SYLLABUS

BSC CHEMISTRY

I YEAR – MAJOR PAPER-I

I SEMESTER

I SEMESTER
MAJOR PAPER-I-GENERAL CHEMISTRY-I (60 Hrs)

UNIT-I

1.1 Atomic Structure

Aufbau principle, Hund's rule and electronic configurations of elements-stability of half filled and completely filled orbitals, shapes of s,p,d orbitals.

1.2 Periodicity of properties

Definition and periodicity of the following properties-atomic radii, ionic radii- ionization potential, electron affinity and electro negativity (no determination)Lanthanide contraction-inert pair effect and diagonal relationship with examples.

1.3 Principles of Inorganic Analysis

Principles of acid base equilibria, common ion effect and solubility product and their application in qualitative analysis. Reactions involved in the separation and identification of cations and anions in the analysis, spot test reagents-Aluminon,Cupferron,DMG,Thiourea, Magneson, Alizarin and Nesslers reagent-Semi –micro techniques.

UNIT-II

2.1 Quantum Chemistry

Planck's theory-Photo electric effect-Compton effect ,de Broglie's relationship ,Heisenberg's uncertainity principle-Schrodinger wave equation (no derivation)-significance of wave function (ψ &ψ^2).

2.2 Solid state

Crystalline and Amorphous solids ,Isotropy and Anisotropy, Symmetry in crystal systems, Elements of symmetry ,space lattice and Unit cells, number of atoms/ions per unit cell in a cubic lattice ,Bravais lattices, Law of rationality of indices, Miller indices. X-ray diffraction, Bragg's equation ,Structure of CsCl and NaCl, Imperfections in crystals-Point defect, Schottky defect ,Frenkel defect

Reference Books

1. Text book of Inorganic Chemistry-P.L.Soni
2. Text book of Inorganic Chemistry- Puri & Sharma
3. Advanced Inorganic Chemistry –Satya prakash
4. Selected topics in Inorganic Chemistry- Malik,Tuli & Madan.
5. Physical Chemistry- Puri & Sharma
6. Physical Chemistry-P.W.Atkins
7. Concise Inorganic Chemistry-J.D.Lee

I SEMESTER

MAJOR PAPER-II-GENERAL CHEMISTRY-II (60 Hrs)

UNIT-I

1.1 Gaseous State

Gas laws from the Kinetic theory of gases. Transport properties-Viscosity-thermal conductivity-diffusion-definition only-Maxwell's distribution of molecular velocities, Law of equipartition of energy, Derivation of Vanderwaal's equation from Ideal gas equation, coefficient of compressibility and thermal expansion.

1.2 Liquid state

Intermolecular forces in liquids ,physical properties-Vapour pressure, Heat of Vapourisation, Effect of temperature-Surface tension, determination of Surface tension by Capillary rise method and Stalagmometer method, effect of temperature, Viscosity –Determination using Ostwald Viscometer,effect of temperature and pressure.

1.3 Mesomorphic state

Liquid crystals-classification molecular arrangements and applications.

UNIT-II

2.1 Basic concepts of bonding in organic chemistry-Hybridisation and geometry of molecules-Methane, Ethane, Ethylene, Acetylene and Benzene. Electron displacement effects-Inductive, resonance and steric effects.Cleavage of bonds-homolytic and heterolytic fission of carbon- carbon bond, reaction intermediates-carbocations, carbanions and free radicals-their stability.

2.2 Cycloalkanes-preparation using Wurtz's reaction, Dieckmann's ring closure and reduction of aromatic hydrocarbons. Substitution and ring opening reactions. Bayer's strain theory.

Reference Books

1. Text book of Organic Chemistry-P.L.Soni
2. Text book of Organic Chemistry- B.S.Bahl & Arun Bhal
3. Organic chemistry-Reactions & Reagents-O.P.Agarwal
4 . Physical Chemistry- Puri & Sharma
5. Physical Chemistry-P.W.Atkins
6. Modern organic Chemistry M.K.Jain and S.C.Sharma

II SEMESTER
MAJOR PAPER-III-GENERAL CHEMISTRY-III (60 Hrs)

UNIT-I

CHEMICAL BONDING

1.1 Ionic Bond

Formation and general properties. Radius ratio rule and its limitations .Hydration energy and lattice energy and their applications .Born-Haber cycle-Fajan's rules.

1.2 Covalent Bond

Valence bond theory, formation and general properties ,orbital overlap, VSEPR theory and geometries of H_2O,NH_3,CH_4,PCl_5,SF_6,IF_7,BF_3 molecules.

1.3 Molecular Orbital Theory

Bonding, antibonding orbitals and bond order. MO diagram of H_2,He_2,O_2,O_2^+,O_2^-,N_2,F_2. Comparison of VB and MO theories, Hydrogen bonding-types, examples and effect on properties.

1.4 Chemistry of S block elements

Alkali metals

Li,Na,K,Rb and Cs-occurrence ,comparative study of elements, oxides, halides, hydroxides and carbonates. Exceptional property of lithium.

Alkaline Earth Metals

Be, Mg, Ca, Sr and Ba occurrence and comparative study of the elements oxides, halides, hydroxides, sulphates and carbonates. Exceptional property of Berylium.

UNIT-II

2.1 Alkenes –General methods of preparation, properties of alkenes-electrophilic and free radical addition ,addition reactions with hydrogen, halogens,hydrogen halide (Markownikoff's rule) hydrogen bromide(peroxide effect),sulphuric acid, water, hydroboration, Ozonolysis, hydroxylation with $KMnO_4$,allylic substitution by NBS.

2.2 Dienes-Stability of dienes,conjugated,isolated and cumulative-stability and chemical reactivity-1,2 and 1,4 additions,Diels-Alder reactions,Synthesis of dienes-1,3 butadiene, isoprene, chloroprene.

2.3 Alkynes-Preparation and properties-acidity of alkynes, formation of acetylides, addition of water with $HgSO_4$ catalyst ,addition of hydrogen halides and halogens ,oxidation, ozonolysis and hydroboration.

Reference Books

1. Text book of Inorganic Chemistry-P.L.Soni
2. Text book of Inorganic Chemistry- Puri & Sharma
3. Advanced Inorganic Chemistry –Satya prakash
4. Selected topics in Inorganic Chemistry- Malik,Tuli & Madan.
5. Advanced Organic Chemistry by Bahl Arun Bahl
6. Concise Inorganic Chemistry-J.D.Lee.
7. Text book of Organic Chemistry-P.L.Soni
8. Modern organic Chemistry M.K.Jain and S.C.Sharma

II SEMESTER
MAJOR PAPER-IV-GENERAL CHEMISTRY-IV (60 Hrs)

UNIT-I

Thermodynamics

1.1 Definition and explanation of terms-intensive and extensive properties, types of systems, thermodynamic process-cyclic, reversible, irreversible, isothermal and adiabatic processes.

1.2 Thermodynamic functions-complete differential, zeroth law of thermodynamics, concept of heat and work.

1.3 First law of Thermodynamics-statement and equation C_P,C_V relationship-calculation of q, w, ΔE and, ΔH for the expansion of ideal gases under reversible,isothermal and adiabatic conditions-P-V,P-T,T-V relationships.

