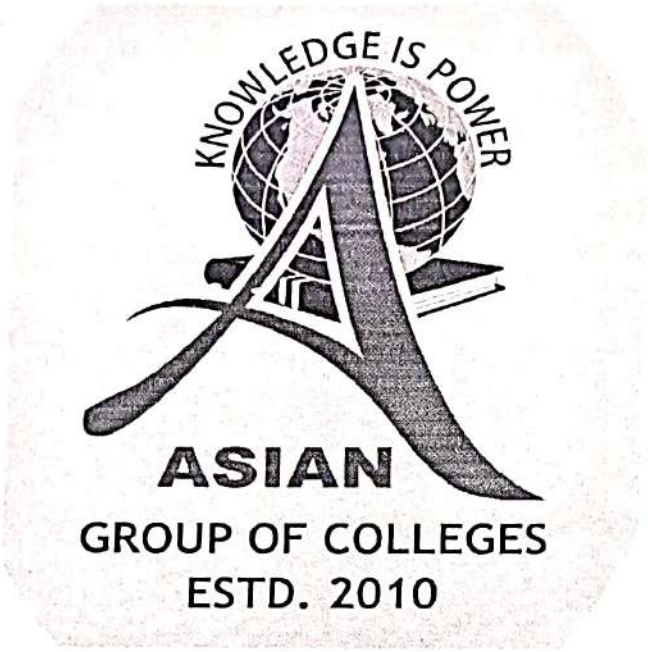
Asian Educational Institute, Patiala

(An Autonomous College)

School of Scicnce and Mathematics



SYLLABUS

B.Sc./B.Sc.(Honours)

Physical Sciences/Life Sciences/ Multidisciplinary

CHEMISTRY (Major, Minor, IDC/MDC, SEC)

(Semester-I & II)

Session: 2025-26

ASIAN EDUCATIONAL INSTITUTE, PATIALA (PB)

UG PROGRAMME (Bachelor of Science)

PHYSICAL SCIENCES/LIFE SCIENCES/ MULTIDISCIPLIANARY

B.Sc./B.Sc. (HONOURS)

SESSION: 2025-2026

Code	Title of Paper	Hours (Per Week)	Max. Marks			Credits	Examination Time(Hours)
SEMESTR-I			**Total**	**Ext.**	**Int.**		
BCHEM101T	**MAJ:** ORGANIC CHEMISTRY-I	03	100	70	30	03	03
BCHEM101L	**MAJ:** CHEMISTRY PRACTICAL	02	50	35	15	01	03
BCHEM101T(M)	**MIN:** ORGANIC CHEMISTRY-I	03	100	70	30	03	03
BCHEM101L	**MIN:** CHEMISTRY PRACTICAL	02	50	35	15	01	03
BIDC101	**IDC/MDC:** CHEMISTRY IN DAILY LIFE	03	100	70	30	03	03
BSEC101	**SEC:** CHEMISTRY OF COSMETICS AND PERFUMES	03	100	70	30	03	03
SEMESTR-II							
BCHEM102T	**MAJ:** INORGANIC CHEMISTRY-I	03	100	70	30	03	03
BCHEM102L	**MAJ:** CHEMISTRY PRACTICAL	02	50	35	15	01	03
BCHEM102T(M)	**MIN:** INORGANIC CHEMISTRY-I	03	100	70	30	03	03
BCHEM102L	**MIN:** CHEMISTRY PRACTICAL	02	50	35	15	01	03
BIDC102	**IDC/MDC:**BASIC ANALYTICAL CHEMISTRY	03	100	70	30	03	03
BSEC102	**SEC:** CHEMISTRY OF DRUGS	03	100	70	30	03	03

- **MAJ:** Discipline Specific Core Course: **MIN**: Minor Core Course; **IDC/MDC:** Inter Disciplinary Course/Multi-Disciplinary Course, **AEC:** Ability Enhancement Course, **VAC:** Value Added Course, **SEC:** Skill Enhancement Course.

