

BHARATHIAR UNIVERSITY, COIMBATORE 641 046.**B. Sc. CHEMISTRY (SCHOOL OF DISTANCE EDUCATION)****For the students admitted during the academic year 2014-15 Batch and Onwards**

Subject Title		University Exam	
		Duration in Hours	Maximum Marks
I YEAR			
Language :	Tamil Paper I	3	100
Language :	English Paper I	3	100
Core I	Chemistry Paper I	3	100
Core II	Chemistry Paper II	3	100
Core III	Chemistry Practical I Inorganic Qualitative Analysis	3	50
Allied	Mathematical Paper	3	100
II YEAR			
Language :	Tamil Paper II	3	100
Language :	English Paper II	3	100
Core IV	Chemistry Paper III	3	100
Core V	Chemistry Paper IV	3	100
Core VI	Chemistry Practical II Volumetric and Organic Analysis *	3	75
Allied	General Physics	3	100
III YEAR			
Core VII	Chemistry Paper V	3	100
Core VIII	Chemistry Paper VI	3	100
Core IX	Chemistry Paper VII	3	100
Core X	Chemistry Paper VIII	3	100
Core XI	Chemistry Practical III Gravimetric and Physical Chemistry **	3	75
Total			1600

* Volumetric -25 Marks; Organic Analysis-50 Marks

** Gravimetric -25 Marks; Physical Chemistry-50 Marks

CORE I - CHEMISTRY PAPER I

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

Structure and shape of molecules: VSEPR Theory and geometry of molecules. Hybridization and geometry of sp , sp^2 , sp^3 , dsp^2 , dsp^3 , d^2sp^3 , sp^3d^2 and sp^3d^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 II

1. Polar effects – inductive effect, mesomeric effect, electromeric effect, hyper conjugation and steric effects.

Classification of reagents: Electrophiles, Nucleophiles and Free radicals.

Types of reaction: Polar reactions involving carbonium ions and carbanions with simple examples.

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

3. Cycloalkanes: Preparation by Dieckmann ring closure and by reduction of aromatic hydrocarbons – ring opening reactions of cyclopropane with H_2 , Br_2 and HI .

UNIT III

1. Alkenes: Preparation by Wittig 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).

2. Dienes: Stability of isolated and conjugated dienes-1, 2 and 1, 4 additions, Diels -Alder reaction. Free Radical addition – Polymerization – synthetic rubber.

3. Alkynes: Acidity of Alkynes – formation of acetylides-addition of water with $HgSO_4$ catalyst-hydroboration.

UNIT IV

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 V:

1. Failure of classical theory in explaining black body radiation- Planck's theory of quantization of energy – Einstein theory of photoelectric effect-Compton effect.

deBroglie theory of wave-particle dualism-Heisenberg's uncertainty principle

2. Covalent bonds – Molecular orbital theory – application to molecules such as H_2 , H_2^+ , He_2 , O_2 , N_2 , F_2 , CO and NO .

CORE II - CHEMISTRY PAPER II

Subject description: This paper presents the concept of coordination chemistry, aromaticity and thermodynamics.

Goals: To enable the students to learn about acids and bases, aromaticity, and thermodynamics

Objectives: To study the principles of acids and bases and thermodynamics.

Contents

Unit I:

. Acids and bases; Definitions- different approaches to protonic acid – base systems – strengths of Lewis Acids and Bases -Hard and Soft Acids and Bases. Applications of HSAB concept Basis of hardness and softness, limitations of HSAB concept.

Unit II:

Chemistry of Boron family – Group discussion – Electron acceptor behaviour and electron deficiency of boron hydrides; bonding in diboranes; NaBH_4 and borazole - preparation, properties, structure and uses-Classification of silicate- simple silicates chain silicates and sheet silicates only.

Unit III:

Structure of benzene-Aromaticity-Huckel's rule. Electrophilic substitution in benzene with mechanism. Grignard reagents and synthetic applications-Nucleophilic substitution reaction – $\text{S}_{\text{N}}1$, $\text{S}_{\text{N}}2$ and $\text{S}_{\text{N}}i$ reactions – Elimination versus substitution-Benzyne mechanism and intermediate complex mechanism.