1.4 Thermochemistry Bond energy, Bond dissociation energy, calculation from thermochemical data, Heat of reaction,heat changes at constant pressure and constant volume,variation of heat of reaction with temperature,Kirchoff's equation.

UNIT-II

Oils,fats, soaps and detergents

Extraction and refining, structure and composition ,analysis of fats and oils, Saponification number ,iodine number, acid number and RM number-determination of iodine value and saponification value .Soaps –raw materials and manufacture ,detergents-classification and applications-raw materials and principles of manufacture.

Reference Books

1. Advanced Organic Chemistry by Bahl Arun Bahl
2. Text book of Organic Chemistry-P.L.Soni
3. Physical Chemistry- Puri & Sharma
4. Physical Chemistry-P.W.Atkins
5. Industrial Chemistry-B.K.sharma

I YEAR - MAJOR PRACTICAL-I

II SEMESTER

MAJOR CHEMISTRY PRACTICALS

PRACTICAL I - INORGANIC QUALITATIVE ANALYSIS AND PREPARATION

1.Analysis of a mixture containing two cations and two anions, one of which will be an interfering ion. Semimicro methods using the conventional scheme may be adopted.

Reactions of the following anions to be studied:
carbonate,sulphide,sulphate,fluoride,Chloride,bromide,nitrate,oxalate, phosphate,borate,*iodide,*arsenite,*chromate,*sulphite,thiosulphate*,nitrite, arsenate*

Reactions of the following cations to be studied :
lead,silver*,mercury*,copper,tin*,Antimony,cadmium,bismuth,aluminium,*chromium,iron,manganese,zinc,cobalt,strontium,barium,magnesium,nickel, calcium and ammonium.

2.Preparation of the following inorganic compounds:
1.Ferrous ammonium sulphate 2.Manganous sulphate 3.Microcosmic salt 4.Tetrammine copper(II)sulphate 5.*Sodium thiosulphate and 6.*Potassium trioxalatochromate(III)
*.not to be given for examination.

DEPARTMENT OF CHEMISTRY

CHEMISTRY PRACTICALS

SCHEME OF VALUATION

CHEMISTRY MAIN PRACTICAL – I
UCH/CP/2001

Maximum: 50 marks

Internal : 20 marks
External : 30 marks
Total : 50 marks

(a) Inorganic qualitative analysis with systematic analysis with correct elimination and confirmatory tests. (16marks)

4 Radicals 4 x 4 = 16 marks
Spotting each radical 1mark
Detection of correct group for each basic radical 1 mark

(b) Preparation :

Record : 5 marks

Internal

Attendance : 10 marks

Test : 10 marks (2 tests)

II YEAR – MAJOR PAPER-V

III SEMESTER

III SEMESTER
MAJOR PAPER-V-GENERAL CHEMISTRY-V (60 Hrs)

UNIT-I

1.Principles of Volumetric Analysis

1.1 Definitions of molality, normality, molarity and mole fraction-definition and examples for primary and secondary standards. Theories of acid-base, redox, complexometric, iodometric and iodimetricand precipitation titrations. Calculations of equilavent weights, theories of acid-base redox, metal ion and adsorption indicators and choice of indicators.

1.2 p-block elements-Boron family

Electron deficiency behavior of Boron halides-preparations,properties,structure and uses of borazole,$NaBH_4$,Boron nitride,$LiAlH_4$ and diborane.

1.3 Carbon family

Comparison of properities of Carbon and silicon. Classification, preparation, properties, structure and uses of Carbides. Classification of Silicates.

UNIT-II

2.1 Aromaticity - Huckel's (4n+2) rule and its applications. Electrophilic substitution reaction in aromatic compounds. General mechanisms-nitration, halogenations, Sulphonation,Friedal Crafts acylation and alkylation. Directive influence-Orientation.

2.2 Aliphatic Nucleophilic substitutions.Mechanisms of SN^1,SN^2,and SN^i reactions-effects of structure, substrate, solvent, nucleophile and leaving groups. Hofmann and Saytzeff's rule.

2.3 Eliminations- mechanism of E_1 and E_2 reactions.

Reference Books

1. Vogel's Textbook of Quantitative Analysis.
2. Text book of Inorganic Chemistry-P.L.Soni
3. Modern Inorganic Chemistry R.D.Madan
4.Organic Chemistry R.T.Morrison and Boyd
5. Organic Chemistry-Reactions and Reagents-O.P.Agarwal
6. Advanced Organic Chemistry-B.S.Bhal.S
7. Concise Inorganic Chemistry-J.D.Lee
8. Modern organic Chemistry M.K.Jain and S.C.Sharma

II YEAR – MAJOR PAPER-VI

III SEMESTER

III SEMESTER
MAJOR PAPER-VI-GENERAL CHEMISTRY-VI (60 Hrs)

UNIT-I

1.1 Second law of Thermodynamics-Limitations of I law, Statements of the II law. Spontaneous Process, Carnot's cycle-efficiency, Carnot's theorem.(Statement only)

Concept of Entropy-definition-entropy of an ideal gas- entropy changes in cyclic, reversible and irreversible process and physical transformations, Trouton's rule and its applications. Calculations of entropy changes with changes in T,V and P.

1.2 Gibb's free energy-Helmholtz free energy-their variation with temperature,pressure and volume. Criteria for spontaneity. Gibb's Helmholtz equation-derivation and applications.

1.3 Photo Chemistry

Laws of Photo Chemistry-
Fluorescence,Phosphorescence,Photosentisation,Chemiluminescence, Primary and Secondary reactions-Quantum yield.

UNIT-II

Metallurgy - General principles, ores-concentration, extraction of metals-refining methods-electrolytic refining,Zone refining and Van Arkel process. Extraction and uses of Ti,Zr,Pt,Ni,Th and U. Different types of steel.Role of Carbon in steel. Steel alloys-heat treatment of steel. Application of steel Alloys.

Reference Books

1.Inorganic Chemistry by Cotton & Wilkinson
2. Text book of Inorganic Chemistry-P.L.Soni
3. Modern Inorganic Chemistry R.D.Madan
4. Physical Chemistry- Puri & Sharma
5. Physical Chemistry-P.W.Atkins

II YEAR – MAJOR PAPER-VII

IV SEMESTER

IV SEMESTER
MAJOR PAPER-VII-GENERAL CHEMISTRY-VII (60 Hrs)

UNIT – I (30hrs)

1.1. Nitrogen Family:

Comparative study of nitrogen, Phosphorus, Arsenic, Antimony and Bismuth.Prepartions, properties, structure and uses of hydrazine, hydroxyl amine and Hydrazoic acid.

1.2. Oxygen Family:

Comparative study of O,S, Se and Te . Peroxy acids of sulphur and thionic acidsof sulphur.

1.3. Halogens:

Comparative study of F, Cl, Br, I and At . Inter halogen Compounds, pseudo Halogens and positive iodine. Exceptional properties of fluorine.

1.4.Noble Gases:

Electronic Configuration and position in the periodic table. Clathrates, Compounds of Xenon – XeF_2, XeF_4, XeF_6, $XeOF_4$.