Semester-I

Paper Code	Title of paper	Teaching hour/week	Max. Marks			Credits	Examination Time (Hours)
			Total Marks	External Exam (marks)	Internal Assessment (Marks)		
BCHEM101T	MAJOR THEORY ORGANIC CHEMISTRY-I	03	100	70	30	03	03
BCHEM101L	MAJOR PRACTICAL CHEMISTRY LAB	02	50	35	15	01	03

Semester-II

Paper Code	Title of paper	Teaching hour/week	Max. Marks			Credits	Examination Time (Hours)
			Total Marks	External Exam (marks)	Internal Assessment (Marks)		
BCHEM102T	MAJOR THEORY INORGANIC CHEMISTRY-I	03	100	70	30	03	03
BCHEM102L	MAJOR PRACTICAL CHEMISTRY LAB	02	50	35	15	01	03

Sem

(Semester I)
ORGANIC CHEMISTRY-I
(Major Theory)
Paper Code: BCHEM101T

Max Marks: 100
External Exam: 70
Internal Assessment: 30
Passing Marks: 35%

Credits:03
Total Teaching hours:45
Exam Time Duration: 3 hrs.

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 12 marks each. Section C will consist of 11 short answer questions that will cover the entire syllabus and will be of 2 marks each.

INSTRUCTIONS FOR THE CANDIDATES

Students have to attempt four questions in all from Section A and B by selecting two questions from each section. Section C will be compulsory.

COURSE OBJECTIVES:

1. To expand the knowledge of basic concepts in organic chemistry.
2. To know the structure and formation of all the intermediates involved in chemical reaction.
3. An understanding of the stereochemistry of organic compounds.

COURSE OUTCOMES:

Sr. No.	On completing the course
CO1	Students will understand the basics of Organic chemistry starting from bonding in organic compounds and notations in a reaction/ reaction mechanism.
CO2	Students will be able to identify the type of organic reaction, properties and structures of reactive intermediates involved in mechanisms.
CO3	Students will learn to understand the Stereochemistry of organic compounds.
CO4	Students will know the methods of preparation and chemical as well as physical properties of Alkanes and Alkenes.

Section-A

Structure and Bonding

Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bond, Van der Waals interactions, resonance, Electronic displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications. Hydrogen bonding.Aromaticity in benzenoid and non-benzenoid compounds, alternant and non-alternate hydrocarbons, Huckel's rule, anti-aromaticity, homo-aromaticity, non-aromatic, Quasi-aromatic, Craig's rule, Annelation effect.

Mechanism of Organic Reactions

Homolytic and heterolytic bond fission with suitable examples. Curved arrow notation, drawing electron movements with half- headed and double headed arrows, Types of reagents of organic reaction. Nucleophilicity and Basicity.Types of reagents-electrophiles and nucleophiles.Energy considerations. Reactive intermediates - carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (with examples). Assigning formal charges on intermediates and other ionic species.Methods of determination of reaction mechanism (intermediates & isotope effect).

Stereochemistry of Organic Compounds

Concept of isomerism.Types of isomerism. Optical isomerism, elements of symmetry,molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogeniccentres, diastereomers, threo and erythrodiasteremers, meso compounds, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature. Geometric isomerism–determination of configuration of geometric isomers.E and Z system of nomenclature.Conformational isomerism–conformational analysis of ethane and n – butane; conformation of cyclohexane, axial and equatorial bonds, conformation of mono substituted cyclohexane derivatives. Newman projection and Sawhorse formulae, Fischer and flying wedge formulae. Difference between configuration and conformation.

Section-B

Alkanes

Alkanes - Isomerism in alkanes, sources, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids), physical properties and Mechanism of free radical halogenation of alkanes: orientation, reactivity and selectivity.

Alkenes

Alkenes - Nomenclature of alkenes-methods of formation, mechanisms and dehydration of alcohols and dehydrohalogenation of alkyl halides regioselectivity in alcohol dehydration. The Saytzeff's rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes-mechanisms involved in hydrogenation, electrophilic and free radical additions. Markownikoff's rule, hydroboration-oxidation, oxymercuration reduction. Epoxidation, ozonolysis.

Vanelha

Cycloalkanes

Cycloalkanes - nomenclature, chemical reactions, Baeyer's strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strain less rings. The case of cyclopropane ring: banana bonds.

