AMITY UNIVERSITY
RAJASTHAN

AMITY SCHOOL OF APPLIED SCIENCES
(ASAS)

B.Sc. (Pass Course) PCM

Courses Focusing on Entrepreneurship

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Molecular, Structure & Bonding in compounds

Course Name	Course Code	LTP	Credit	Semester
Molecular, Structure & Bonding in Compounds	BSP106	2:0:0	2	1

CLO1	**To acquire knowledge of atomic bonds**
CLO2	**To understand the properties p block elements**
CLO3	**To acquire knowledge of molecular structure**

Module I

Ionic Solids: Ionic structures, radius ratio effect and coordination number, limitations of radius ratio rule, lattice defects, semiconductors, lattice energy and born haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarizability of ions, fajans rule.

Metallic Bond: Free electron, valence bond and band theories

Weak Interactions: Hydrogen bonding, vanderwaals forces

Module II

Covalent Bond: Valence bond theory and its limitations, directional and shapes of simple inorganic molecules and ions, valence shell electron pair repulsion (VSEPR) theory to NH_3, H_3O^+, SF_4, ClF_3, ICl_2, H_2O

Molecular Orbital Theory: Homonuclear and heteronuclear (CO and NO) diatomic molecules, multicentre bonding in electron deficient molecules, bond strength and bond energy, percentage ionic character from dipole moment and electronegativity difference.

Module III

S-block elements: Comparative study, diagonal relationships, salient features of hydrides, solvation and complexation tendencies including their functions in Biosystems, an introduction to alkyls and aryls

Periodicity of p-block elements: Periodicity in properties of p-block elements with special reference to atomic and ionic radii, ionization energy, electron affinity, electronegativity, diagonal relationship, catenation

Books Suggested:

1. Concise Inorganic Chemistry: J. D. Lee
2. General Inorganic Chemistry: J. A. Duffy, Longman (2nd Ed.)
3. Principles of Inorganic Chemistry: B. R. Puri and L. R. Sharma
4. Basic Inorganic Chemistry: F. A. Cotton and G. Wilkinson, Wiley Eastern
5. Molecular Geometry: R. J. Gillespie, Van Nostrand Reinhold

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

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Some concepts of Organic Chemistry& Hydrocarbons

Course Name	Course Code	LTP	Credit	Semester
Some concepts of organic Chemistry & Hydrocarbons	BSP107	2:0:0	2	1

CLO1	**Understanding of organic reactions**
CLO2	**To understand IUPAC nomenclature**

Module I

Mechanism of organic reactions: Homolytic and heterolytic bond cleavage, types of reagents, electrophiles and nucleophiles, reactive intermidiates- carbocations, carbanions, free radicals, carbenes, arynes and nitrenes with examples, types of organic reactions, energy considerations, methods of determination of reaction mechanism (product analysis, intermidiates, isotope effects, kinetic and stereochemical studies)

Module II

Alkanes and Cycloalkanes: IUPAC nomenclature of branched and unbranched alkyl group, classification of carbon atoms in alkanes, methods of formation (with special reference of wurtz reaction, kolbe reaction, corey-house reaction and decarboxylation of carboxylix acids), physical properties and chemical reactions of alkanes, mechanism of free radical halogenation, orientation, reactivity and selectivity, cycloalkanes-nomenclature, methods of formation, chemical reaction, baeyer's strain theory and its limitations, theory of strainless rings

Module III

Alkenes, Cycloalkenes, Dienes and alkynes

Nomenclature of alkenes, methods of formation, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halide, regioselectivity in alcohol dehydration, The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes-mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikof's rule, hydroboration- oxidation, oxymercutation –reduction, Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with KMnO4 Polymerization of alkenes, Substitution at the allylic and vinylic-positions of alkenes. Industrial applications of ethylene and propene, Methods of formation, conformation and chemical reactions of cycloalkenes, Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes, Structure of allenes and butadiene, methods of formation, polymerization. Chemical reactions- 1,2- and 1,4- additions, Diels-alderreaction Nomenclature, structure and bonding in alkynes, Methods of formation, Chemical reactions of alkynes, acidity of alkynes, Mechanism of electrophilic and nucleophilic addition reactions, hydroborationoxidation, metal ammonia reductions, oxidation and polymerizations.

