degumming and Bleaching of silk Scouring and Bleaching of wool.

UNIT IV:
Dyeing – Classification of dyes and their properties- applications – direct, basic, sulphur and azoic dyes on cotton. Application of Vat and solubilised vat dyes on cotton and viscose. Mordant mineral colours and black. Application of vegetable and other colour to cotton.

UNIT V:
2. Finishes given to fabrics- Mechanical finishes on cotton, wool and silk, method used 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.

CORE CHEMISTRY PRACTICAL II
Volumetric and Organic Analysis
III & IV TH SEMESTERS (3 hours per week)

I. EXPERIMENTS IN VOLUMETRIC ANALYSIS:

A. Acidimetry & Alkalimetry: Estimation of Na₂CO₃
B. Permanganametry:
   1. Estimation of Ferrous sulphate & Oxalic acid
   2. Determination of Iron in Ferric Alum.
   3. Estimation of Calcium-Direct method.
C. Dichrometry: Estimation of Ferrous iron using internal indicator.
D. Iodimetry:
   1. Estimation of k₂cr₂o₇
   2. Estimation of Copper.
   3. Estimation of As₂O₃
E. Argentometry: (Demonstration experiments)
   Estimation of chloride- Fajan’s and Volhards method.

II. ORGANIC ANALYSIS

Systematic analysis of an organic compound Preliminary tests, detection of elements present, Aromatic or Aliphatic, Saturated or unsaturated, nature of the functional group, confirmatory tests and preparation of derivaties - Aldehydes, Ketones, Amines, Amides, Diamide, Carbohydrates, Phenols, Acids, Esters & Nitro compounds.

CORE CHEMISTRY PRACTICAL III
GRAVIMETRIC ANALYSIS AND CHEMISTRY PHYSICAL
V & VI TH SEMESTERS (7 hours per week)

I. GRAVIMETRIC ANALYSIS:

1. Estimation of Sulphate as Barium Sulphate.
2. Estimation of Barium as Barium Chromate.
3. Estimation of Lead as Lead Chromate.
4. Estimation of Calcium as Calcium Oxalate.
5. Estimation of Nickel as Nickel Dimethylglyoxime.
II. PHYSICAL CHEMISTRY EXPERIMENTS:

1. Determination of partition coefficient of Iodine between Benzene and Water.
2. Determination of rate constant of acid-catalysed hydrolysis of an ester (Methyl acetate or Ethyl acetate).
5. Determination of concentration of an electrolyte (Nacl/Kcl/succinic acid).
6. Phase Diagram – Simple Eutectic system.
7. Determination of cell constant, specific conductivity and equivalent conductivity of strong electrolyte.
8. Determination of dissociation constant of a weak acid (acetic acid).
10. Potentiometric titrations, Acid-base HCl Vs NaOH.

APPLICATION ORIENTED PRACTICALS
V AND VITH SEMESTERS (3hours per week)

1. Determination of Melting point/Boiling point of an organic substance.
2. Preparation of inorganic complexes.
   (a) Tetramine copper (II) sulphate       (b) Potassium Trioxalato chromate (III)
   (c) Prussian Blue             (d) Hexamine Cobalt (II) chloride
   (e) Potassium Trioxalato Ferrate(III)  (f) Sodium Cuprous Thiosulphate.
3. Preparation involving Acetylation, Hydrolysis, Oxidation, Halogenation, Nitration and Benzoylation.
4. Estimation of Hardness of Water using EDTA.
5. Calorimetric experiments involving Nessler’s tubes.
   (a) Extimation of Fe+++ with Ammonium thiocyanate.
   (b) Extimation of Ni as Nickel Dimethyl glyoxime.
   (c) Estimation of Mn++ in Potassium permanganate
6. Paper Chromatography-Chromatographic separation of components present in commercial inks (i.e. Green ink, Red ink, Black ink etc) and in flowers like Rose, Hybiscus etc.
B. Sc. CHEMISTRY MAJOR STUDENTS WHO JOINED THE FROM
THE YEAR 2007-2008
SYLLABUS FOR DIPLOMA IN TEXTILE CHEMISTRY-

DIPLOMA IN TEXTILE CHEMISTRY PAPER – I
(Chemistry of Natural and Synthetic Fibers)
Teaching Hours : 30 Hrs. Per Semester (2 Hrs per week)

UNIT: I

UNIT: II

UNIT: III

UNIT: IV
Nylon Fibres: Synthesis of caprolactum from aniline, adipic acid from cyclohexane and hexamethylene diamine from adiponitrile. Polycondensation reactions leading to the formation of Nylon 6 and Nylon 6,6. Properties and uses of Nylon fibers. Structure and uses of Kevlar fibers.

UNIT: V
Polyester Fibers: Synthesis of Dimethyl Terephthalate (DMT) from p-xylene, terephthalic acid from benzoic acid (Henkel-II process) and synthesis of ethylene glycol. Chemical reactions of Poly Ethylene Terephthalate (PET) preparation. Properties and uses of Polyester fibers.