Dienes

Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes. Structure of allenes and butadiene, methods of formation, polymerization. Chemical reactions -1, 2 and l, 4 additions, Diels-Alder reaction.

.

BOOKS PRESCRIBED:

1. Organic Chemistry, J. Clayden; N.Greeves; S.Warren, 2nd Ed.,Oxford university Press, 2012.
2. Advanced Organic Chemistry, F. A. Carey, R. J. Sundberg, 2nd Ed., Springer, 2007.
3. Organic Chemistry by T.W.G. Solomons,10th Ed.,Wiley, 2024.
4. Advanced Organic Chemistry by Jerrymarch, 4th Ed.,Wiley, 2015.

Vanelly

(Semester I)
ORGANIC CHEMISTRY-I
(Minor Theory)
Paper Code: BCHEM101T(M)

Max Marks: 100
External Exam: 70marks
Internal Assessment: 30 marks
Passing Marks: 35%

Credits:03
Total Teaching Hours: 40
Exam Time Duration: 3 hrs.

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 12 marks each. Section C will consist of 11 short answer questions that will cover the entire syllabus and will be of 2 marks each.

INSTRUCTIONS FOR THE CANDIDATES

Students have to attempt four questions in all from Section A and B by selecting two questions from each section. Section C will be compulsory.

COURSE OBJECTIVES:

1. To expand the knowledge of basic concepts in organic chemistry.
2. To know the structure and formation of all the intermediates involved in chemical reaction.
3. An understanding of the stereochemistry of organic compounds.

COURSE OUTCOMES:

Sr. No.	On completing the course
CO1	Students will understand the basics of Organic chemistry starting from bonding in organic compounds and notations in a reaction/ reaction mechanism.
CO2	Students will be able to identify the type of organic reaction, properties and structures of reactive intermediates involved in mechanisms.
CO3	Students will learn to understand the Stereochemistry of organic compounds.
CO4	Students will know the methods of preparation and chemical as well as physical properties of Alkanes and cycloalkanes.

Section-A

Structure and Bonding

Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bond, Van der Waals interactions, resonance, Electronic displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications. Hydrogen bonding.Aromaticity in benzenoid and non-benzenoid compounds, alternant and non-alternate hydrocarbons, Huckel's rule, anti-aromaticity, homo-aromaticity, non-aromatic, Quasi-aromatic, Craig's rule, Annelation effect.

Mechanism of Organic Reactions

Homolytic and heterolytic bond fission with suitable examples. Curved arrow notation, drawing electron movements with half- headed and double headed arrows, Types of reagents of organic reaction. Nucleophilicity and Basicity.Types of reagents-electrophiles and nucleophiles.Energy considerations. Reactive intermediates - carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (with examples). Assigning formal charges on intermediates and other ionic species.Methods of determination of reaction mechanism (intermediates & isotope effect).

Section-B

Stereochemistry of Organic Compounds

Concept of isomerism.Types of isomerism. Optical isomerism, elements of symmetry,molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogeniccentres, diastereomers, threo and erythrodiasteremers, meso compounds, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature. Geometric isomerism–determination of configuration of geometric isomers.E and Z system of nomenclature.Conformational isomerism–conformational analysis of ethane and n – butane; conformation of cyclohexane, axial and equatorial bonds, conformation of mono substituted cyclohexane derivatives. Newman projection and Sawhorse formulae, Fischer and flying wedge formulae. Difference between configuration and conformation.

Alkanes

Alkanes- Isomerism in alkanes, sources, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids), physical properties and Mechanism of free radical halogenation of alkanes: orientation, reactivity and selectivity.

Cycloalkanes

Cycloalkanes - nomenclature, chemical reactions, Baeyer's strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strain less rings. The case of cyclopropane ring: banana bonds.

BOOKS PRESCRIBED:

1. Organic Chemistry, J. Clayden, N. Greeves, S.Warren, 2nd Ed.,Oxford university Press, 2012.
2. Advanced Organic Chemistry, F.A. Carey, R. J. Sundberg, 2nd Ed., Springer, 2007.
3. OrganicChemistrybyT.W.G.Solomons,10th Ed.,Wiley, 2024.
4. Advanced Organic Chemistry by Jerrymarch, 4th Ed.,Wiley, 2015.