Books Suggested:

1. A Text Book of Organic Chemistry: K. S. Tiwari, S. N. Mehrotra and N. K. Vishnoi
2. Modern Principles of Organic Chemistry: M. K. Jain and S. C. Sharma
3. A Text Book of Organic Chemistry: (Vol. I & II) O. P. Agarwal
4. A Text Book of Organic Chemistry: B. S. Bahl and ArunBahl
5. A Text Book of Organic Chemistry: P. L. Soni
6. Organic Chemistry: (Vol. I, II & III) S. M. Mukherji, S. P. Singh and R. P. Kapoor, Wiley Eastern Ltd. (New Age International)
7. Organic Chemistry: Morrison & Boyd, Prentice Hall

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

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Inorganic Chemistry-I

Course Name	Course Code	LTP	Credit	Semester
Inorganic Chemistry-I	BSP306	2:0:0	2	3

CLO1	**Understanding first and second transction series**
CLO2	**Acqurire knowloedge of steoreo knowledge**
CLO3	**Acquaire knowlged of cooridnation chemmistry**

Module I

Chemistry of Elements of first Transition Series : Characteristics properties of d-Block elements. Properties of the elements of the first transition series, their Binary Compunds and complexes. Illustrating relative stability of their oxidation states, Coordination number and geometry.

Module II

Chemistry of Elements of Second and Third Transition Series : General characteristics, comparative treatment with their 3d-analogues in respect of ionicRadii, Oxidation States, magnetic, behaviour, Spectral properties, Stereo-chemistry.

Module III

Coordination Compounds: Werner's coordination theory and its experimental verification, Effective atomic number concept, Chelates, Nomenclature of coordination Compounds, Isomerism in coordination compounds, valence bond theory of transition metal complexes.

Books Suggested:

1. Text book of Quantitative Inorganic Analysis: A. I. Vogel (Chapter – I, II and XXIII)
2. Text book of Quantitative Inorganic Analysis: I. M. Kothoff and E. R. Sandell
3. Concise Inorganic Chemistry: J. D. Lee
4. General Inorganic Chemistry: J. A. Duffy
5. Principle of Inorganic Chemistry: B. R. Puri and L. R. Sharma
6. Basic Inorganic Chemistry: Cotton and Wilkinson and Gaus, Willey

Examination Scheme For Exams:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

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General Organic Chemistry-I

Course Name	Course Code	LTP	Credit	Semester
General Organic Chemistry-I	BSP307	2:0:0	2	3

CLO1	Understand the UV absorption spectroscopy, IR spectroscopy and their applications in syntheticorganic chemistry.
CLO2	Understand types of alcohols and different types of name reactions.
CLO3	Find out the types of aliphatic alcohols, aromatic alcohols, and re-arrangement reactions.
CLO4	Find out the types carbonyls compounds and different type of condensation reactions.
CLO5	Find out the applications of different types of alcohols and carbonyls compound in daily life.

Module I

Alcohols: Classification and nomenclature. Monohydric alcohols - Nomenclature, Method of formation by Reduction of aldehydes, Ketones,Carboxylic acids and esters, Hydrogen bonding, Acidic nature, Reactions of alcohols, Dihydric Alcohols - Nomenclature, methods of formation, Chemical reaction of vicinal glycols, Oxidative-Cleavage [$Pb(OAc)_4$ and HIO_4] and pinacol-pinacolone rearrangement. Trihydric Alcohols - Nomenclature and methods of formation, chemical reactions of glycerol.

Phenols: Nomenclature, Structure and bonding, Preparation of Phenols, Physical Properties and acidic character, Comparative acidic strengths of alcohols and phenols, Resonance stabilization of phenoxide ion, Reactions of phenols: electrophylic aromatic substitution, acylation and carboxylation, mechanism of fries rearrangement, Claisen rearrangement, gatter-man synthesis. Hauben- HoeschReaction, Lederer-manasse reaction and Reimer-tiemann Reaction.