UNIT II (30 hrs)

2.1 Carboxylic Acid (Mono and Dicarboxylic)

Preparation and properties of Acetic acid, Benzoic acid, Cinnamic acid and Crotonic acids.

Preparation and properties of Oxalic, Malonic, Succinic, Glutaric and adipic acids.

2.2 Acidic Character of phenols – explanation on the basis of resonance stabilization Ring substitution in phenols, orientaition of phenolic groups towards electro philes. Mechanisms of nitration, sulphonation, halogenation and coupling with diazonium salts, Kolbe's reaction,

Riemer – Tiemann reaction, Gattermann Lederer – Manasse and Houben – Hoesh reactions.

2.3. Substituted Phenols and Naphthols:

Dihydric phenols-preparation and properties of Catechol,resorcinol and quinol.Trihydric phenol-preparation and properties of Pyrogallol and Phloroglucinol.Amino phenol-preparation and properties.Cresols-preparation,properties and uses of meta cresol and para cresol.Nitro phenol- preparation and properties of 2,4,6 Trinitrophenol.Naphthol-preparation and properties and uses of alpha and beta naphthol

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2.3. Amino Acid:

Classification of amino acids. Essential and non – essential amino acids. preparation of α - amino acids, properties and reactions. Zwitter ions, and isoelectic points.

Reference Books:

1. Vogel ‘s Text book of Quantitative Inorganic Analysis.
2. Text book of Inorganic Chemistry P.L. Soni – Sultan and Chand.
3. Modern Inorganic Chemistry R.D. Madan – S. Chand and Company.
4. Organic Chemistry R.T. Morrison and Boyd – Prentice Hall.
5. Organic Chemistry – Reactions and reagents – O.P. Agarwal - Goel Publishing House.
6. Advanced Organic Chemistry B.S. Bhal – S.chand.
7. Modern organic Chemistry M.K.Jain and S.C.Sharma.

II YEAR – MAJOR PAPER-VIII

IV SEMESTER

IV SEMESTER
MAJOR PAPER-VIII-GENERAL CHEMISTRY-VIII (60 Hrs)

UNIT-I

1.1 Partial Molar Properties:

Chemical potential – Gibb's – Duhem equation – effect of temperature and Pressure on chemical potential – Duhem – Margulus equation.

1.2. Free energy and equilibrium constant:

Thermodynamic derivation of the law of chemical equilibirium , reaction isotherm Standard free energy change – Standard free energy change and equilibirium constant – Variation of equilibirium constant with temperature.

1.3. Fugacity and activity:

Concept of fugacity and activity , determination of fugacity of gas, activity and activity Coefficient.

1.4. III Law Of Thermodynamics:

Nernst heat theorem, statement of III Law of Thermodynamics. Evaluation and Absolute entropy from heat capacity measurements. Exceptions to III Law.

UNIT-II

2.1 Ethers

General methods of preparation of ethers-Williamson's synthesis,Structure and bonding in ethers,general properties of ethers-Diethyl ether-preparation,properties,uses.Cyclic polyethers-Crown ether.

2.2 Thioalcohols and thioethers

General methods of preparation,properties of Mercaptans,sulphonal,Thioethers-mustard gas.

2.3 Organometallic compounds.

Preparation,Properties and synthetic uses of Grignard reagent- preparation,properties and uses of Organolithium compound and Organolead compound.

Reference Books

1.Elements of Physical Chemistry – Glasstone and Lewis – Macmillan.

2.Principles of Physical Chemistry – B.R. Puri Sharma and pathania – S.chand and Company..

3.Advanced Organic Chemistry-Bahl Arun Bahl

4. Physical Chemistry – P.W. Atkins.. .

5.Problems on Physical Chemistry S.Dogra &Dogra

6.Text Book of Organic Chemistry-P.L.Soni &H.M.Chawla

II YEAR - MAJOR PRACTICAL-II

IV SEMESTER

PRACTICAL –II VOLUMETRIC ESTIMATION

Acidimetry

1.Estimation of Sodium hydroxide using standard Sodium Carbonate and link Hydrochloric acid.

2. Estimation of Sodium carbonate using standard Sodium Carbonate and link Hydrochloric acid

3. Estimation of Borax using standard Sodium Carbonate and link Hydrochloric acid.

Permanganometry

Estimation of Oxalic acid using standard Mohr's salt or Ferrous Sulphate solution and link Potassium Permanganate.

Estimation of Ferrous Sulphate using standard Oxalic acid solution and link Potassium Permanganate.

Iodometry

Estimation of Copper using standard Potassium dichromate and link Sodium thiosulphate.

Dichrometry

Estimation of ferrous ion using diphenylamine as the indicator and link Potassium dichromate.

Demonstration (Not to be given for the exams) Experiments.

1. Estimation of Sodium nitrite- using potassium permanganate.
2. Estimation of Ferric ion using potassium permanganate.
3. Estimation of arsenious oxide using standard arsenious oxide and link iodine.
4. Estimation of Zinc or Magnesium using EDTA.
5. Estimation of Zinc using potassium ferrocyanide.
6. Estimation of chloride in neutral medium-Mohr's method.

CHEMISTRY PRACTICALS

SCHEME OF VALUATION

MAIN PRACTICAL –II - UCH/CP/4002

VOLUMETRIC ESTIMATION

Internal	:	20 marks
External	:	30 marks
Total	:	50marks

External

Record	:	5 marks
Accuracy	:	25 marks
Error upto 1%	:	25 marks
Error upto 2%	:	20marks
Error upto 3%	:	15 marks
Error upto 4%	:	10 marks
Error upto 5% and above 5%	:	5 marks

(i) For errors between the limits proportionate deduction of marks may be made.

(ii) For arithmetical error deduct 2 marks.

Model Question Paper

B.Sc.,Chemistry-Major

(Semester Pattern)

Time:3hrs **Max.marks:60**

Section : A **(Marks:10 x 1 = 10)**
Answer 10 questions out of 12 questions.
Section : B **(Marks:5 x 4 = 20)**
Answer 5 questions out of 7 questions.
Section : C **(Marks:3 x 10 =30)**
Answer 3 questions out of 5 questions.

III YEAR — MAJOR

V SEMESTER

INORGANIC CHEMISTRY-I

PAPER IX

PAPER – IX
INORGANIC CHEMISTRY – I (60 hrs)

Unit – I

NUCLEAR CHEMISTRY-I (10 hrs)

1.1. Fundamental particles of the nucleus – nucleon terminology, nuclides, isotopes, isobars, isotones, mirror nuclei, nuclear isomerism, nuclear forces operating between nucleons- π-meson theory

1.2. Nuclear stability: Packing fraction, N/P curve and stability belt, Magic numbers, Main features of shell model and liquid drop model.

Unit – II

NUCLEAR CHEMISTRY-II (15 hrs)

2.1 Mass defect, binding energy and binding energy per nucleon - simple calculations

2.2 Natural radioactivity, Properties of α, β, γ rays – radioactive series.

2.3 Detection and measurement of radioactivity – GM counter method. Law of radioactive decay-half life period, Disintegration constant and average life period.