(Semester I)
CHEMISTRY PRACTICAL
PAPER CODE: BCHEM101L

Max Marks: 50
External Practical Exam: 35 marks
Internal Assessment: 15 marks
Passing Marks: 35%

Credits: 01
Exam Time Duration: 3 hrs.
Teaching hours: 2 hours/week

INSTRUCTIONS FOR THE PAPER SETTERS EXAMINERS/CANDIDATES

Paper setter will enlist the two experiments and the examiner will randomly distribute these mixtures among the students. Each candidate will analyze one mixture along with crystallization of the given sample. Students are permitted to consult the books for the scheme of tests for semi-micro analysis.

COURSE OUTCOMES:

S. No.	On completing the course
CO1	Students learn to analyze melting point of different organic compounds.
CO2	To develop the ability to apply the principles of Chemistry
CO3	Students will learn about the techniques used for chemical analysis.

DETAILS OF DISTRIBUTION OF MARKS

1) Melting point/boiling point — 10 marks
2) Crystallization — 10 marks
3) Performance — 05 marks
4) Viva-voce — 05 marks
5) Practical Record — 05 marks

Laboratory Techniques

Determination of melting points:

Naphthalene, 80-82^{0}C. Benzoic acid, 121.5-122^{0}C

Urea, 132.5-133^{0}C, Succinic acid, 184.5-185^{0}C.

Cinnamic acid, 132.5-133^{0}C, Salicylic acid, 157.5-158^{0}C.

Acetanilide, 113.5-114^{0}C, m-Dinitrobenzene, 90^{0}C.

ρ-Dichlorobenzene, 52^{0}C, Asprin, 135^{0}C.

Determination of boiling points

Ethanol 78^{0}C, Cyclohexane 81.4^{0}C, Tolune 110.6^{0}C, Benzene 80^{0}C.

Crystallization

Phthalic acid from hot water (using fluted filter paper and seamless funnel)

Acetanilide from boiling water

Naphthalene from ethanol

Benzoic acid from water

BOOKS PRESCRIBED:

1. Experimental Organic Chemistry. Vol.I &II, P.R. Singh, D.S. Gupta and K.S. Bajpai,Tata McGraw Hill.
2. Laboratory Manual in Organic Chemistry. R.K. Bansal, Wiley Eastern.
3. Vogel's TextbookPractical Organic Chemistry. B.S. Furniss, A.I. Harnaford, V. ogers, P.W.G. Smith and A.R. Tatchell, ELBS.
4. Experiments in General Chemistry. C.N.R. Rao and U.E. Aggarwal. East- West Press.

Vandha

(Semester-I)
Interdisciplinary Course (IDC)
CHEMISTRY IN DAILY LIFE
Paper Code: BIDC101

Max Marks: 100
External Exam: 70
Internal Assessment: 30
Passing Marks: 35%

Credits: 03
Exam Time Duration: 3 hrs.
Total Teaching Hours: 36

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 12 marks each. Section C will consist of 11 short answer questions that will cover the entire syllabus and will be of 2 marks each.

INSTRUCTIONS FOR THE CANDIDATES

Students have to attempt four questions in all from Section A and B by selecting two questions from each section. Section C will be compulsory.

COURSE OBJECTIVES:

The aim of the course is to enhance the basic knowledge of students on the topics Chemistry in everyday life, Biomolecules and Polymers.

COURSEOUTCOMES:

S. No.	On completing the course
CO1	Students will gain knowledge about the medicines and their applications in everyday life.
CO2	Students will gain knowledge regarding designing of drugs, interaction of drugs with receptor targets and types of drugs.
CO3	Students will acquire knowledge of various chemicals used in food.
CO4	Students will be able to understand the chemistry of biomolecules and polymers.

Section-A

Chemistry in everyday life: Chemicals in Medicines, Designing a drug and classification of drugs, interaction of drug with targets, interaction of drugs with receptor targets. Types of drugs, neurologically active drugs, Antipyretics, and Analgestics, Antihistamines.

Soaps and detergents- Types of soaps, synthetic detergents(neutral, anionic and cationic), cleansing action ofdetergents.Advantages and disadvantages of detergentsover soaps.