Unit IV:

The laws of thermodynamics, generalities and Zeroth law – kinds of energy – Scope of the first and second laws of thermodynamics-thermodynamic terms-definitions – heat – work of expansion – work of compression – maximum and minimum quantities of work – Reversible and irreversible transformations of energy. First law of thermodynamics – properties of energy changes in relation to properties of system- isothermal and adiabatic changes – meaning of the thermodynamic state function – properties of exact and inexact differentials – Joule Thomson experiment Relation between E and H, Cp and Cv.

Unit V:

Application of the first law of thermodynamics to chemical reactions. The heat of reaction – conventions in the values of H. The determination of heats of formation – sequences of reactions – Hess's law – heats of combustion – determination by Bomb Calorimeter – Bond energies – Resonance energies – Heats of solution – integral and differential heat of dilution – Heats of reaction at constant volume – dependence of the heat of reaction on temperature and Kirchoff's equation.

TEXTBOOKS FOR REFERENCE:

1. Principles of Inorganic Chemistry, B.R. Puri L.R. Sharma, Shobanlal Nagin Chand & Co.
2. Inorganic Chemistry, P.L.Soni, Sultan Chand & Sons.

3. Organic Chemistry, Vol. 1, 2, 3, S. M. Mugherjee, S.P. Singh, R.P. Kapoor, Wiley Eastern.
4. Advanced Organic Chemistry, B.S. Bahl, Arun bahl, S.Chand & Co.
5. Essentials of Physical Chemistry, B.S. Bahl and G.D. Tuli, S.Chand & Co.
6. Text book of Physical Chemistry, P.L.Soni, D.B. Dharmarke, Sultan Chand & Sons.
7. Physical chemistry, G. N. Castellan, Addison- Wesley Pub. Co.

CORE III - CHEMISTRY PRACTICAL I

INORGANIC QUALITATIVE ANALYSIS

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

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 IV - CHEMISTRY PAPER III

Subject description:

This paper presents the principle in the extraction of metals and mechanism of some important organic reactions and second and third law of thermodynamics.

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

Objectives: To understand the mechanism and synthetic uses of important organic reactions and about the macroscopic variables involved in the thermodynamics.

Contents:

Unit I:

General methods of Extraction: Concentration – Gravity separation, Froth Floatation, magnetic separation, Extraction – Chemical and Electrolytic methods of refining, Zone refining, Van Arkel refining and Electrolytic refining. Occurrence, extraction, properties and uses of Thallium, Germanium, Titanium and Tin - their important compounds such as GeCl_4 , TiO_2 , TiCl_4 , and SnCl_2 .

Unit II:

Chemistry of Carbonyl Compounds – I:

Reaction mechanisms: Nucleophilic addition of Grignard reagent, NH_3 , primary amine- Aldol condensation, Cannizzaro reaction, Perkin reaction, Knoevenagel reaction and Claisen-Schmidt reaction. Chemistry of Carbonyl Compounds – II Reaction mechanisms – Reformatsky reaction, benzoin condensation, Wittig reaction, haloform reaction – Reaction with LiAlH_4 and NaBH_4 – Clemmensen reduction, Wolff Kishner reduction, MPV reduction – reducing properties of Carbonyl compounds.

Unit III:

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.

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 ΔA and ΔG -physical significance of $-dA$ and dG . Temperature and pressure dependence of ΔG - Gibbs - Helmholtz equation. Chemical equilibrium - The concept of chemical potential - chemical equilibrium in a mixture of ideal gases - van't Hoff Isotherm and isochore - Third law of thermodynamics- statement and applications. Exception to third law.

CORE V - CHEMISTRY PAPER IV

Subject description

This paper presents the chemistry of few metals, 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 :

Occurrence, extraction, properties and uses of Zirconium, Vanadium, Molybdenum and Tungsten -their important compounds V_2O_5 , $ZrOCl_2$, ammonium molybdate, molybdenum blue, WO_2 , and tungsten bronzes.

UNIT II :

Monohydric phenols - preparation & properties –Reaction of monohydric phenols with mechanism – alkylation, esterification, nitration, sulphonation, halogenation coupling with diazonium salts – Kolbe, Reimer – Tiemann, Schotten – Bauman and Gattermann reactions.

UNIT III :

Amines- Preparation and properties of aliphatic and aromatic primary, secondary and tertiary amines – their separation, comparison of their basicity – ring substitution, diazotization and coupling reaction of aromatic amines.