2.4 Group displacement law. Nuclear fission, Explanation of nuclear fission by liquid drop model, nuclear energy.

2.5 Nuclear fusion – energy source of the sun and stars.

Unit – III

'd' Block Elements (10 hrs)

3.1 General Characteristics – metallic character, atomic and ionic radii, oxidation states, colour, complex formation, catalytic and magnetic properties.

3.2 Comparative study of Ti, V, Cr, Mn and iron triad group metals – occurrence, oxidation states, magnetic properties, catalytic properties and colour.

3.3 Bioinorganic chemistry – Role of Na, K, Ca, P, Fe, Zn, Co and Mg in human system (Structure is not necessary).

Unit - IV

'f' Block Elements (15 hrs)

4.1 Lanthanides – Properties – Electronic configuration, oxidation states, ionic radii, Lanthanide contraction and its effects, colour and magnetic properties.

4.2 Separation of lanthanides by ion exchange method, Solvent extraction method.

4.3 Main uses of lanthanides and their compounds.

4.4 Actinides – Sources, Electronic configuration, oxidation states, ionic radii, colour of ions.

4.5 Comparison between lanthanides and actinides.

Unit – V

Industrial Chemistry (10 hrs)

5.1 Introduction to nanoscience and nanotechnology – Methods of synthesis of nanomaterials - Plasma arching, Sol gels – applications of nanochemistry.

5.2 Fuel gases: Calorific value – advantages of gaseous fuels. Composition and sources/formation of water gas, semiwater gas, carburetted water gas, producer gas, oil gas, natural gas, LPG and bio gas (manufacture is not required).

Reference Books:

1. Chemistry of Nanomaterials by C.N.R. Rao.
2. Principles of Inorganic Chemistry by P.L. Soni.
3. Advanced Inorganic Chemistry by R.D. Madan.
4. Selected topics in Inorganic Chemistry by Wahid. U. Malik, G.D. Tuli , R.D. Madan.
5. Inorganic Chemistry by Cotton & Wilkinson.
6. Industrial Chemistry by B.K.Sharma.
7. NANO: The Essentials by Dr.T. Pradeep.
8. Introduction to Nanotechnology -by charles .P.Poole Jr. Frank.J.Owens Wiley ,India.
9. Nuclear chemistry by Arnikar.

III YEAR — MAJOR

V SEMESTER

ORGANIC CHEMISTRY-I

Paper X

Paper X– Organic Chemistry - I (60 hrs)

Unit- I (10 hrs)

1.1. Reduction of carbonyl group with sodium borohydride, lithium aluminium hydride – Wolff Kishner and MPV reduction.

1.2. Mechanisms of Aldol, Perkin, and benzoin condensation, Claisen, Wittig, Cannizaro and Reformatsky and Knoevenagal reactions

Unit- II (10 hrs)

2.1 Malonic and Acetoacetic esters characteristic reactions of active methylene group synthetic uses of malonic ester, acetoacetic ester and cyano acetic ester.

2.2 Tautomerism – definition – ketoenol tautomerism (identification, acid and base catalysed inter conversion mechanism, preparation and characteristics).

Unit – III (10 hrs)

3.1 Conformational analysis – introduction of terms conformers, configuration, dihedral angle, torsional strain – conformational analysis of ethane and n-butane including energy diagrams - conformers of cyclohexane (chain, boat and skew boat forms) – axial equatorial bonds – ring flipping showing axial equatorial inter conversionsconformers of mono and disubstituted hexanes. 1:2 and 1:3 interactions.

3.2 Projection formulae – Fischer, flying wedge, sawhorse and newmann projection formula – 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.

Unit – IV (15 hrs)

4.1 Optical isomerism – optical activity – optical and specific Rotations – conditions for optical activity – asymmetric center – chirality –meaning of (+) and (-) and D and L notations – Elements of symmetry – 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.

4.2 Optical activity in compounds not containing asymmetric carbon atoms, Biphenyls, allenes and spirans.

4.3 Geometrical isomerism – cis- trans, syn- anti and E-Z notations. Geometrical isomerism in maleic and fumaric acids and unsymmetrical ketoximes – methods of distinguishing geometrical isomers using melting point, dipole moment dehydration, cyclisation and heat of hydrogenation.

Unit – V (15 hrs)

5.1 Aromaticity of heterocyclic compounds.

5.2 Preparation, properties and uses of furan pyrrole, thiophen and pyridine compartive study of basicity of pyrrole pyridine and piperidine with aliphatic amines.

5.3 Synthesis and reactions of quinoline and isoquinoline.

5.4 Aromatic nitro compounds and amines – reduction in neutral, acidic and alkaline media. Diazotisation and its mechanism. Synthetic applications of Diazonium salts.

5.5 Diazomethane and Diazoacetic ester – preparation, properties uses and synthetic uses.

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Reference Books:

1. Reactions and Reagents – O.P. Agarwal – Goel Publishing House.
2. Advanced organic chemistry B.S. Bahl and Arun Bahl- S.Chand and company ltd.
3. Organic Chemistry – R.T. Morrison and Boyd – Prentice Hall.
4. Stereo chemistry, Conformation and mechanism – kalsi – Newage.
5. Stereo Chemistry in organic compounds – Arora- An mol Publishers.
6. Organic Chemistry for under graduate students by Dr. C.N. Pillai. University Press (India) 2008.

III YEAR — MAJOR

V SEMESTER

PHYSICAL CHEMISTRY-I

Paper XI

PAPER – XI PHYSICAL CHEMISTRY – I (60 hrs)

Unit – I (15hrs)

1.1 Solutions – Henry's law , Raoult's law. Binary liquid mixtures – ideal solutions – deviations from ideal behaviour – vapour pressure – composition and vapour pressure – temperature curves – Duhem Margulas equation for binary mixtures,azeotropic distillation.

1.2 Dilute solutions-colligative properties- Clapeyron – Clausius equation – derivation and uses thermodynamic derivation of elevation of boiling point and depression of freezing point calculation of molecular weights.

1.3 Distribution law – Thermodynamic derivation and applications.

Unit – II (15hrs)

Phase equilibria – Gibb's phase rule – statement and definition of terms – Application to one component systems -water and sulphur–reduced phase rule – two component systems – lead – silver system–freezing mixtures–compound formation with congruent melting point–Zn-Mg system,Ferric chloride – water system – incongruent melting point Na-K system.

Unit – III (10 hrs)

Chemical kinetics – Definition of order and molecularity – methods to determine the rate of reactions – derivation of rate constants for I, II and zero order reactions and examples – derivation for time for half change with examples – methods to determine the order of reactions – effect of temperature on the rate of reactions – Arrehenius equation and concept of energy of activation.

Unit – IV (10 hrs)

Collision theory and derivation of rate constant for bimolecular reactions – theory of absolute reaction rates–thermodynamic derivation for the rate constant for a bimolecular reaction from it –consecutive,parallel and reversible reactions (no derivation only examples).

Unit – V (10 hrs) **(10 hrs)**

Adsorption – Physisorption and chemisorption – Freundlich adsorption isotherm – Langmuir adsorption isotherm – BET equation (no derivation) – applications of adsorption.

Catalysis: - definition– function of a catalyst in terms of Gibb's free energy of activation. Homogeneous & heterogeneous catalysis – kinetics of unimolecular surface reactions.