Section-B

Biomolecules: Carbohydrates, Mono-saccharides- glucose and fructose, Disaccharides-sucrose, Polysaccharides-starch and cellulose, Reducing and Non-reducing sugars, Importance of carbohydrates, Proteins, ά-amino acids-classification and properties of ά-amino acids. Denaturations and Renaturation of protein, Enzymes and Vitamins (characteristics, sources and deficiency disease of some important vitamins only).

Polymers: Basic concept of polymers, classification and characteristics of polymers. Applications of polymers asplastics in electronic, automobile components, medicalfields, and aerospace materials.Problems of plastic wastemanagement.Strategies for the development ofenvironment-friendly polymers.

BOOKS PRESCRIBED:

1. General Chemistry (XI and XII) and Engineering Chemistry, B.Tech (Part-I), 2024.
2. Medicinal Chemistry, Ashotosh Kar, New Age International Pvt. LTD, 2018.

(Semester-I)
Skill Enhancement Course (SEC)
CHEMISTRY OF COSMETICS AND PERFUMES
Paper Code: BSEC101

Max Marks: 100
External Exam: 70 marks
Internal Assessment: 30 marks
Passing Marks: 35%

Credits: 03
Exam Time Duration: 3 hrs.
Total Teaching Hours: 36

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 12 marks each. Section C will consist of 11 short answer questions that will cover the entire syllabus and will be of 2 marks each.

INSTRUCTIONS FOR THE CANDIDATES

Students have to attempt four questions in all from Section A and B by selecting two questions from each section. Section C will be compulsory.

COURSE OBJECTIVES:

The aim of the course is to enhance the basic knowledge of students on the topics perfumes, chemistry of cosmetics - I and II, Catalytic Processes used in cosmetic industries.

COURSE OUTCOMES:

S. No.	On completing the course
CO1	Understanding the basics of perfumes and perfume industry.
CO2	Insight into the cosmetics, hair and nail care products.
CO3	Understanding the cosmetics for the skin care products.
CO4	Discuss the various raw materials for cosmetics and perfumes.

Section-A

Perfumes: Introduction to perfumes, history, classification of perfumes, the concept of aroma, types and physiological effects. Composition, formulation and working mechanism of perfume. Antiperspirants and deodorants: definition, working mechanism, composition, formulation chemistry and comparison. Introduction to perfumery chemicals: Natural sources, natural identical and synthetic compounds. Extraction methods of perfumery chemicals. Examples of some important perfumery chemicals (synthesis, properties and chemistry)

Chemistry of cosmetics-I: Introduction to cosmetics: Definition, history and application. Cosmetology, Introduction to cosmeceuticals. Anatomy of skin and hair with respective to cosmetology. Classification of cosmetics. Physiological effects of cosmetics. Cosmeceuticals: definition, classification, chemicals, mechanism of action. Induction to oral care products. Examples chemistry of materials used in skin, nail care products and their function. Chemistry of materials used in cosmeceuticals.

Section-B

Chemistry of cosmetics-II: Introduction to skin care cosmetics: classification, chemicals, properties, physiological effects. Study chemistry of some skin care products (creams, foundation, primer, lotions). Chemistry of nail polish and paints. Hair care products: Properties, classification, working mechanism, formulation, safety and chemistry of hair products (shampoo, conditioner, gels, colouring agents etc.)

Catalytic processes: Introduction to herbal cosmetics. Characterisation of cosmetics and perfumes (Chromatography, physical methods, spectroscopy). Safety and testing of cosmetics and perfumes. Regulatory and quality control of cosmetics. Modern developments in cosmetics chemistry. Cosmetic surgery and related studies.

BOOKS PRESCRIBED:

1. Poucher's Perfumes, Cosmetics, and Soaps 10th edition , Halida Butler (editor) Dordrecht: Kluwer Academic Publishers.
2. Chemistry and Technology of the Cosmetics and Toiletries Industries, by D.F. Williams, Springer International Edition.
3. Organic Chemistry for cosmetic chemists, J. Anthony, O'Lenick Jr.: Thomas G. O'Lenick, Carol Stream, II: Allured Publishing.
4. Beginning Cosmetic Chemistry by Schueller and Romanowsk, Allured Pub Corp; 3rd edition.
5. Handbook of cosmetic science and technology. A. O. Barel, M. Paye, Maibarch HICRC press.