Diazomethane and diazoacetic ester – preparation, structure and their synthetic applications.

UNIT IV :

Phase rule and phase equilibria –the equilibrium condition. Stability of phase of a pure substance. Pressure dependence of μ and T curves. The Clapeyron and Clapeyron-Clausius equations. Derivation of Gibbs phase rule. Phase equilibria in one component system. Phase diagram for sulphur, water, carbon dioxide system, phase diagram for two component system – construction of the phase diagram/Thermal analysis method Bi-Cd; Zn-Mg and Na-K system.

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 VI - CHEMISTRY PRACTICAL II
Volumetric and Organic Analysis

I. EXPERIMENTS IN VOLUMETRIC ANALYSIS:

- A. Acidimetry & Alkalimetry: Estimation of Na_2CO_3 B. Permanganometry:
1. Estimation of Ferrous sulphate & Oxalic acid
 2. Estimation of Calcium-Direct method.
- C. Dichrometry: Estimation of Ferrous iron using internal indicator.
- D. Iodimetry:
1. Estimation of $\text{K}_2\text{Cr}_2\text{O}_7$ 2. Estimation of Copper.
 3. Estimation of As_2O_3 .

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 derivatives - Aldehydes, Ketones, Amines, Amides, Diamide, Carbohydrates, Phenols, Acids, Esters & Nitro compounds.

CORE VII - CHEMISTRY PAPER V

Subject description

This paper presents the principle of radio activity, acids , 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 :

Structure of metals and alloys-substitutional and interstitial solid solution-Hume Rothery ratios-metallic bonding-electrical, optical and mechanical properties of metals-semiconductors, intrinsic and extrinsic-their uses. Super conductors-An elementary treatment.

UNIT II :

Artificial radio activity. Artificial transmutation of elements, synthesis of radio isotopes and. nuclear fission and fusion. Nuclear reactors – principle of working – production of electrical energy – atomic projects in India – Safety measures; disposal of reactor wastes – pollution. Nuclear reactions, mechanisms and different types of stellar energy.

UNIT III :

Nature of isotopes and isobars – detection and isolation of isotopes – various methods – importance of discovery of istopes – uses of isotopes in various fields. Nuclear stability n/p ratio, magic numbers, C-12 atomic weight scale, C-14 dating, mass defect and nuclear binding energies. Radio active disintergration series.

UNIT IV :

Co-ordination compounds – Nomenclature – conductivity and precipitation studies – Werner Co-ordination theory – electronic interpretation of coordinate bond by SidgeWick. Isomerism: Examples of Geometrical and optical isomerism in square planar and octahedral coordination compounds – magnetic properties of coordination compounds and their interpretation by Pauling's valence bond theory and crystal field theory.

UNIT V :

The solvents- solubility of compounds – effect of temperature on solubility- Role of water as solvent- chemical structure and solubility. Classifications of solvents-general behaviour- properties of ionizing solvents. Types of reactions in non aqueous solvents-protonic solvents - ammonia, hydrogen fluoride. Non Protonic solvents-SO₂ and BrF₃. Organic solvents - C₂H₅OH and Ether.

CORE VIII - CHEMISTRY PAPER VI

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 :

Optical activity of compounds with asymmetric carbon- racemisation – resolution – asymmetric synthesis- configuration D,L and R,S. nomenclature. Optical activity due to restricted rotation (biphenyls, allenes and spiranes) and molecular over crowding.

UNIT II :

Mechanism of molecular rearrangement reactions: Pinacol Pinacolone, Beckmann, Hoffmann, Curtius, Benzilic acid, Schmidt, Lossen, Cope and Claisen rearrangements.

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-mutarotation – Epimerisation.

UNIT IV :

Aminoacids and proteins

Amino acids-Classification –Preparation and properties of 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, Pyridine, Quinoline, Isoquinoline, Indole and Indigo.

CORE IX - CHEMISTRY PAPER VII**Subject description**

This paper presents the principles of conduction Electro motive force, fuel cells and the basic the principles of spectroscopy.

Goals To enable the students to know about electro chemistry and to determine the structure of an organic compound by using spectroscopic methods

Objectives To study EMF, pH and their applications.