Reference Books:

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1. Elements of Physical Chemistry – Glasstone and Lewis – Macmillan
2. Text book of Physical Chemistry – S.Glasstone, Macmillan
3. Principles of Physical Chemistry – B.R. Puri and Sharma - Shobanlal Nagin Chand and Co.
4. Physical Chemistry – G.W. Castellan – Narose Publishing house.
5. Chemical Kinetics – Keith.J.Laidler- Tata Mc Graw- Hill Publishing Company Limited.
6. Text Book of Physical Chemistry by Atkins

III YEAR — MAJOR

V SEMESTER

ANALYTICAL CHEMISTRY

PAPER XII

PAPER – XII ANALYTICAL CHEMISTRY – I (60 HRS)

UNIT I (10 Hrs)

1.1 Principles of gravimetric analysis – characteristics of precipitating agents – choice of precipitants and conditions of precipitation – specific and conditions of selective precipitation – specific and selective precipitants – DMG, cupferron, salicylaldehyde, oxime ,EDTA– Use of sequestering agents – co–precipitation – post precipitation – peptisation – differences – reduction of error – precipitation from homogeneous solutions – calculations in gravimetric methods – use of gravimetric factor.

UNIT II (10 Hrs)

2.1 Purification of solid organic compounds – extraction – use of immiscible solvents – crystallization – use of miscible solvents – fractional crystallization – sublimation. Purification of liquid mixtures – experimental techniques of distillation – fractional distillation – vacuum distillation – steam distillation – tests for purity.

2.2 Separation and purification techniques: solvent extraction and soxhlet extraction.

UNIT III (10 Hrs)

3.1 Chromatography techniques – column chromatography – Principles - adsorption, adsorbents - preparation of column elution, recovery of substance and applications- Thin layer Chromatography (TLC) – choice of adsorbent and solvent – preparation of chromatogram and application – Rf value..

3.2 Partition and paper chromatography – Solvents used and principles – factors affecting Rf value – separation of amino acid mixtures. Ion exchange chromatography - Principle – resins – action of resins – experimental techniques – applications – separation of Zn- Mg,Co-Ni, Chloride – bromide.

3.3 Gas chromatography and High Pressure Liquid Chromatography – Principles – experimental techniques - instrumentation and applications. Electrophoresis.

UNIT IV (15 Hrs)

4.1 UV – Visible spectroscopy – Absorption laws – calculations involving Beer – lambert's law – instrumentation – spectrophotometer – block diagrams with description of components – theory – types of electronic transitions – chromophore and auxochromes – absorption bands and intensity – factors governing absorption maximum and intensity.

4.2 Infrared spectroscopy – principle – types of stretching and bending vibrations – vibrational frequencies – instrumentation – block diagram – source – monochromator – cell sampling techniques – detector and recorders – identification of organic molecules from characteristic absorption bands _carbonyl compounds-alkenes – hydroxyl compounds.

4.3 Raman spectroscopy – Rayleigh and Raman scattering – Stoke's and anti stokes lines – instrumentation block diagram – differences between IR and Raman spectroscopy – mutual exclusion principle – application..

Unit – V (15 Hrs)

5.1 Data analysis – Theory of errors – idea of significant figures and its importance with examples – precision – accuracy – methods of expressing accuracy – error analysis – minimizing errors method of expressing accuracy and precision – average deviation – standard deviation and confidence limit.

5.2 Thermal analytical methods – Principle involved in thermo gravimetric analysis and differential thermal analysis – discussion of various components with block diagram – characteristics of TGA and DTA – factors affecting TGA and DTA curves – thermometric titrations.

5.3 Analytical Chemistry in Consumer Protection

Detection of Adulteration in some Common Food Items:– Problems Milk, Oils, Ghee, Coffee powder, Asafoetida, Chilli powder, Turmeric powder, Pulses.

Reference Books:

1. Analytical Chemistry – R. Gopalan – Sultan Chand.
2. Fundamentals of analytical chemistry – A. Skog and M. West.
3. Instrumental methods of Chemical analysis – B.K. Sharma – Goel Publications.
4. Instrumental methods of Chemical analysis – Willard Merrit and Dean.

III YEAR — MAJOR

V SEMESTER

ELECTIVE PAPER - I

Elective Paper – I – Pharmaceutical Chemistry

Unit – I (10 Hrs)

1.1. Definition of the following terms – drug, pharmachophore, pharmacology, pharmacopeia, pharmacognesy – pharmacodynamics, pharmacokinetics, bacteria, virus and vaccine.

1.2. Common diseases – types - causes, symptoms and drugs for anaemia, jaundice, cholera, malaria, filarial and typhoid.

Unit – II (10 Hrs)

2.1. Indian medicinal plants and uses – tulasi, neem, kizhanelli, mango, mint, coriander semparuthi, adadodai and thoothuvalai.

2.2. Antibacterials – Sulpha drugs – examples and actions – prontosil, sulphathiazole, sulphafurazole – Antibiotics – definition and uses of penicillin, streptomycin, chloramphenicol, tetracylines-Erythromycin .

Unit – III (10 Hrs)

3.1. Antiseptics and disinfectants – definition and distinction – phenolic compounds, chloro compounds.

3.2. Analgesics – Definition and actions – narcotic and non narcotic – morphine and its derivatives, pethidine and methodone - disadvantages and uses, Antipyretic analgesics – salicylic derivatives, paracetomal, ibuprofen.

Unit – IV (15 Hrs)

4.1. Drugs affecting CNS – Definition, distinction and examples for – transqualisers, sedatives, hypnotics, psychedelic drugs – LSD, hashish – their effects.

4.2. Anesthetics – Definition – local and general – volatile nitrous oxide, ether, uses and disadvantages – non volatile –uses and disadvantages. thiopental sodium, methohexitone.

Unit – V (15 Hrs)

5.1 Hormones - Introduction; Properties and Functions of hormones – Chemical Nature of Hormones – Structure and physiological functions of thyroxin, oxytocin, adrenaline, insulin, sex hormones.

5.2 Blood – Grouping, composition, Rh factor, blood pressure, hypertension and hypotension – causes and remedies – Diabetes – causes and treatment – hypoglycemic drugs (any two) – lipid profile – HDL, LDL, Lipid lowering drugs.

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Reference Books:

1. A text book of pharmaceutical chemistry – Jayashree Ghosh – S. Chand.
2. Pharmaceutical chemistry – S. Lakshmi Sultan Chand.
3. Medicinal chemistry – Asutosh Kar – New Age.
4. A text book of biochemistry – Ambika. S.
5. Biochemistry – A.L. Lehinger.
6. Essentials of biological chemistry – James Fanley – East West press.
7. Experimental pharmaceutical chemistry by Annes Ahmed siddiqui and Seemi siddiqui- B.S. Publishers New Delhi.