Sem

(Semester II)
INORGANIC CHEMISTRY-I
Paper Code: BCHEM102T
(Major Theory)

Max Marks: 100
External Exam: 70
Internal Assessment: 30
Passing Marks: 35%

Credits: 03
Total Teaching Hours: 45
Exam Time Duration - 3 hrs.

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 12 marks each. Section C will consist of 11 short answer questions that will cover the entire syllabus and will be of 2 marks each.

INSTRUCTIONS FOR THE CANDIDATES

Students have to attempt four questions in all from Section A and B by selecting two questions from each section. Section C will be compulsory.

COURSE OBJECTIVE:

The aim of the course is to enhance the basic knowledge of students on the topics of the structure of atom, periodic properties, chemical bonding and its types and molecular interactions taking place in solids.

COURSE OUTCOMES:

S. No.	On completing the course
CO1	Students will gain knowledge about the atomic structure, Schrodinger wave equation, quantum numbers, shapes of orbitals, rules governing the filling of electrons in orbitals and electronic configuration of elements and ions.
CO2	Students will gain knowledge about positioning of elements in the periodic table, periodic properties such as ionisation energy, electron affinity, electronegativity and its calculations and chemical behaviour of elements.
CO3	Students will acquire knowledge of Valence Bond Theory, Hybridisation, shapes of molecules, Molecular Orbital theory, Molecular orbital diagrams of diatomic and simple polyatomic molecules.
CO4	Students will learn about close packing in solids, ionic structures, coordination number, radius ratio rules, Born Haber cycle, Solvation power and Polarising power of ions by Fajan's rule.

Vasudha

Section-A

Atomic Structure

Bohr's Theory and its limitations, Idea of de Broglie matter waves, Heisenberg uncertainty principle and its significance, atomic orbitals, Schrodinger wave equation, significance of, Ψ and Ψ^2, quantum numbers, shapes of *s, p, d* orbitals. Normalized and orthogonal wave functions. Aufbau Principle, Pauli exclusion principle, and Hund's rule of maximum multiplicity. Electronic configurations of some elements (first 30 elements of modern periodic table). Variation of orbital energy with atomic number.

Periodic Properties

Position of elements in the periodic table, effective nuclear charge and its calculations, shielding or screening effect, Slater's rules, variation of effective nuclear charge in periodic table, Atomic and ionic radii (Van Der Waals), trends in atomic and ionic radii, ionization energy, Successive ionization energies and factors affecting the ionization energy. Applications of ionization energy, electronic affinity and electronegativity. Electronegativity-Pauling's, Mulliken's, Allred-Rachow's, Sanderson's and Mulliken-Jaffe's electronegativity scales.

***s*-Block Elements**

General electronic configurations, Comparative study, diagonal relationships, solvation and complexation tendencies including their functions in biosystems.

Section-B

Chemistry of Noble gases

Chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds.

Chemical Bonding

Ionic bond: General characteristics, types of ions, size effects, radius ratio rule and its limitations. Packing of ions in crystals.Born-Haber cycle and its applications, solvation energy.

Covalent Bond: Lewis structure, Valence bond theory, energetics of hybridization, Equivalent and Non-equivalent hybrid orbitals. Bent's rule, resonance and resonance energy, Molecular Orbital Theory. Molecular orbital diagrams of diatomic and simple polyatomic molecules N_2, O_2, C_2, B_2, F_2, CO, NO, and their ions; HCl, BeF_2, CO_2, (idea of s-p mixing and orbital interaction to be given)Covalent character in ionic compounds, polarizing power and polarizability. Fajan's rules and consequences of polarization.

BOOKS PRESCRIBED:

1. Inorganic Chemistry, Weller, Overton, Rourke and Armstrong, 7th Ed. Oxford University Press, 2014.
2. Concise Inorganic Chemistry, J. D. Lee, 5thEd.,Wiley India, 2008.
3. Advanced Inorganic Chemistry, F. Albert Cotton,Geoffrey Wilkinson 6thEd., Wiley, 1999.
4. Inorganic Chemistry: Principles of Structure and Reactivity, James E .Huheey 4thEd., Pearson, 2006.