Reference:
5. A.A.Vidya., ed.:Production of Synthetic Fibers, Prentice-Hall of India, 1988, New-Delhi..
UNIT I:


UNIT II:


UNIT III:


UNIT IV:


UNIT V:


Reference

11. J.K. Aspland, Textile Dyeing and Colouration, AATCC Publications, USA.
15. Wilfred Ingamells, Colour for Textiles, SDC Publications, UK.

DIPLOMA IN TEXTILE CHEMISTRY PAPER – III
(WATER & EFFLUENT TREATMENT AND POLLUTION CONTROL)

Teaching hours : 30 Hours per semester (2 hours per week)

UNIT I :

UNIT II :
WHO, ISO standards for raw water criteria – A general study on raw water pollution and consequence of River water pollution – Effluent discharge standards for inland surface water public sewers, on land for irrigation, marine coastal areas and drinking water parameters- A general study on Boiler water requirements which includes problem caused by water and effect and feed water requirements for low and medium pressure boilers and at a pressure of 450 – 500 psi. Water softening – study includes Cation Exchange softening, lime soda softening, softening by Sequestering agents and De-mineralization with schematic diagram of removal of carbon di oxide and silica.

UNIT III :
Removal of colour and turbidity (simple Coagulation, Flocculation and Filtration methods). General study on removal of Iron and Manganese by Aeration, setting and filtration method- Water analysis – colour, pH value, dissolved solids, suspended solids, total hартness

UNIT IV:

UNIT V:

Reference
2. Industrial safety & Pollution control Hand Book by National safety council and Associate Data Publisher Pvt Ltd.
5. I.S.O Hand Book.
6. Tamilnadu state publications and Hand book of pollution control –Central Board of pollution control.

DIPLOMA IN TEXTILE CHEMISTRY PAPER – IV
TEXTILE CHEMISTRY – PRACTICAL

Lab- hours : 30 Hours per semester (2 hours per week)

LIST OF EXPERIMENTS
1. Identification of textile fibres by burning test
2. Identification of textile fibres by solubility test
3. Estimation of pH- paper, digital pH meter, pH solution
4. Volumetric analysis of Sodium bi Sulphite
5. Volumetric analysis of Sodium Nitrite
6. Volumetric analysis of Sodium Hydro Sulphite
7. Volumetric analysis of Hydrogen Peroxide (permanganometry)
8. Volumetric analysis of Sodium Hypochlorite.

PREPARATION OF DYES
1. Methyl Red
2. Malachite Green
3. Methyl Orange
4. Pare nitro benzene azo beta napthol
5. Azo Amino Benzene.

MODEL QUESTION PAPERS
(Core Chemistry paper I)

Time : Three hours          Maximum : 100 marks

Answer All questions in each section

Section A (10x1=10 Marks)

Fill in the blanks
1. The coordination number of Caesium in Caesium Chloride is …………..
2. Water is……………….solvent
3. The hybridization of carbon in methane is ………………….
4. Predict the product the following reaction
   \[ \text{H}_3\text{CCH} = \text{CH}_2 + \text{HBr} \]
5. The E\textsubscript{2} reaction is ………….molecular
6. Define lattice energy
7. What is an electrophile?
8. What is a free radical?
9. Write Markownikoff’s rule
10. What are the orbitals involved in the hybridization in SP\textsuperscript{3}d\textsuperscript{2}

SECTION B (6x5=30 Marks)

11. (a) Explain the crystal structure of sodium chloride
    (or)
    (b) Explain the crystal structure of calcium chloride.

12. (a) Explain the Hybridization and geometry of XeF\textsubscript{4}
    (or)
    (b) Explain the Hybridization and geometry of PCl\textsubscript{5}

13. (a) Explain the hyper conjugation effect in organic molecule with an example.
    (or)
    (b) Explain Electrophiles, Nucleophiles with an example.

14. (a) State and explain Sayt Zeff’s rule with an example.
    (or)
    (b) State and explain Hoffman’s rule with an example.

15. (a) Explain polymerization with an example.
    (or)
(b) Explain Dickmann ring closure reaction with an example.

SECTION C (5x12=60 Marks)

16. (a) Explain the process of determination of lattice energy using Born Haber cycle with an example.
   (or)
   (b) State VSEPR theory and uses in the determination of geometry of molecules with two examples.

17. (a) Explain the following with examples
   1. Inductive effect
   2. Mesomeric effect
   3. Electromeric effect.
   (or)
   (b) Write briefly the polar reaction involving carbonium ions and carbanions.

18. (a) Write a short note on wittig reaction with an example.
   (or)
   (b) Write a note on the conformation of ethane.

19. (a) Discuss the following evidences of E2 elimination mechanism in the preparation of alkenes
   (i) Kinetic evidence
   (ii) Isotope effect
   (iii) Stereochemical effect.
   (or)
   (b) predict the product and mechanism of the following reactions
   i) $1,3$ – Butadiene + Ethene $\xrightarrow{\Delta}$
   ii) $1,3$ – Butadiene + HBr

20. (a) write notes on the following:
   (i) Peroxide effect
   (ii) Steric effect
   (iii) Synthetic rubber
   (or)
   (b) Write a essay on the Free Radical addition polymerization?