III YEAR — MAJOR

VI SEMESTER

INORGANIC CHEMISTRY-II

PAPER XIII

PAPER XIII – INORGANIC CHEMISTRY II (60 hrs)

Unit – I

Coordination Chemistry (10 hrs)

1.1. Coordination number, types of ligands, chelation and its effects. IUPAC nomenclature.

1.2. Werner's theory, Sidgwick's EAN rule, Valence bond theory – postulates, hybridization, geometry and magnetic properties of $[Ni(CN)_4]^{2-}$, $[NiCl_4]^{2-}$, $[Fe(CN)_6]^{3-}$, $[Co(NH_3)_6]^{3+}$ and $[CoF_6]^{3-}$. Limitations of VBT.

Unit – II (15 hrs)

2.1 Isomerism – Structural isomerism, ionization, hydrate, linkage, ligand and coordination Isomerism

2.2 Stereoisomerism - Geometrical and optical isomerism in 4 and 6 coordinated complexes.

2.3 Metallic carbonyls - Bonding, hybridization and structures of carbonyls of Ni, Cr, Fe, Co and Mn.

Unit – III (15 hrs)

3.1 Crystal field theory – Postulates, splitting of d-orbitals in octahedral, tetrahedral and square planar complexes. CSFE calculations in octahedral complexes. Factors affecting crystal field splitting.

3.2 Spectrochemical series – low spin and high spin complexes – Explanation of magnetic properties and colour using CFT. Limitations of CFT.

3.3 Comparison of VBT and CFT.

Unit – IV (10 hrs)

4.1 Uses of coordination compounds in qualitative and quantitative analysis – use of potassium ferrocyanide, ammonium thiocyanate, Nessler's reagent, Sodium nitroprusside, DMG, Oxine. Applications of EDTA.

4.2 Nucleophilic substitution reactions in octahedral complexes – SN^1, SN^2

4.3 Trans effect in square planar complexes and its explanation by electrostatic polarization theory and π-bonding theory.

Unit – V

Industrial Chemistry (10 hrs)

5.1 Introduction to green chemistry - the need for green chemistry, goals, twelve principles and limitations of green chemistry. Examples of green synthesis/reaction.

5.2 Pollution – Types. Water pollution – Industrial and domestic waste, COD and BOD, pollution due to fertilizers, insecticides, oil, toxic metals like chromium, nickel and lead. Ill effects and methods to control.

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Reference Books:

1. Text book of Inorganic Chemistry by P.L. Soni.
2. Advanced Inorganic Chemistry by R.D. Madan.
3. Selected topics in Inorganic Chemistry by Wahid. U. Malik, G.D. Tuli , R.D. Madan.
4. Advanced Inorganic Chemistry by Sarkar.
5. An introduction to Green Chemistry by V. Kumar.
6. New Trend in Green Chemistry by V.K. Ahluwalia and M. Kidwai.
7. Industrial waste by Nelson and Nenmarrow.
8. Environmental Chemistry by A.K. De.
9. Advanced Inorganic Chemistry J.E. Huheey.
10. Concise coordination chemistry by Gopalan.
11. Environmental Chemistry for Sanitary engineering by Sawyer abd Mecrty.

III YEAR — MAJOR

VI SEMESTER

ORGANIC CHEMISTRY-II
PAPER XIV

PAPER XIV- ORGANIC CHEMISTRY II (60 Hrs)

UNIT I (10 hrs)

Dyes

Classification-according to structure and method of application. Definition and examples of Auxochrome and Chromophor. Preparation and uses of 1)Azo dye-methyl orange. 2) Triphenyl methane dye-Malachite green. 3) Phthalein dye – fluorescein. 4) Vat dye – indigo. 5) Anthraquinone dye –alizarin. Natural dyes.

UNIT II (10 hrs)

. Amino acids –classification of amino acids,Essential and Non-essential amino acids,Preparation of α-amino acids,Zwitter ions,iso-electric points.
Peptides- synthesis-Merrifield's method for the synthesis of polypeptide on a solid support,determinationofstructureofpolypeptides,endgroupanalysis
.
Protiens:- Classification based on physical and chemical properties and on physiological functions. Primary and secondary structure of proteins. Helical and sheet structures (elementary treatment only) Denaturation of proteins. Nucleic acids. Types of nucleic acids – DNA and RNA, polynucleotide chain components – biological functions.

UNIT III (15 hrs)

Carbohydrates
Classifications – Reactions of glucose and fructose – osazone formation. Mutarotation and its mechanism - Constitution of glucose and fructose. Cyclic structure. Determination of ring size. Haworth projection formula, configuration of monosaccharides. Epimerisation , chain lengthening and chain shortening of aldoses, inter conversion of aldoses and ketoses.
Disaccharides : Reactions and structure of sucrose.
Polysaccharides :Properties and structure of starch and cellulose.

UNIT IV (15hrs)

Alkaloids –General methods of isolation and general methods of structure elucidation.Structure elucidation of coniine , piperine .
Terpenes – isoprene rule . Structure elucidation of Citral and alpha terpineol.
Vitamins :- Classification –structure elucidation of ascorbic acid.

UNIT V (10hrs)

Molecular rearrangements: -Classification as anionotropic , cationotropic,sigmatropic and intramolecular. Pinacol – pinacolone rearrangement. . Beckmann, Hoffmann, Benzilic acid rearrangement,- mechanism only.

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Reference Books:

1. Organic Chemistry – R.T. Morrison and Boyd – Prentice Hall.
2. Text book of Organic Chemistry K.S.Tewari, S.N. Mehrotra and N.K. Vishno – Vikas Publishing house private limited.
3. Chemistry of Organic Natural Products – O.P. Agarwal – Goel Publishing house.
4. Reactions and Reagents – O.P. Agarwal – Goel Publishing House.
5. Synthetic dyes – Gurdeep R. Chatwal – Himalaya Publishing House.
6. Organic Chemistry by I.L. Finar,Vol I & II,Longman Group Limited.

III YEAR — MAJOR

VI SEMESTER

PHYSICAL CHEMISTRY-II

PAPER XV

PAPER – XV- PHYSICAL CHEMISTRY II (60 hrs)

Unit – I (15 hrs)

Metallic and electrolytic conductors – specific, equivalent and molar conductance – measurement of conductance – variation of conductance with dilution for strong and weak electrolytes (qualitative explanation) – Transport number and its determination by Hittorff's and moving boundary method – effect of temperature and concentration – ionic mobility and ionic conductance – Kohlrausch's law and its applications .

Unit – II (15 hrs)

2.1 Salt hydrolysis and PH of a salt solution, buffer action and explanation – buffers in human systems – Phosphate buffer and bicarbonate – carbonate buffer.Theory of strong electrolytes –and Debye – Huckel – Onsager theory – verification of On sager equation – Wein effect and Debye – Falkenhagen effect – ionic strength. Activity and activity coefficients of strong electrolytes.

2.2 Applications of conductivity measurements – degree of hydrolysis, solubility product and conductometric titrations.

Unit – III (10 hrs)

3.1 Galvanic cells – reversible and irreversible electrodes and cells – standard cell – emf and its measurement – types of electrodes – electrode reactions – electrode potentials – reference electrodes – standard electrode potentials.

3.2 Derivation of Nernst equation for electrode potential and cell emf – sign conventions – electrochemical series and its applications – formation of cells – electrode and cell reactions – cell emf - chemical cells and concentration cells with and without transference – examples – liquid junction potential.