Module II

Aldehydes And Ketones: Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3Dithianes synthesis of ketones from nitriles and from carboxylic acids. Physical properties, Mechanism of Nucleo-philic additions to carbonyl, aldol, perkin and Knoevenagel condensations, Condensation with ammonia and its Derivatives, Wittig reaction, Mannich reaction. Use of acetals as Protecting group Oxidation of aldehydes, baeyer-villiger oxidation of ketone, cannizzaro's reaction, MPV, Clemmensen, Wolff-kishner, Li AlH4 reductions, Halogenation of enolizable ketones, An introduction to O⊥O Unsaturated aldehydes and ketones.

Books Suggested:

1. A Text Book of Organic Chemistry: K. S. Tiwari, S. N. Mehrotra and N. K. Vishnoi
2. Modern Principles of Organic Chemistry: M. K. Jain & S. C. Sharma
3. A Text Book of Organic Chemistry: (Vol. I & II) O. P. Agarwal
4. A Text Book of Organic Chemistry: B. S. Bahl and ArunBahl
5. A Text Book of Organic Chemistry: P. L. Soni
6. Organic Chemistry: (Vol. I, II & III) S. M. Mukherji, S. P. Singh and R P. Kapoor

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

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CHEMISTRY LAB-III

Course Name	Course Code	LTP	Credit	Semester
Chemistry Lab-III	BSP308	0:0:2	2	3

NOTE: Students are expected to perform any eight experiments from the given list. The duration of the Practical Examination shall be 4 hours. The distribution of marks in the practical examination will be as follows:

1. Three experiments: 20 Mark each.
2. Distribution of marks will be as follows:
   Figure /Formula/Theory : 5
   Observations/Calculations : 8
   Result /Result Analysis : 5
   Precautions : 2
3. Viva -Voce : 10

List of Experiments:

1. Quantitative analysis
2. Volumetric analysis
   - Determination of acetic acid in commercial vinegar. Using NaOH
   - Determination of Alkali content in Anta-acid tablet Using HCl.
   - Estimation of calcium content in chalk as calcium oxalate by permangano-metry.
   - Estimation of hardness of water by EDTA.
   - Estimation of ferrous and ferric by dichromate method.
   - Estimation of copper using thiosulphate.
3. Qualitative analysis:
   - Identification of an organic compound through the functional group analysis, determination of melting point and preparation of suitable derivatives
4. Thermo chemistry:
   - To determine the solubilies of benzoic acid at different temperatures and to determine OH of the dissolution process
   - To determine the enthalpy of neutralization of a weak acid weak base verses strong acid and strong base and determine the enthalpy of ionisation of the weak acid/weak base.
   - To determine the enthalpy of solution of solid calcium chloride and calculate the lattice energy of calcium chloride from its enthalpy data using born haber cycle.

Books Suggested:

1. Practical Chemistry: GiriBajpai and Pandey, S. Chand & Co. Ltd., New Delhi
2. Practical Chemistry (Hindi Ed.): Suresh Ameta& P. B. Punjabi, Himanshu Publication

Chemistry of States of Matter

Course Name	Course Code	LTP	Credit	Semester
Chemistry of States of Matter	BSP406	2:0:0	2	4

Module I

Solid State

Definition of space lattice, unit cell, Laws of crystallography- (i) Law of constancy of interfacial angles (ii) Law of rationality of indices (iii) Law of symmetry, Symmetry elements in crystals. X-ray diffraction by crystals, Derivation of Bragg's equation Determination of Crystal structure of NaCl and CsCl(Laue's method and powder method.)