(Core Chemistry paper II)

Time: Three hours Maximum:100 marks

ANSWER ALL QUESTIONS IN EACH SECTION

SECTION A (10X1=10 MARKS)

Fill in the blanks
1. Ozone is used in………..
2. …………… Is a Friedel craft catalyst
3. ……………is an example of liquid crystal
4. The energy of a photon is ……………..
5. $O_2$ molecules is paramagnetic because……………….
6. Write the structure of hydrogen peroxide.
7. Define resonance energy.
8. What is the transition point in liquid crystals?
9. Define Heisenberg uncertainty principle?
10. Explain degenerate state in the energy of electron.

**SECTION B (6x5=30 Marks)**

11. (a) Discuss any three oxidizing property of hydrogen peroxide.

   (or)

   (b) Give the uses of Tellurium.

12. (a) Discuss the mechanism of Friedel craft acylation.

   (or)

   (b) Write short notes on hydroboration.

13. (a) Enumerate the differences between solids, liquids and gases.

   (or)

   (b) Write short notes on

      (i) Coefficient of thermal expansion.

      (ii) Compressibility factor in liquids and solids.

14. (a) Explain the theory of Photoelectric effects.

   (or)

   (b) Discuss the debroglie theory of wave particles duality.

15. (a) Give the significance of $\Psi$ and $\Psi^2$

   (or)

   (b) Explain molecular orbital diagram for nitrogen molecules. Calculate the Bond order for it.

**SECTION C (5x12=60 Marks)**

16. (a) Explain the preparation and structure of hydrogen peroxide.

   (or)

   (b) Give the comparative study of hydroxides, oxides and halides of sulphur selenium and Tellurium.

17. (a) (i) Discuss the inductive effect?

       (ii) How does inductive effect affect the properties of organic compound?

       (iii) What are the rules of reasonance?

   (or)

   (b) (i) Explain the reasons for the acidic nature of alkynes

       (ii) Discuss the mechanism of addition of water with HgSO4 Catalyst in alkynes.

18. (a) Discuss the classification and properties of liquid crystals.

   (or)

   (b) Write short notes on

      (i) Surface Tension and

      (ii) Viscosity of liquids.

19. (a) Write short notes on Black Body radiation.

   (or)

   (b) (i) Planck’s theory of quantization of energy

       (ii) Compton effect.
20. (a) Derive Schrodinger wave equation for a particle in one dimensional box.
(b) Discuss salient feature of
   (i) Valence Bond theory.
   (ii) Molecular orbital theory.

MODEL QUESTION PAPER
(Core Chemistry paper III)

Time: Three hours      Maximum: 100 marks

ANSWER ALL QUESTIONS IN EACH SECTION

SECTION - A (10x1=10 MARKS)

Fill in the blanks
1. The formula if chloropentammine Cobalt III ion is………………
2. NaBH4 is a good………………
3. Polymerisation of styrene gives………………
4. The heat change in chemical reaction at constant volume is ……………
5. The heat change accompanying the burning of one mole of carbon is called as………………
6. Give the IUPAC name of the complex K₄[Fe(N)₆]
7. Write the structure of Di Borane.
8. State Huckels’s Rule
10. what is bond energy?

SECTION B (6x5=30 Marks)

11. (a) What are the postulates of werner’s Co-ordination theory 
    (or)
    (b) Explain Sidgwick concept of EAN with example.
12. (a) Give an Account of a ionization energy and metallic character of 
    Boron Family
    (or)
    (b) Discuss the classification of silicates with example
13. (a) Discuss SN1 mechanism with example.
    (or)
    (b) Discuss the effect of solvent and structure of substrate on 
    nucleophilic substitution reaction.
14. (a) Derive the relationship between Cp and Cv 
    (or)
    (b) Discuss Joule Thomson’s effect
15. (a) Write a note on Bomb calorimeter.
    (or)

b) The heat of formation of methane at 298K as constant pressure is 
-17.890 K.Cals Calculate is heat of formation at Constant Volume.
SECTION C (5x12=60 Marks)

16. (a) Discuss with examples geometrical Isomerism present in square planar and Tetrahedral complexes
   (or)
   (b) Explain with examples spin paired complexes and spin free complexes.

17. (a) Discuss the preparation, properties and structure of Borozole
   (or)
   (b) Write notes on
       (i) Sheet silicates
       (ii) Chain silicates

18. (a) Discuss SN¹ and SN² mechanism with example
   (or)
   (b) What are Grignard reagents? Explain three of their synthetic uses

19. (a) Derive Kirchoff’s equation and explain how it may be used to calculate values from heat capacity data.
   (or)
   (b) Derive an expression for the work done during isothermal adiabatic reversible processes of an ideal gas. In which case work done is maximum?

20. (a) Calculate the bond energy of C=C from Lk1 following reaction.
    \[ H_2C=CH_2(g) + H_2(g) \rightarrow CH_3CH_3 \quad H=12.5 \text{ KJ} \]
    The bond energies of C-C, C-H, H-H, are 347.3, 414.2 and 435.1 KJ mole⁻¹ respectively.
    (or)
    (b) Calculate the enthalpy of formation of ethane from the following data.