(Semester II)
INORGANIC CHEMISTRY-I
Paper Code: BCHEM102T(M)
(Minor Theory)

Max. Marks: 100
External Exam: 70
Internal Assessment: 30
Pass Marks: 35%

Credits: 03
Total Teaching Hours: 40
Exam Time Duration: 03 hrs.

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 12 marks each. Section C will consist of 11 short answer questions that will cover the entire syllabus and will be of 2 marks each.

INSTRUCTIONS FOR THE CANDIDATES

Students have to attempt four questions in all from Section – A and B by selecting two questions from each section. Section – C will be compulsory.

COURSE OBJECTIVE:

The aim of the course is to enhance the basic knowledge of students on the topics of the structure of atom, periodic properties, chemical bonding and its types and molecular interactions taking place in solids.

COURSE OUTCOMES:

S. No.	On completing the course
CO1	Students will gain knowledge about the atomic structure, Schrodinger wave equation, quantum numbers, shapes of orbitals, rules governing the filling of electrons in orbitals and electronic configuration of elements and ions.
CO2	Students will gain knowledge about positioning of elements in the periodic table, periodic properties such as ionisation energy, electron affinity, electronegativity and its calculations and chemical behaviour of elements.
CO3	Students will learn about close packing in solids, ionic structures, coordination number, radius ratio rules, Born Haber cycle, Solvation power and Polarising power of ions by Fajan's rule.

Section - A

Atomic Structure

Bohr's Theory and its limitations, Idea of de Broglie matter waves, Heisenberg uncertainty principle and its significance, atomic orbitals, Schrodinger wave equation, significance of, Ψ and Ψ^2, quantum numbers, shapes of *s, p, d* orbitals. Normalized and orthogonal wave functions. Aufbau Principle, Pauli exclusion principle, and Hund's rule of maximum multiplicity. Electronic configurations of some elements (first 30 elements of modern periodic table).Variation of orbital energy with atomic number.

Periodic Properties

Position of elements in the periodic table, effective nuclear charge and its calculations, shielding or screening effect, Slater's rules, variation of effective nuclear charge in periodic table, Atomic and ionic radii (Van Der Waals), trends in atomic and ionic radii, ionization energy, Successive ionization energies and factors affecting the ionization energy. Applications of ionization energy, electronic affinity and electronegativity. Electronegativity-Pauling's, Mulliken's, Allred-Rachow's, Sanderson's and Mulliken-Jaffe's electronegativity scales.

Section-B

s-Block Elements

General electronic configurations, Comparative study, diagonal relationships, solvation and complexation tendencies including their functions in biosystems.

Chemistry of Noble gases

Chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds.

Ionic Solids

Concept of close packing, ionic structure, (NaCl type, Zinc Blende, Wurtzite, CaF_2 and antifluorite), radius ratio rule and coordination number, limitations of radius ratio rule, lattice defects, semi- conductors and Born-Haber's Cycle, solvation energy, solubility of ionic solids, polarizing power and polarizibility of ions, Fajan's rule. Metallic bond free electron, Valence bond and Band theories.

BOOKS PRESCRIBED:

1. Inorganic Chemistry, Weller, Overton, Rourke and Armstrong, 7th Ed. Oxford University Press, 2014.
2. Concise Inorganic Chemistry, J. D. Lee, 5th Ed., Wiley India,2008.
3. Advanced Inorganic Chemistry, F. Albert Cotton, Geoffrey Wilkinson 6th Ed., Wiley, 1999.
4. Inorganic Chemistry: Principles of Structure and Reactivity, James E. Huheey 4th Ed., Pearson, 2006.