Contents**UNIT I:**

Electrical conduction, conduction in metals and in electrolytic solutions. Measurement of conductivity in electrolytic solutions. Migration of ions-Kohlrausch's law. Arrhenius theory of electrolytic dissociation-Ostwald's dilution law. Theory of strong electrolytes-Debye-Huckel-Onsagar theory (elementary account only) verification. Debye-Falkenhagen effect-Wien effect-Transport numbers-Determination. Conductometric titrations.

UNIT II:

Ionic Equilibria -Solubility and solubility product-determination of solubility product-Applications of solubility product principle. Dissociation of weak acids and bases-Dissociation constants-pH scale-common ion effect-buffer solutions- Determination of pH values of buffer mixtures-Henderson's equation-Hydrolysis of salts-Degree of hydrolysis. 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 III:

Reference electrodes-Electrodes for measurement of pH-concentration cells with and without transport-liquid junction potential-applications of EMF measurements. Redox potential-Redox indicators-uses. Potentiometric titrations.Fuel cells: Hydrogen- oxygen cell and hydrocarbon - oxygen cell. Storage cells. Lead storage cell and Nickel cadmium cell. Decomposition voltage-over voltage-Deposition and discharge potential.

UNIT IV:

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 rotational spectra-Molecular rotation-diatomic molecule as rigid rotor-diatomic molecule as non-rigid rotor-intensities of spectral lines. Applications of rotational spectra- bond length-isotopic substitution. Theories of IR spectra-simple harmonic oscillator model-Anharmonic oscillator model of diatomic molecules- information on molecular constitution from IR spectra; Application of IR spectra.

UNIT V:

Theory of Raman spectra-comparison of IR and Raman spectra. Theory of UV and visible spectra-Frank Condon principle-Predissociation-determination of dissociation energies – Applications of UV spectra to simple molecules.NMR spectra- Basic principles – chemical shift-NMR spectra of simple molecules (high resolution details not expected)

CORE X - CHEMISTRY PAPER VIII

Subject description

This paper presents the chemistry of natural products, drugs, magnetic properties of molecules and kinetics of chemical reaction

Goals To enable the students to know about terpenoids, vitamins, alkaloids, hormones, drugs of biological importance and electro chemistry

Objectives To study natural products, medicinal drugs, EMF, pH and their applications.

UNIT I:

Terpenoids; Introduction-Classification-General methods of isolation-isoprene rule-structural elucidation and synthesis of geraniol, terpineol and dipentene.

Vitamins-introduction-importance of vitamins-structural elucidation and synthesis of Retinol, Riboflavin and Ascorbic acid. Alkaloids – introduction – classification – General characteristics – general methods of determining structures- Hoffmann's exhaustive methylation. Structural elucidation and synthesis of conine, piperine and papaverin.

Hormones; Introduction-Structural elucidation and synthesis of adrenaline and thyroxine.

UNIT II :

Chemotherapy; Introduction-Classification of drugs-applications of sulpha drugs, anti-malarials Amebecidal, Antiseptics, Analgesics and Antibiotics (Penicillin, Streptomycin, Chloromycetin, tetracycline-structure and uses only).

UNIT III :

Electrical properties of molecules: Molar polarization, Orientation polarization and Distortion polarization polar and non polar molecules. Determination of dipole moment of polar gases, liquids and solids-Applications of dipole moment in the study of simple molecules. Magnetic properties of molecules; Meaning of the terms magnetic susceptibility, magnetic moment, diamagnetism, paramagnetism and ferromagnetism, Determination of magnetic susceptibility by Guoy's method. Application of magnetic properties in solving structural problems .

UNIT IV:

Empirical laws and experimental aspects. Rate laws, Stoichiometry, order and molecularity of reactions- Setting up and solving simple differential equation for first order, second order, third order and zero order reactions. Characteristics of I, II, III and Zero order reactions . Determination of order of reactions. Experimental techniques involved in following kinetics of reaction. Volumetry, manometry, polarimetry and colorimetry, typical examples for each of the techniques. Theoretical aspects. Effect of temperature on 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 H_2/Br_2 reaction.

Kinetics of photochemical reactions. Absorption of light and photochemical process. The Stark-Einstein law of photochemical equivalence. Photochemical chain reaction H_2/Br_2 reaction. Quantum yield of photochemical reactions. Comparison of thermal & photochemical kinetics of H_2/Br_2 reaction. Photosensitized reactions. Fluorescence, phosphorescence and chemiluminescence.