    - (i) \[ \text{CO}_2(g) + \text{O}_2(g) \rightarrow \text{CO}_2(g) \quad H=-393.40 \text{ KJ} \]
    - (ii) \[ \text{H}_2(g) + \frac{1}{2} \text{O}_2(g) \rightarrow \text{H}_2\text{O}(l) \quad H=-284.6 \text{ KJ} \]
    - (iii) \[ \text{C}_2\text{H}_6(g) + 3\frac{1}{2}\text{O}_2 \rightarrow 2\text{CO}_2(g) + 3\text{H}_2\text{O} \quad H=-1516.00 \text{ KJ} \]

MODEL QUESTION PAPER
(Core Chemistry paper IV)
(INORGANIC AND ORGANIC CHEMISTRY)

Time: 3 hours
Max marks: 100

Section A
10X1=10

Answer all questions

1. Germanium reacts with ______________ to form germanates.
2. Thallium is present in the mineral ______________
3. ______________ is the important reagent used for the detection and determination of phosphates and arsenates.
4. When ______________ is reduced with hydrogen at red heat a chemically inert bronze-like substance is formed.
5. In cannizzaro reaction the attacking species is ______________
6. The base used in knoevanagel reaction is ______________
7. The essential condition for the haloform reaction is the presence of ________ group.
8. The electron donor in cleemenssen reduction is ______________
9. The structure of enol form of acetoacetic ester is ______________
10. Give the structures of cis and trans isomers of 2-butene.
Section – B

Answer all questions choosing either ‘a’ or ‘b’

11. a) How Ti is extracted from its ore? OR
   b) Explain the extraction of Ge from its ore?
12. a) Explain the extraction and uses of Mo. OR
   b) Give an account of the preparation, properties and uses of V₂O₅.

13. a) Write the mechanism of Crossed aldol condensation. OR
   b) Explain the mechanism of Perkin reaction
14. a) Write the mechanism of Reformatsky reaction. OR
   b) Explain MPV reduction
15. a) Explain the tautomerism of acetoacetic ester OR
   b) Write a note on E and Z isomerism with an example.

Section C

Answer all questions choosing either ‘a’ or ‘b’

16. a) Give the preparation and properties of TiCl₄ and TiO₂ OR
   b) i) How is Tin extracted from its ore.
      ii) Give the preparation of SnCl₂ and its reactions with (1) HgCl₂ and (2) acidified KMnO₄.
17. a) Explain the extraction and uses of W OR
   b) i) Describe the preparation and properties of ZrOCl₂ and WO₂
      ii) Write a note on tungsten bronze and molybdenum blue.
18. a) Discuss the nucleophilic addition reactions of Grignard reagents to different carbonyl compounds. OR
   b) i) Explain in detail the reaction of ammonia with (1) formaldehyde
      (2) acetone (3) acetaldehyde
      ii) Give the mechanism of Claisen – Schmidt reaction.
19. a) Explain the mechanism of i) Wittig reaction and
   ii) benzoin condensation OR
   b) i) Discuss the reducing properties of carbonyl compounds.
      ii) Explain the mechanism of MPV reduction.
20. a) Discuss the preparation and synthetic applications of cyanoacetic ester. OR
   b) i) How will your distinguish cis-trans isomers?
      ii) Classify the following as E and Z isomers.

\[
\begin{array}{ll}
1) & \begin{array}{c}
\text{H}_3\text{C} \\
\text{C} = \text{C} \\
\text{H} \\
\text{NH}_2
\end{array} & \begin{array}{c}
\text{Br} \\
\text{SO}_3\text{H}
\end{array} \\
2) & \begin{array}{c}
\text{C} = \text{C} \\
\text{Cl} \\
\text{OCH}_3
\end{array} \\
3) & \begin{array}{c}
\text{OHC} \\
\text{C} = \text{C} \\
\text{H}_3\text{C} \\
\text{COCH}_3
\end{array} & \begin{array}{c}
\text{H} \\
\text{C}_6\text{H}_5 \\
\text{Cl} \\
\text{Br}
\end{array}
\end{array}
\]
B.Sc. CORE CHEMISTRY PAPER V.
COMPUTER APPLICATIONS IN CHEMISTRY AND PHYSICAL CHEMISTRY

Time: Three hours                                                                   Maximum: 100 marks

Answer ALL the questions.

Section-A (10 x 1= 10 marks)

1. What do you mean by RAM?
2. Write one use of OCR
3. The storage range of unsigned character is -------.
4. Print f( ) is an output function present in the standard library header file-------.
5. The expression for the rate constant of a first order reaction is ------------.
6. ------- function gets a character from the keyboard and so directs the program to wait for a key press.
7. Define entropy.
8. State Trouten’s rule.
9. The function A is termed as the -------.
10. The sign of ∆G for a spontaneous reaction is -------.

Section –B (5 x 6 = 30 marks)

11. a) Draw the block diagram of a computer. ( or )
    b) Write a note on Read Only Memory.

12. a) Explain the hierarchy of operators in C language. ( or )
    b) Write a note on key words in C language.

13. a) Write a C program to compute the order of a reaction. ( or )
    b) Write a C program to compute the half-life period of a first order reaction.