Module II

Gaseous States

Postulates of kinetic theory of gases, deviation from ideal behaviour, vanderwaals equation of state. Critical Phenomena: PV isotherms of real gases, continuity of states, the isotherms of vander Waals equation, relationship between critical constants and vanderwaals constants, the law of corresponding states, reduced equation of state. Molecular Velocities: Root mean square, average and most probable velocities. Qualitative discussions of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter. Liquification of gases (based on Joule-Thomson effect)

Module III

Liquid state

Intermolecular forces, structure of liquids (a qualitative description). Structural differences between solids, liquids and gases, Liquid Crystals: Difference between liquid crystal, solid and liquid, Classification, structure of nematic and cholestric phases, Thermography and seven segment cell.

Colloidal State

Definition of colloids, classification of colloids, Solids in liquids (sols) properties- kinetic, optical and electrical, stability of colloids, Protective action, Hardy-Schulze law, gold number, Liquids in liquids (emulsions): types of emulsions, preparation, Emulsifier, Liquids in solids (gels): classification, preparation and properties, inhibition, general applications of colloids.

Books Suggested:

1. Principles of Physical Chemistry: B. R. Puri and L. R. Sharma
2. A Text Book of Physical Chemistry: A. S. Negi and S. C. Anand
3. Physical Chemistry, Pt. I & II: C. M. Gupta, J. K. Saxena and M. C. Purohit
4. Computers and Applications to Chemistry: Ramesh Kumari, Narosa Publishing House P. Ltd.
5. A Text Book of Physical Chemistry : Kundu and Jain

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

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General Organic Chemistry II

Course Name	Course Code	LTP	Credit	Semester
General Organic Chemistry-II	BSP407	2:0:0	2	4

CLO1	**Acquire knowledge of** Ethers And Epoxides
CLO2	**Acquire knowledge of** Carboxylic Acids
CLO3	Organic Compounds of Nitrogen

Module I

Ethers And Epoxides: Nomenclature of ethers and methods of formation, physical properties. Chemical reaction, cleavage and autoxidation, ziesel's method of synthesis of epoxides, Acid and Base catalyzedring opening, Reactions of Grignard and organolithium reagents with epoxides.

Module II

Carboxylic Acids: Nomenclature structure and bonding, Physical properties, Acidity of carboxylic acids, Effect of subsituents on acid Strength, preparation of carboxylic acids, Reactions of carboxylic acids, Hell-Volhardzelinsky reaction, Synthesis of acid chlorides, Esters and amides. Reductions of carboxylic acids, Mechanism of decarboxylation, Methods of formation and chemical reactions of unsaturated mono carboxylic acids, Dicarboxylic Acids: Methods of Synthesis and effect of heat and dehydrating agents.

Carboxylic Acid Derivatives: Structure and nomenclature of acid chlorides, Esters, Amides and acid- anhydrides, Relative stability and reactivity of acid derivatives, physical properties, Inter conversion of acid derivatives by nucleophilic acyl substitution, preparation of carboxylic acid derivatives, chemical reactions, mechanism of esterification and hydrolysis (Acidic and Basic)

Module III

Organic Compounds of Nitrogen: Preparation of nitro alkanes and nitro arenes. Chemical Reactions of Nitro alkanes, Mechanism of nucleophilic substitution in nitro arenes and their reduction in acidic, neutral and alkaline media, Picric Acid

Alkyl and aryl amines: Reactivity, Structure and nomenclature of amines, physical properties. Stereo chemistry of amines, Separation of a mixture of primary, secondary and tertiary amines .Structural features, effecting basicity of amines. Amine salts as phase- transfer catalysts, preparation of alkyl and aryl amines (Reduction of nitro compounds, Nitriles) Reductive amination of aldehydic and ketonic compounds, Gabriel-Phthalimide reaction, Hofmann bromamide Reaction, Reactions of amines, Electrophilic Aromatic substitution in arylamines, Reactions of amines with nitrous acid, Synthetic transformations of aryl- diazonium salts, azo couplin.