Unit – IV (10 hrs)

Applications of emf measurements – calculation of G.H, S and equilibrium constants – determination of PH using quinhydrone and glass electrodes – potentiometric titrations.
Applications of Concentration cells – determination of valency of ions – transport number – solubility product.

Unit – V (10 hrs)

5.1 Fuel Cells-Definition,Types of Fuel cells-Primary cells-Zinc-Air Fuel cells,Molten Carbonate Cell,Proton Exchange membrane cell,Secondary cells-Zinc-Silveroxidecells,Iron-Nickeloxidecells,Advantages and Disadvantages of cells,Applications of Fuel cells.

5.2 Group theory – Symmetry operations – products of symmetry operations – classes and subgroups – group multiplication table – properties of a group – point groups – C_2v, C_3v, C_2h, (any one example for each) .

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Reference Books:

1. Electro Chemistry – S. Glasstone – Macmillan.
2. Principles of Physical Chemistry – B.R. Puri and Sharma – Shobanlal Nagin Chand and Co.
3. Group theory in chemistry V. Ramakrishnan and M.S. Gopinathan - Vishal Publications.
4. Physical Chemistry through problems – S.G. Dogra. New Age International.
5. Modern Electro Chemistry – Vol –I & II J.O.M Bockris and A.K.N.Reddy,Plenum Publishing corporation.
6. Modern Electro Chemical Methods – Crow.
7. Fundamentals of Electro Chemical Methods - Allan Bard.

III YEAR — MAJOR

VI SEMESTER

ELECTIVE PAPER - II

INSTRUMENTAL TECHNIQUES IN ANALYTICAL CHEMISTRY

ELECTIVE PAPER – II - INSTRUMENTAL TECHNIQUES IN ANALYTICAL CHEMISTRY (60 hrs)

Unit – I **(10 Hrs)**

Polarography – principle – concentration polarization – dropping mercury electrode - advantages and disadvantages – convection, migration and diffusion currents – Ilkovic equation (derivation not required) and significance – experimental assembly – electrodes – capillary solutions – current voltage curve – oxygen wave – influence of temperature and agitation on diffusion layer – pology as an analytical tool in quantitative and qualitative analysis. Amperometry – basic principles and uses.

Unit – II **(10 hrs)**

Polarimetry – principle – instrumentation – Estimation of glucose and sucrose, calculation of optical purity, comparison of acids by hydrolysis.

Unit- III **(15 hrs)**

NMR spectroscopy – principle of nuclear magnetic resonance – basic instrumentation- shielding mechanism – chemical shift – number of signals – spin – spin coupling and coupling constants – splitting of signals – Proton NMR spectrum of simple organic compounds - ethanol, choloro benzene, acetophenone, toluene.

Unit-IV **(10 hrs)**

Mass spectroscopy – Basic principles of mass spectrum – molecular peak base peak isotopic peak metastable peak their uses fragmentation - Nitrogen rule – instrumentation mass spectrum of simple organic compounds - ethanol, choloro benzene, acetophenone, toluene .

Unit – V **(15 Hrs)**

<u>Introduction to computers and its applications in chemistry:</u> -

5.1. Introduction to computers – characteristics of a computer – types of computers – block diagram of a digital computer.

5.2. Introduction to structure of a C program key terms – the art of programming – general features of a programming language – Algorithm flow chart - the character set of C - data types – identifiers –reserved words – variables – constants – keywords – escape – sequence - C operations (basic aspects only)

5.3 Applications of computer in chemistry – (only selected programs) determination of molarity, normality and molality of solutions – calculation of PH.

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Reference Books:

1 .Analytical Chemistry – R. Gopalan – Sultan Chand.
2. Fundamentals of analytical chemistry – A. Skog and M. West.
3. Instrumental methods of Chemical analysis – B.K. Sharma – Goel Publications.
4. Instrumental methods of Chemical analysis by Shrivastava and Jain.
5. Computers in chemistry – K.V. Raman.
6. Programming with C – Venugopal and prasad.
7. Programming in C (II Edition) E Balguruswamy.
8. Programming language C with pracitcals – Ananthi Seshasayee – Margam.

III YEAR — MAJOR

VI SEMESTER

CORE – ELECTIVE PAPER -III

APPLIED CHEMISTRY

CORE - ELECTIVE -III - Applied Chemistry (60 hrs)

UNIT – I

POLYMER CHEMISTRY (15 hrs)

Introduction, Classification of polymers, mechanism - cationic – anionic – free radical - natural and synthetic – rubber, cellulose, starch, wool, silk - synthetic rubber, polyalkenes, acrylics, polyamides, polyesters, PVC polyurethane – Preparations and uses only.

UNIT-II

LEATHER CHEMISTY (15 hrs)

2.1. Structure and compositions of hides, skins and leather. Principles of pretanning process. Vegetable, mineral and synthetic tanning. Chemistry of chrome tanning. Dyeing of leather.

2.2. Tannery effluents – Pollution and control – solid wastes.

UNIT – III

AGRICULTURAL AND SOIL CHEMISTRY (10 hrs)

3.1 Soil – Definition , classification and properties of soil – soil water, soil oil, soil temperature, soil minerals, soil colloids, soil pH, soil acidity, soil alkalinity.

3.2 Soil fertility and its evaluation – buffering of soil and its effects. Soil formation and its reclamation.

UNIT-IV

INSECTICIDES ,PESTICIDES HERBICIDES (10 hrs)

Introduction-methods of pest Control, methods of using pest controls, Insecticides; arsenic compounds, fluorine compounds, Boron compounds, mercurycompounds,coppercompounds.Modern insecticides, some important herbicides ,rodenticides_-_benefitsof pesticides and adverse effects of pesticides.

UNIT-V

FERTILISERS (10 hrs)

Classification of fertilizers-Nitrogenous fertilizers, phosphate fertilizers, potash fertilizers and NPK fertilizer ill effects of fertilizers- Compost

Reference books:

1. A Text book of Applied chemistry - Jayashree Ghosh – S.Chand.
2. Applied chemistry – S.Lakshmi Sultan Chand.
3. Theories and Methods – K.T. Sarkar and S.S. Dutta.
4. Polymer Chemistry by Gowrikar.

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III YEAR

MAJOR PRACTICAL - III

VI SEMESTER

PRACTICAL III PHYSICAL CHEMISTRY

1. Distribution Law
    a) Determination of partition coefficient of iodine between carbon tetra chloride and water.
    *b) Equilibrium constant of the reaction $KI + I_2 = KI_3$.

2. Kinetics
    Determination of the rate constant of the following reactions.
    a) Acid catalysed hydrolysis of an ester (methyl or ethyl acetate)
    b) Iodination of acetone.

3. Molecular weight of a solute – Rast's method using naphthalene, para dichlorobenzene and diphenyl as solvents.

*4. Heterogeneous equilibria:
    a) Phenol – water system – CST.

    b) Effect of impurity – 2% NaCl solutions on phenol – determination of the concentration of the given solution.

5. Determination of the transition temperature of the given salt hydrate.
    $Na_2S_2O_3.5H_2O$, $CH_3COONa.3H_2O$, $SrCl_2.6H_2O$, $MnCl_2.4H_2O$.