14.a) Calculate the entropy change in the evaporation of 1 mole of water at 100 °C. Latent heat of evaporation of 1 mole of water is 9650 cal/mol. ( or )
    b) One mole of an ideal monoatomic gas expands reversibly from a temperature of 25 °C and a pressure of 1 atm to a temperature of 0 °C and a pressure of 500 mm Hg. Calculate ∆S for the process (C_v = 3/2 R).

15 a) Derive the Gibbs –Helmholtz equation. ( or )
    b) State and explain the third law of thermodynamics.

Section –C(5 x 12 = 60 marks)

16 a) Explain in detail the fixed head system and the movable head system of a hard disk. ( or )
    b) i. Explain the symbols used in flow charts.
ii. Write any five advantages of flow charts.

17 a) Discuss the different types of constants used in a C program.
( or )

b) Write notes on the following:
   i. Data types in C language.
   ii. Increment and decrement operators in C language.

18 a) Write a C program to calculate the $P_{\text{H}}$ of a solution using Henderson equation
( or )

b) Write a C program to calculate the energy of activation of a reaction.

19 a) i. Explain Carnot theorem.

ii. Calculate $\Delta S$ accompanying the isothermal expansion of 5 moles of an ideal gas at 330 K until its volume has increased six times.
( or )

b) i. Discuss the effect of pressure and temperature on entropy.

ii. Calculate $\Delta S$ when 4 moles of hydrogen and 1 mole of oxygen are mixed together at 300 K and 1 atmosphere pressure.

20 a) i. Derive the Van’t Hoff isotherm equation.

ii. Show that $(dA)_{\text{V,T}} \leq 0$ for the reversible and irreversible processes, respectively.
( or )

b) i. Explain the effect of temperature and pressure on Gibbs free energy.

ii. Using the third law of thermodynamics show that

$$\lim_{T \to 0} (\partial P/\partial T)_V = 0.$$

MODEL QUESTION PAPER
(Core Chemistry paper VI)

Time: Three hours      Maximum: 100 marks

ANSWER ALL QUESTIONS IN EACH SECTION

SECTION A (10x1=10 MARKS)

Fill in the blanks

1. The unwanted impurities present in the ore is called ..............
2. Phenol on treatment with sulphuric acid at 100°C gives the product ..............
3. NN$^1$ Dimethyl aniline is ...................... amine
4. Reduced phase rule is ......................
5. Colligative properties depend on ..............
6. Explain the term “Concentration of the ore” ..............
7. Give an example for dihydric phenol ..............
8. What is the structure of Diazomethane ..............
9. How many eutectic points are present in Bi-Cd – phase Diagram ..............
10. State Raoult’s Law ..............

SECTION B (5x6=30)
11. a) Write a short note on Froth Floatation process
(b) Write a short note on Electro magnetic concentration of the ore

12. a) Explain the mechanism of Riemen Tiemann reaction
(b) Explain the mechanism of nitration of phenol.

13. a) How is Diagomethane prepared? Explain its structure
(b) Explain diazotization and coupling reactions of aromatic amines.

14. a) Explain the phase Diagram of Carbon dioxide system.
(b) Derive Gibb’s phase rule

15. a) (i) What are ideal and non ideal solutions?
(ii) Discuss the reasons for deviation from ideal behavior
(b) State and explain Henry’s Law
What are its limitations.

SECTION B  (5X12=60)

16. a) Explain the terms : mineral, ore, roasting, gravity separation, magnetic separation
(b) Write a note on the following
   (i) Van Arkel refining
   (ii) Zone, refining
   (iii) Electrolytic refining

17. (a) Explain the following reaction
   (i) Kolbe reaction
   (ii) Gattermann Reaction
   (iii) Reimer Tiemann reaction
(b) Compare the acidity of phenols with aliphatic alcohols and carboxylic acids.

18. (a) Explain any four synthetic applications of Diazacetic ester.
(b) What are primary, secondary and tertiary amines? How are they separated from a mixture.

19. (a) Derive the Clausius – Clapeyron equation.
(b) Explain the phase Diagram of Zn-Mg, diagram with a neat sketch.

20. (a) Calculate the osmotic pressure of 5% solution of sucrose in water at 300k.
(b) 0.001 Kg of a solute dissolved in 0.1 Kg of water gave depression of freezing point 0.2K. Calculate the molecular mass of the solute.

(Core Chemistry paper VII)
(Inorganic chemistry)

Time: Three hours  Maximum: 100 marks

ANSWER ALL QUESTIONS IN EACH SECTION

SECTION A (10X1=10 MARKS)

Fill in the blanks
1. Barium is estimated gravimetrically form its solution by precipitating it as ………….by adding potassium chromate solution.
2. Enriched uranium is ……………………..
3. Atoms having same mass numbers but differ from atomic number is known as ……………………..
4. The Basicity of phosphoric acid is ……………………..
5. Ammonia is a ……………………… Solvent.
6. Explain the term digestion …………..
7. Name the place of atomic energy project in Tamil Nadu.
8. Define as isotope.
9. What is Lewis acid?
10. Give an example non-protonic solvent.