TEXT BOOKS AND REFERENCES

Inorganic Chemistry

1. Principles of inorganic chemistry, B.R.Puri & L.R. Sharma, Shobanlal Nagin Chand & Co.,
2. Inorganic chemistry, P.L.Soni, Sultan Chand & Sons
3. Concepts of Inorganic Chemistry, F.A.Cotton
4. Text book of inorganic chemistry – a new approach, S.Sundaram and V.S. Srinivasan, Margham publications.
5. A text book of inorganic chemistry, A.K.De, Wiley
6. Concise inorganic chemistry, J.D.Lee.
7. Inorganic chemistry, Shriver and Atkins
8. Theoretical principles of inorganic chemistry, Manku, Tata McGraw Hill edition.

Organic chemistry

1. Organic chemistry, Vol. 1,2,3 S.M. Mughgerjee, S.P.Sigh, R.P.Kapoor, Wiley Eastern
2. Advanced Organic Chemistry, B.S.Bahl, Arun bahl, S.Chand & Co.,
3. Text book Organic Chemistry, P.L. Soni, S.M. Chawla, Sultan Chand & Sons
4. Stereoisomerism of carbon compounds, RaviBhusanm, CBS Publishers
5. Stereochemistry, Conformation and mechanisms, Kalsi, Wiley- Eastern Ltd.,
6. Stereochemistry of Organic compounds, D. Nasipuri, Wiley-Eastern Ltd.,
7. Organic chemistry, Vol 1 and 2, I.L. Finar, Addison-Wesley Longman
8. Organic chemistry, R.T.Morrison and R.W. Boyd, Prentice –Hall.
9. Organic chemistry, P.H.Pine, McGrawHill.
10. Fundamentals of Organic Chemistry, T.W.Graham Solomen, John-Wiley & Sons
11. Introduction to Organic Chemistry. Andrew Streitwieser, Jr.C.H.Heathcock
12. Stereochemistry of Carbon compound- Eliel, Tata Mc Graw Hill.
13. Organic chemistry- Stanley H pine Fifth edition - Tata Mc Graw – Hill Publishing House, New Delhi.
14. Solution Manual for organic chemistry –Robert C.Alkins and Francis Carey fifth edition - Tata Mc Graw – Hill Publishing House, New Delhi.
15. Organic reaction Mechanism - Dr.Raj Bansal third Edition Tata Mc Graw – Hill Publishing House, New Delhi.
16. Spectroscopic methods in organic chemistry – williamms & Fleming fifth edition Tata Mc Graw – Hill Publishing House, New Delhi.
17. Organic chemistry –schaum series. 300- solved problems 2003 edition. Tata Mc Graw – Hill Publishing House, New Delhi.
18. Biochemistry –SC Rastogi 2nd edition . Tata Mc Graw – Hill Publishing House, New Delhi.

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
3. Principles of Physical Chemistry, B.R.Puri, L.R.Sharma and M.S.Phathania, Shobanlal Nagin Chand & Co.,
4. Principles of Physical Chemistry, S.M.Maron and C.F.Brutton, Oxford IBH
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
8. Physical Chemistry,P.W.Atkins, Oxford.
9. physical Chemistry – Barrow Tata McGraw H.U. editor
10. Fundamentals of molecular spectroscopy-Ban welt – Taba McGraw Hill edition.
11. Introductory Quantum chemistry A.K.Chandra fourth edition. Tata Mc Graw – Hill Publishing House, New Delhi.
12. Atomic structure and the chemical Manas Chanda fourth edition. Tata Mc Graw – Hill Publishing House, New Delhi.

CORE XI - CHEMISTRY PRACTICAL III GRAVIMETRIC ANALYSIS AND PHYSICAL CHEMISTRY

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 Dimethyl glyoximate.

II. PHYSICAL CHEMISTRY EXPERIMENTS :

1. Determination of partition coefficient of Iodine between carbon tetra chloride and Water.
2. Determination of rate constant of acid-catalysed hydrolysis of an ester (Methyl acetate or Ethyl acetate).
3. Determination of K_f / molecular weight by Rast's macro method-Naphthalene, Diphenyl and diphenylamine.
4. Determination of critical solution temperature of Phenol-Water system.
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).
9. Conductometric titrations, strong-acid-strong base.