Books Suggested:

1. A Text Book of Organic Chemistry: K. S. Tiwari, S. N. Mehrotra and N. K. Vishnoi
2. Modern Principles of Organic Chemistry: M. K. Jain & S. C. Sharma
3. A Text Book of Organic Chemistry: (Vol. I & II) O. P. Agarwal
4. A Text Book of Organic Chemistry: B. S. Bahl and ArunBahl
5. A Text Book of Organic Chemistry: P. L. Soni
6. Organic Chemistry: (Vol. I, II & III) S. M. Mukherji, S. P. Singh and R P. Kapoor

Examination Scheme:

Components	CT	Attendance	Assignment/	EE

			Project/Seminar/Quiz	
Weightage (%)	15	5	10	70

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CHEMISTRY LAB V

Course Name	Course Code	LTP	Credit	Semester
Chemistry Lab-V	BSP508	0:0:2	2	5

NOTE: Students are expected to perform any eight experiments from the given list. The duration of the Practical Examination shall be 4 hours. The distribution of marks in the practical examination will be as follows:

1. Three experiments: 20 Mark each.
2. Distribution of marks will be as follows:
   Figure /Formula/Theory : 5
   Observations/Calculations : 8
   Result /Result Analysis : 5
   Precautions : 2
3. Viva -Voce : 10

1. Synthesis and Analysis

- Preparation of sodium trioxalato ferrate (III) $Na_3[Fe(C_20_4)_3]$ and determination of its composition by permagnomotry.
- Preparation of Ni-DMG complex, $[Ni(DMG)_2]$.
- Preparation of copper tetraammine complex $[Cu(NH_3)_3]S0_4$.
- Preparation of cis-and trans-bisoxalatodiaquachromate (III) ion.

1. Synthesis of Organic Compounds

- Acetylation of salicylic acid aniline, glucose and hydroquinone, Benzoylation of aniline and phenol
- Aliphatic electrophilic substitution: Preparation of Iodoform from ethanol and acetone.
- Aromatic Electrophilic substitution:Nitration: Preparation of m-dinitrobenzene, Preparation of p-nitroacetanilide or Halogenation: Preparation of p-bromoacetanilide Preparation of 2,4,6- tribromophenol.
- Diazotization/coupling: Preparation of methyl orange and methyl red.
- Oxidation: Preparation of benzoic acid from toluene.
- Reduction: Preparation of aniline from nitrobenzene, Preparation of m-nitroaniline fromm-dinitrobenzene.

2. Colorimetry

- To verify Beer-Lambert law $KMn0_4/K_2Cr_20_7$ and determined the concentration of the given solution of the substance.

3. Molecular Weight Determination

- Determination of molecular weight of a non-volatile solute by Rast method/Beckmann freezing point method.
- Determination of the apparent degree of dissociation of an electrolyte (e.g. NaCl) in aqueous solution at different concentrations by ebulliscopy.

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Quantum Chemistry & Spectroscopy-I

Course Name	Course Code	LTP	Credit	Semester
Quantum Chemistry & Spectroscopy-I	BSP511	3:0:0	3	5

CLO1	Elementary quantum Mechanics: Black-body, radiation, Planck's radiation law
CLO2	Molecular orbital theory: Basic ideas-criteria for forming M.O. from A.O. construction of M.O's by LCAO. H_2^+ ion calculation of energy
CLO3	Spectroscopy: Introduction: Electromagnetic radiation, spectrum, basic features of different spectrometers, statement

Module I

Elementary quantum Mechanics: Black-body, radiation, Planck's radiation law, photoelectric effect, heat capacity of solids, Bohr's mode of hydrogen atom (no derivation) and its defects. Compton effect. Luis De Broglie hypothesis Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in a one dimensional box. Schrodinger wave equation for H-atom; separation into three equations (without derivation), quantum numbers and their importance, hydrogen like wave functions, radial wave functions, angular wave, functions.

Module II

Molecular orbital theory: Basic ideas-criteria for forming M.O. from A.O. construction of M.O's by LCAO. H_2^+ ion calculation of energy level from wave functions, physical picture of bonding and anti-bonding wave functions, concept of σ, σ*, π, π* orbitals and their characteristics. Hybrid orbitals - sp, sp^2, sp^3, calculation of coefficients of A. O's used in these hybrid orbitals, Introduction to valence bond model of H_2, comparison of M.O. and V.B. models.