SECTION B (5X6=30)

11. (a) Explain the term post precipitation.
    (or)
    (b) Explain the Co-precipitation.
12. (a) Explain the principle of working nuclear Reactor.
    (or)
    (b) Explain the terms with example: Nuclear fission and nuclear fusion.
13. (a) Write a note on “magic Numbers”.
    (or)
    (b) What is nuclear binding energy? How is it related to nuclear stability?
14. (a) What are limitations of hard and soft acid and base concept?
    (or)
    (b) Explain the role of π bonding in Hard and soft Acids.
15. (a) What are Ionising and non-ionising solvents?
    Give two example for each.
    (or)
    (b) What are the advantages of using liquid Ammonia as solvent.

SECTION C (5X12=60)

16. (a) What an essay on the principles of gravimetric analysis
    (or)
    (b) Write a note on the factors influencing the precipitation and solubility in gravimetric Analysts.
17. (a) Give a brief account of Artificial radioactivity.
   (or)
   (b) Write a note on
       (i) Disposal of reactor wastes
       (ii) Radio active pollution

18. (a) Discuss the methods of separation of isotopes by various methods.
       (or)
       (b) Write a note on Radio Active disintegration series.

19. (a) Explain hardness and softness on the bases of electronegativity
       (or)
       (b) Write a note on solvolytic reactions

20. (a) Discuss the properties of liquid sulphur dioxide as a solvent
       (or)
       (b) Discuss the typical reaction of liquid Hydrogen fluoride acts as a solvent

MODEL QUESTION PAPER
(Core Chemistry paper VIII)
(Organic Chemistry)

Time: Three hours Maximum:100 marks

ANSWER ALL QUESTIONS IN EACH SECTION

SECTION A (10X1=10 MARKS)

Fill in the blanks
1. Optical activity of mesotartaric acid is due to the presence of .................
2. An oxide becomes amide in .........................rearrangement
3. Glucose and mannose pair is termed as ............... 
4. Protein on complete hydrolysis gives .................
5. Pyridine on treatment with NaNH2 gives .................pyridine
6. Define an asymmetric carbon.
7. What is the starting compound for curtius rearrangement.
8. Give an example for Disaccharide.
9. What is zwitter ion?
10. Write the structure of pyridine?

SECTION B (5X6=30 MARKS)

11. (a) With illustration define the following terms?
       (i) Enantiomer (ii)Diastereomer
       (or)
       (b) What is meant by asymmetric synthesis?
       Explain-with-example

12. (a) Explain the mechanism of Schmidt rearrangement
       (or)
       (b) Explain the mechanism of Beck mann rearrangement
13. (a) Explain Mutarotation with mechanism?
   (b) Deduce the structure of glucose

14. (a) Explain the classification of proteins based on their functions?
   (b) Give the product obtained when alainine treated with
       (1) Barium hydroxide (2) Nitrous Acid (3) Hydrochloric acid

15. (a) Pyridine shows aromatic character-Explain this fact with molecular orbital picture?
   (b) Give the synthesis of iso quinoline?

**SECTION -C (5X12=60 MARKS)**

16. (a) Define the terms Recemization and Resolution and give one method for each process
   (b) (i) With illustrations explain assymmetric synthesis
       (iii) Discuss the optical activity – exhibited by Allenes

17. (a) Write short note on
       (i) Hoffmann rearrangement  (ii) Curtius Rearrangement
       (b) Explain the mechanism in
       (i) Cope rearrangement  (ii) Claisen rearrangement

18. (a) compare and contrast the structure and function of starch and cellulose
   (b) Effect the following conversions
       (i) Ketose  Aldose (ii) Aldo hexose  Aldo pentose.

19. (a) Discuss the general properties of proteins
   (b) Write down the synthesis of  Istat and Indigo

20. (a) Assign R,S Configuration for the following

   (i) H ____________ OH  (ii) Cl ____________ OH  (iii) D ____________ COOCH3
      CH3                     CH2OH                  H

   (b) Predict the product and suggest the mechanism

   (Me) 2 ____________ C ____________ C ____________ CHC6H5 ____________ H+ 
      OH                     OH

**MODEL QUESTION PAPER**
(Core Chemistry paper IX)

(Electro Chemistry)

Time: Three hours       Maximum: 100 marks

ANSWER ALL QUESTIONS IN EACH SECTION

SECTION A (10X1=10 MARKS)

Fill in the blanks
1. The specific conductance of electrolyte on dilution …………………
2. The pH of 0.01N sodium Hydroxide solution is…………………
3. The relation between and EMF of a cell and the frequency change of cell reaction is …………………
4. The value of liquid junction potential maybe………………
5. The reduction potential of Hydrogen electrode at 25°C is………………
6. Define the term specific conductance
7. Define pH
8. What is the oxidation potential of standard hydrogen electrode?
9. Give an example of Redox indicator?
10. What is the voltage of lead storage cell?

SECTION B (5X6=30 MARKS)

11.(a) What is the principle of conductometric titration?
   (i) Draw and explain The conductometric titration Curve of (HCL + CH₃ COOH) X NaoH
   (or)
   (b) Explain to any two Applications of Kohlrausch Law.
12. (a) Explain the application of solubility product principle in qualitative analysis?
   (or)
   (b) How is dissociation constant of weak base determined by conductance measurements?