6. Electrochemistry
    Conductivity
    b) Determination of cell constant and equivalent conductivities of solutions of two different concentrations.
    c) Conductometric titration of a strong acid against a strong base.

* Not to be given for the Examination

CHEMISTRY PRACTICALS

SCHEME OF VALUATION

III Major - Physical Chemistry

Maximum – 100 marks
Internal – 40 marks
External - 60 marks

Internal – 40 marks
Test - 30 marks
Attendance – 10 marks

External – 60 marks
Record - 10 marks
Accuracy - 30 marks
Experimental
Skill and presentation
of data - 20 marks

(1) Kinetics

Graph - 6 marks
Below a factor of 10- 24 marks
By a factor of 10 - 18 marks
More than the above-10 marks

(2) Distribution co-efficient

Error upto 10% - 30 marks
Error upto 12% - 27 marks
Error upto 14% - 24 marks
Error upto 16% - 18 marks
Error upto and
Above 20% - 10 marks

(**3) Molecular weight**

Error upto 10% - 30 marks
Error upto 20% - 20 marks (1 mark to be reduced for each percent)
Error upto 30% - 10 marks (1 mark to be reduced for each percent)
Error above 30% - 6 marks

(4) Effect of electrolyte (Concentration of electrolyte)

Error upto 10% - 30 marks
Error upto 20% - 20 marks (1 mark to be reduced for each percent)
Error upto 30% - 10 marks (1 mark to be reduced for each percent)
Error above 30% - 6 marks

(5) Transition temperature

Error upto 2°c difference - 30 marks
Error upto 7°c difference - 15 marks (reduce 3 marks for each degree)
Error above 7°c - 10 marks

(6) Conductometric titration

Error upto 10%	-	30 marks
Error upto 15%	-	27 marks
Error upto 20%	-	21 marks
Error above 20%	-	10 marks

(**7) Conductance - Cell constant**

Error upto 10%	-	20 marks
Error upto 15%	-	15 marks
Error above 15%	-	10 marks

(8) Conductance for solutions

Error upto 10%	-	10 marks
Error upto 15%	-	5 marks
Error above 15%	-	2 marks (* 5 marks for each solutions)

III YEAR

MAJOR PRACTICAL- IV

VI SEMESTER

Practical IV A - Gravimetric Estimation

1. Estimation of sulphate as barium sulphate.
2. Estimation of barium as barium sulphate.
3. Estimation of barium as barium chromate.
4. Estimation of Lead as Lead chromate.

*5. Estimation of chloride as silver chloride.

*6. Estimation of Calcium as Calcium oxalate monohydrate.

* 7. Estimation of Nickel as DMG complex.

*Not to be given for examination.

Practical IV B - Organic Analysis and Preparation/Determination of Boiling point

I Organic preparations:

a) Oxidation (benzaldehyde to benzoic acid)
b) Hydrolysis (methyl salicylate or ethyl benzoate to the acid)
c) Nitration (Nitrobenzene to m- dinitrobenzene)
d) Halogenation (Acetanilide to p-bromo acetanilide)
e) Acylation (β - Naphthol to β - Naphthyl benzoate)

II) Determination of the boiling point of the given liquid.

III) Organic analysis:

Analysis of organic compounds containing one functional group and characterisation with a derivative.

Aldehyde, ketone, carboxylic acid (mono and di) , ester, carbohydrate (reducing) phenol, aromatic primaryamine, amide nitro compound, diamide and anilide.

CHEMISTRY PRACTICALS

SCHEME OF VALUATION

III Major Chemistry Practicals

a) Gravimetric Analysis – 75 marks
Internal - 30 marks
External - 45 marks

Internal – 20 marks
Attendance - 10 marks
Test - 20 marks

External – 45 marks
Accuracy - 35 marks
Record - 10 marks

Error upto 2% - 35 marks
Error upto 3% - 30 marks
Error upto 4% - 25 marks
Error >4% - 15 marks

b) Organic Analysis - 100 marks
Internal - 40 marks
External - 60 marks
Internal
Attendance - 10 marks
Test - 30 marks
External – 60 marks
Record -10 marks

Preparation / Boiling point - 15 marks (Preparation- Crude-10 samples
Recrystallized- 5 samples)
Organic Analysis - 35 marks

Detection of elements - 6 marks
Saturated/unsaturated - 3 marks
Aliphatic/Aromatic - 2 marks
Preliminary tests - 10 marks
Tests for functional group - 10 marks
Derivative - 4 marks

35 marks

Determination of the Boiling point

Error upto $\pm$ 1°c -15 marks
Error upto $\pm$ 2°c -13 marks
Error upto $\pm$ 3°c -11 marks
Error > $\pm$ 3°c - 09 marks

B.Sc.,Chemistry-Major
(Semester Pattern)

Time:3hrs **Max.marks:75**

Section : A **(Marks:10 x 2 = 20)**
Answer 10 questions out 12 questions

Section : B **(Marks:5 x 5 = 25)**
Answer 5 questions out of 7 questions.

Section : C **(Marks:3 x 10 = 30)**
Answer 3 questions out of 5questions.

DEPARTMENT OF CHEMISTRY

I SEMESTER

NON - MAJOR ELECTIVE - I

NON - MAJOR ELECTIVE - I

(INTERDISCIPLINARY)

FOOD CHEMISTRY – PAPER -I (30Hrs - 2 Credits)

I Semester

UNIT – I

Meaning of food. Classification of food, Functions of Food, Composition of the body, Malnutrition,anaemia.

Unit – II

Carbohydrate – Proteins, Fats – Definition and their importance as food Constituents – Balanced diet – Minerals Vitamins – Sources and their physiological importance.

Unit – III

Water – Vital link to life H_2O Balance – Qualities of Potable Water – Soft and Hard Water – Reverse Osmosis.

Reference Books:

1. Chemical Process Industries (4^{th} Edition) – R. Norris Shreve, Joseph A. Brink,Jr.
2. Environmental Chemistry - A.K.DE
3. Food Chemistry – Ramani Alex.

II SEMESTER

NON – MAJOR ELECTIVE - II

NON – MAJOR ELECTIVE - II

(INTERDISCIPLINARY)

FOOD CHEMISTRY PAPER - II (30Hrs - 2 Credits)

II Semester

Unit – I:
Food Adulteration and Testing – Legal aspects of food adulteration and prevention.Common food adulterants – Contamination of wheat, rice, milk, butter, dhal, tea, oil, fruits, turmeric powder, dhania powder, chilli powder, green peas, pepper, sugar, salt, ghee.

Unit – II :

Food additives – Classification – with examples – Preservatives – Colours – Flavouring agents, Emulsifiers – Antioxidants Taste Maker – MSG.

Unit – III

Beverages – Soft drinks – Soda – Fruit juices – Alcoholic Beverages – Examples – Alcoholism – Related Problems – Physiological, Psychological and Social Aspects.

Reference Books:

1. Food Science and experimental foods – M. Swaminathan, ganesh & Company.
2. Fundamental concepts of Applied Chemistry – Jayashree Ghosh – Sultan & Co.publisher.
3. Nutrition Education – S. Venkataiah.