Module III

Spectroscopy: Introduction: Electromagnetic radiation, spectrum, basic features of different spectrometers, statement of the Born-Openheimer approximation, degrees of freedom. Rotational Spectrum: Diatomic molecules, Energy levels of a rigid rotator (semi-classical principles), selection rules, spectral intensity, using population distribution (Maxwell-Boltzmann distribution) determination of bond length, qualitative description of non-rigid rotator, isotope effect.

Vibrational Spectrum: Infrared spectrum : Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups.

Raman Spectrum: concept of polarizability, pure rotational and pure vibrational Raman Spectra of diatomic molecules, selection rules. Electronic Spectrum: Concept of Potential Energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Frank Condon principle, qualitative description of σ, π and n M.O. their energy levels and the respective transitions.

Books Suggested:

1. Physical Chemistry, G.M. Barrow. International Student Edition, McGraw Hill.
2. Basic Programming with Application, V.K. Jain. Tata McGraw Hill.
3. Computers and Common Sense. R Hunt and Shelly, Prentice Hall.
4. University General Chemistry, C.N.R Rao, Mac Millan.
5. Physical Chemistry, RA. Alberty, Wiley Eastern Ltd.

6. The elements of Physical Chemistry, P.W. Atkins, Oxford.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

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Bio-inorganic and Polymer Chemistry

Course Name	Course Code	LTP	Credit	Semester
Bio-inorganic and Polymer Chemistry	BSP606	2:0:0	2	6

CLO1	Bioinorganic Chemistry: Essential and trace elements in Biological processes, metalloporphyrins with special reference to haemoglobin
CLO2	Synthetic Dyes: Colour and constitution (electronic concept), Classification of dyes, Synthesis of Methyl orange, Congo red. Malachite
CLO3	Silicones and Phosphazenes : Silicones :Phosphazenes as examples of inorganic polymers, nature of bonding in triphosphazenes

Module I

Bioinorganic Chemistry: Essential and trace elements in Biological processes, metalloporphyrins with special reference to haemoglobin and myoglobin. Biological role of alkali and alkaline earth metal ions with special reference to Ca.+2 , Mg+2 Nitrogen fixation

Module II

Silicones and Phosphazenes : Silicones :Phosphazenes as examples of inorganic polymers, nature of bonding in triphosphazenes.

Module III

Synthetic Dyes: Colour and constitution (electronic concept), Classification of dyes, Synthesis of Methyl orange, Congo red. Malachite green, Crystal violet, Phenolphthalein, Fluorescein, Alizarin and Indigo

Books Suggested:

1. Basic Inorganic Chemistry F.A. Cotton. G. Wilkinson and P.L. Gaus. Wiley.
2. Concise Inorganic Chemistry, J.D. Lee ELBS.
3. Concepts of Models Inorganic Chemistry B.Douglas. D.McDaniel and J.Alexander, John Wiley.
4. Inorganic Chemistry. D.E. Shriver P.W. Atkins and C.H. Langfor, Oxford.
5. Inorganic Chemistry, W.W. Porterfield Addison Wesley.
6. Inorganic Chemistry, A.G. Sharpe. ELBS.
7. Inorganic Chemistry, G.L. Miessler and D.A. Tarr, Prentice Hall.
8. Group Theory and Its Chemical Applications: P. K. Bhattacharya
9. Inorganic Chemistry: J. E. Huyee, Principles of Structure & Reactivity, 3rd Ed.
10. Selected Topics in Inorganic Chemistry: W. U. Malik, G. D. Tuli and R. Madan
11. Principles of Inorganic Chemistry: D. Banerje
12. Modern Aspect of Inorganic Chemistry: H. J. Emeleus and A. G. Sharpe