13. (a) Derive Nerst equation. Mention is application
   (or)
   (b) What is Weston cadmium cell? How is it useful in the determination of EMF of a given Cell.
14. (a) Describe the potentiometric titration of HClx NaoH
   (or)
   (b) Derive an expression for EMF of a concentration cell without transference
15. (a) Explain the working of nickel cadmium cell
   (or)
   (b) Write a short note on Decomposition voltage and over voltage.

SECTION C (5X12=60 MARKS)
16. (a) (i) Give a detailed account of Debye – Huckel onsagar theory. How is it verified?
(ii) Write a note on Debye- Falkenhagen effect.

(or)

(b) Sketch and explain conductometric titration curve for HClxNaoH

17. (a) (i) How is the solubility product of sparingly solubility salt determined by EMF measurements?
(ii) Give an account of Redox indicators?
(iii) Give an account of Redox indicators?

(or)

(b) (i) Derive Henderson equation
(ii) Explain the role of common ion effect in qualitative analysis

18. (a) Write an essay on various types of electrodes.

(or)

(b) (i) Derive the Nernst equation.
(ii) Give an account of electrodes chemical series
What is its significance?

19. (a) How is the pH of a solution is determined by using a hydrogen gas electrode and Quinhydrone electrode?
(b) (i) What is liquid function potential?
(ii) Derive an expression for EMF of a concentration cell with transference.

20. (a) (i) The ionic conductance of Na\(^+\) and cl\(^-\) ion at infinite dilution are 50.11.5 cm\(^2\) eq\(^{-1}\) and 76.325 cm\(^2\) eq\(^{-1}\) respectively. Calculate the transport numbers of Na\(^+\) and cl\(^-\)

(ii) the transport number of Ag\(^+\) ion in AgNO\(_3\) at 0482 the equivalence conductance of AgNO\(_3\) solution at infinite dilution is 120 s cm\(^2\) eq\(^{-1}\) Calculate the ionic mobility of NO\(_3\)\(^-\) ion.

(or)

(b) (i) A solution containing 0.05M Benzoic acid and 0.1M sodium Benzoate has pH 4.5. Find the dissolution constant of benzoic acid
(ii) The emt of the cell

Sn | sn\(^{2r}\) | Pb\(^{2+}\) | Pb

A2 \(25^0\)C is 0.014 volt. Calculate the equilibrium constant of the cell reaction at \(25^0\)C

MODEL QUESTION PAPER
(Core Chemistry paper X)
(Spectroscopy and natural product)

Time: Three hours

Maximum: 100 marks

ANSWER ALL QUESTIONS IN EACH SECTION
SECTION A (10X1=10 MARKS)

Fill in the blanks

1. The radiation of wave length 250nm lies on the ……………… region.
2. Raman spectra may be obtained in region of …………………
3. Geraniol and Nerol are…………….isomers
4. All alkaloid are……………in nature
5. The antimalarial drug is………………
6. Give the selection rule for rotational spectra
7. What is the source of Raman spectra?
8. Write the structure of Ascorbic Acid
9. Define an alkaloid
10. What are sulpha drugs?

SECTION B (5X6=30 MARKS)

11. (a) Describe the changes induced by the electromagnetic radiation in the matter
    (b) Explain the various types vibration of carbon dioxide and water.
12. (a) Discuss the theory of Raman Spectroscopy
    (b) Write short note on Frank condon principle and predissociation.
13. (a) What are terpenes? State isoprene rules and classify terpenes.
    (b) Discuss the importance of vitamins in human health and their deficiency diseases
14. (a) What are allkaloids? Explain their classification with examples?
    (b) Write the synthesis of conine.
15. (a) Write a note of on antimalatral drug.
    (b) Write a short note on LD50, ED50 and theracuhc index.

SECTION C (5X12=60 MARKS)

16. (a) Explain the method of determination of bond length in a diatomic molecule using rotational specterscopy.
    (b) Discuss the application of IR spectra’s copy.
17. (a) Discuss the principle and Applications of UV spectros copy
    (b)Discuss the principles of NMR spectroscopy
18. (a) (i) How is dipentene prepared?
        (ii) How geraniol is converted into &- terpineol
    (b) Write the synthesis of thiamine
19. (a) Discuss the structure elucidation of coniine
(b) Write the steps involved in Hoffmann exhaustive methylation and mention its uses.

20. (a) The rotation spectrum of HF has lines 41.9 cm\(^{-1}\) apart. Calculate the moment of inertia and bond length in HF.

(or)

(b) Write a detailed account of supha drugs and their applications.

MODEL QUESTION PAPER

(Core Chemistry paper XI)

(Physical Properties and Chemical Kinetics)

Time: Three hours

Maximum:100 marks

ANSWER ALL QUESTIONS IN EACH SECTION

SECTION A (10X1=10 MARKS)

Fill in the blanks

1. The unit of dipole moment is ………………
2. The unit of molar magnetic susceptibility is ……..
3. The thermal dissociation of N\(_2\)O\(_5\) belongs to …………… order kinetics
4. “Inversion of cane sugar” reaction can be studied by ……………………. 
5. Plank constant is equal to……………
6. Define Dipole moment ……………..
7. What is pramagnetism ……………….
8. Give an example for first order reaction…………….
9. Name the method in which rate is determined by the method change in pressure.
10. What is the quantum yield of photo chemical reaction.