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

CHEMISTRY LAB-VI

Course Name	Course Code	LTP	Credit	Semester
Chemistry Lab-VI	BSP608	0:0:2	2	6

NOTE: Students are expected to perform any eight experiments from the given list. The duration of the Practical Examination shall be 4 hours. The distribution of marks in the practical examination will be as follows:

1. Three experiments: 20 Mark each.
2. Distribution of marks will be as follows:
   Figure /Formula/Theory : 5
   Observations/Calculations : 8
   Result /Result Analysis : 5
   Precautions : 2
3. Viva -Voce : 10

List of Experiments:

1. Instrumentation

2. Colorimetry:
   - Mole-ratio method
   - Adulteration-Food stuff.
   - Effluent analysis - water analysis.
   - Solvent Extraction: Separation and estimation of Mg(II) and Fe(II)
   - Ion Exchange Method: Separation and estimation of Mg(II) and Zn(II)

3. Volumetric Analysis: Iodimetric&Iodimetric titrations.
4. Laboratory Techniques
   - Steam Distillation: Naphthalene from its suspension in water, Clove oil from Clove, Separation of o-and p-nitrophenols
   - Column Chromatography: Separation of fluoressein and methylene blue. Separation of leaf pigments from spinach leaves. Resolution of racemy mixture of (z) mandelic acid.

5. Qualitative Analysis: Analysis of an organic mixture containing two solid components using water, NaHCO3, NaOH for separation and preparation of suitable derivatives.
6. Stereochemical study of Organic Compounds via Models R and S configuration of optical isomers. E, Z configuration of geometrical isomers, Conformational analysis of cyclohexanes and substituted cyc1ohexanes
7. Organic estimation, Amino group, Phenolic group, Carboxylic acid and Glucose.
8. Electrochemistry
   - To determine the strength of the given acid condcutometrically using standard alkali solution.
   - To determine the solubility and solubility product of a sparingly soluble electrolyte conductometrical.
   - To study the saponification of ethyl acetate conductometrica1ly.
   - To determine the ionization constant of a weak acid conductometrically.
   - To titrate potentiometrically the given ferrous ammonium sulphate solution using $KMn0_4/K_2Cr_20_4$ as titmate and calculate the redox potential of Fe^{++}/Fe^{+++} system on the hydrogen scale.

9. Refractometry, Polarimetry

   - To verify law of refraction of mixtures for ego of glycerol and water) using Abe's refractometer.
   - To determine the specific rotation of a given optically active compound.

Books suggested (Laboratory Courses):

1. Vogel's Qualitative inorganic analysis, revised, SveWa, Orient Longman.
2. Vogel's Text Book of Quantitative Inorganic Analysis (revised), J. Bassentt. RC.Deney G.H. Jeffery and J. Mendham.ELBS.
3. Standard methods of chemical Analysis. W.W. Scott. The technical Press.
4. Experimental Inorganic Chemistry, W.G. Palmer, Cambridge.
5. Handbook of Preparative Inorganic Chemistry. Vol I & II, Braver, Academic Press.
6. Inorganic Synthesis, McGraw Hill.
7. Experimental Organic Vol I & II, P.R Singh, D.S. Gupta and K.S. Bajpai, Tata McGraw Hill.
8. Laboratory manual in Organic Chemistry, RK. Bansal, Wiley Eastern.
9. Vogel's Text Book of Practical Organic Chemistry, B.S. Furniss, A.J. Hannaford, V.Rogers, P.W.G. Smith and A.R Tatchell, ELBS.
10. Experiments in General Chemistry, C.N.R Rao and U.c. Agarwal, East-West Press.
11. Experiments in Physical Chemistry, RC. Das and B.Behra, Tata McGraw Hill.
12. Advanced Experimental Chemistry, Vol I Physical, J.N. Gurtu and R Kappor, S Chand & Co.
13. Selected Experiments in Physical Chemistry, N.G. Mukerjee, J.N. Ghose& Sons.
14. Experiments in Physical Chemistry, J.C. Ghosh, BharatiBhavan.
15. Practical Chemistry: GiriBajpai and Pandey, S. Chand & Co. Ltd., New Delhi