SECTION B (5X6=30 MARKS)

11. (a) How dipole moment is determined?

(or)

(b) Explain the terms: (i) Molar Polarization

(ii) Orientation Polarization

12. (a) Distinguish between paramagnetism, diamagnetism and ferrimagnetism.

(or)

(b) How magnetic susceptibility is determined by Gouy method

13. (a) Discuss the differences between order and molecularity of a reaction.

(or)

(b) Write the differential equation for I, II, III and zero order reaction.

14. (a) How polarimetry is useful in the study of kinetic of a reaction?

(or)

(b) How calorimetry is useful to follow the kinetic of a reaction?

15. (a) Write short note on photosensitation and chemiluminescence

(or)

(b) State the law of photochemical equivalence and quantum yield of photochemical reaction.
SECTION C (5X12=60 MARKS)

16. (a) Write an essay on the application of Dipolomoment in the elucidation of structure of molecules?

(or)

(b) Distinguish between orientation polarization and distortion polarization.

(2) O, P, M isomer by dipola moment value?

17. (a) Discuss how magnetic susceptibility measurements are useful in determining the structure of molecules?

(or)

(b) Discuss the photochemical kinetics of H₂/Br₂ reaction?

18. (a) Explain the Lindemann’s theory of unimolecular reaction in detail.

(or)

(b) Explain the Absolute reaction rate theory of unimolecular reaction?

19. (a) How will you determine the order of a reaction by

(1) Differential method

(2) Time for half life method

(or)

(b) What is Quantum yield? Explain the method to determine the Quantum yield of a photochemical reaction?

20. (a) Ethyl Acetate was subjected to hydrolysis in one normal HCl at 298°C. 5ml of the mixture were withdrawn and titrated against standard NaOH solution at different intervals with the following ruler

<table>
<thead>
<tr>
<th>Time in minutes</th>
<th>0</th>
<th>20</th>
<th>75</th>
<th>125</th>
<th>x</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume of NaOH</td>
<td>20.25</td>
<td>21.70</td>
<td>29.65</td>
<td>30.20</td>
<td>43.9r</td>
</tr>
</tbody>
</table>

Show that the reaction is first order and evaluate an average value of reaction rate.

(b) (i) The wave number of a certain electromagnetic radiation 3000 cm⁻¹. Calculate (1) frequency (2) energy in joules and colories per quantum.

(ii) A certain system absorbs 3x10¹⁶ quanta of light per second on irradiation for 10 minutes. 0.002 moles of reactants were found to have reacted. Calculate the Quantum yield of the process.

DIPLOMA IN TEXTILE CHEMISTRY PAPER – I
(CHEMISTRY OF NATURAL AND SYNTHETIC FIBERS)
MODEL QUESTION PAPER

TIME: 3Hrs. Answer ALL Questions Maximum Marks: 100

SECTION – A (1 X 10 = 10 Marks)

1. Animal fiber generally compose of

2. Glucose is the main linking unit in fibers.

3. Regenerated cellulose is also called as

4. Repeat unit of viscose fiber is

5. synthetic fiber is called as synthetic wool.

6. An example of a monomer is
7. Structure of Kevlar fiber is --------.
8. The catalyst used in the preparation of adipic acid from cyclohexane is ------.
9. An ester link is represented as --------.
10. Structure of Dimethyl Terephthalate is represented as --------.

SECTION – B (6X 5 = 30 Marks)

11. a) Bring out the difference between Animal and Protein fibers. (OR)
    b) Write a note of Jute fibers and its cultivation.
12. a) With a flow chart discuss about wet spinning of viscose filaments. (OR)
    b) Write a note on the properties and uses of Viscose fibers.
13. a) With an example explain the steps involved in addition polymerization reaction. (OR)
    b) Explain the process of synthesis of acrylonitrile through Sohio Process.
14. a) Write the difference in structures between Nylon 6 and Nylon 6,6. (OR)
    b) How hexamethylene diamine is prepared from adiponitrile?
15. a) Explain the properties and uses of Polyester fibers. (OR)
    b) How terephthalic acid is prepared from benzoic acid?

SECTION – C (5X 12 = 60 Marks)

16. a) Write the structure, properties and uses of cotton fibers. (OR)
    b) Write the structure, properties and uses of wool and silk fibers.
17. a) Explain with a flow chart the production of viscose fibre. (OR)
    b) Explain the chemical reactions involved in the production of regenerated cellulose.
18. a) With equations explain the production of poly (acrylonitrile). (OR)
    b) Explain the properties and uses of acrylonitrile fibers.
19. a) Explain the synthesis of caprolactum and further reaction leading to Nylon 6. (OR)
    b) How Nylon 6,6 is produced industrially?
20. a) Explain the industrial preparation of Poly Ethylene Terephthalate (OR)
    b) Discuss the properties and uses of polyester fibers.