(Semester II)
CHEMISTRY PRACTICAL
Paper CODE: BCHEM102L

Max Marks: 50
External Exam: 35 marks
Internal Assessment: 15marks
Passing Marks: 35%

Credits: 01
Exam Time Duration: 3 hrs.
Time duration: 2 hours/week

INSTRUCTIONS FOR THE PAPER SETTERS EXAMINERS/CANDIDATES

The Practical Examinations will be of 3 hours duration. During this session students will perform semi micro analysis. Paper setter will enlist five different mixtures and the examiner will randomly distribute these mixtures amongst the students. Each candidate will analyze one mixture. Students are permitted to consult the books for the scheme of tests for semimicro analysis. Examiners will check the note books and will hold viva-voce.

COURSE OUTCOMES:

S. No.	On completing the course
CO1	Students will gain knowledge about semimicro analysis.
CO2	They will learn about cationic analysis, separation and identification of ions from groups I, II, III, IV, V, VI.
CO3	They will also learn about anionic analysis.

DETAILS OF DISTRIBUTION OF MARKS

Salt Analysis	20 Marks
Viva Voce	10 Marks
Practical Record	05 Marks

Inorganic Chemistry Experiment
Semi-micro analysis:
Cation analysis, separation and identification of ions from Groups I, II, III, IV, V and VI. analysis (2 cations and 2 anions with no interference).

BOOKS PRESCRIBED:

1. Vogel's Qualitative Inorganic Analysis, revised, Svehla, Orient Longman.
2. Vogel's Textbook of Quantitative Inorganic Analysis (revised), J. Basseff, R.C. Dennery, 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, Brauer, Academic Press.
6. Inorganic Synthesis, McGraw Hill.

(Semester-II)
Skill Enhancement Course (SEC)
CHEMISTRY OF DRUGS
Paper Code: BSEC102

Max Marks: 100
External Examination: 70 marks
Internal Assessment: 30marks
Passing Marks: 35%

Credits: 03
Exam Time Duration: 3 hrs.
Total Teaching hours: 36hrs.

INSTRUCTIONS FOR THE PAPER SETTER
The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 12 marks each. Section C will consist of 11 short answer questions that will cover the entire syllabus and will be of 2 marks each.

INSTRUCTIONS FOR THE CANDIDATES
Students have to attempt four questions in all from Section A and B by selecting two questions from each section. Section C will be compulsory.

COURSE OBJECTIVES:
The aim of the course is to expose the students to the basic concepts regarding Chemistry of drugs.

COURSE OUTCOMES:

S. No.	On completing the course
CO1	Students will be having knowledge about the importance and needof Drugs chemistry.
CO2	Understand the concept, principle and applications of drugs used in pharmaceutical formulations.
CO3	Students will learn about the techniques used in Drug analysis.
CO4	Student will also learn about drug formulation.

Section-A

General Introduction of Drugs

Introduction: Diseases- causes of diseases, Drug-Definition and sources.

ADME of drugs (brief)- Absorption, distribution, drug metabolism (in liver), elimination (brief), Toxicity.

Examples:

1. Zintac (Ranitidine, antacid)
2. Paracetamol (antipyretic)
3. Benadryl (Cough syrup)

Characteristics of an ideal drug.

Nomenclature of Drugs: Chemical name- Generic name-Trade name. Trader names for the given generic names:

1. Asprin
2. Amoxycillin
3. Ciprofloxacin
4. Paracetamol
5. Mebendazole

Drug formulation: Definition-need for conversion of drug into pharmaceutical (drug formulations) – Additives-diluents, binders, lubricants, antioxidants, flavourants, sweeteners, colourants, coating agents. Classification of drug formulations: oral, parental and topical dosage forms-advantage and disadvantages.

Oral Dosage forms: Tablets (Asprin-analgestic; Ciprofloxacin- antibacterial). Capsules (Amoxycillin-antibiotic; Omperazole-antacid) Syrups (B-complex syrup; benadryl-Cough syrup).

Section-B

Classification of Drugs

Classification of drugs based on therapeutic actions- Chemotherapeutic agents, Pharmacodynamics agents and drugs acting on metabolic processes.

Brief explanation for the following drug with their utilities only:

Chemotherapeutic agents: Antimalarials-Chloroquine; Antibiotic- Amoxycillin; Antitubercular drugs- isoniazide; Antiprotozoals-metronidazole.

Pharmacodynamic agents

1. Drug acting on CNS: Diazepam (CNS depressant), general anesthetic (thiopental sodium), antipyretic and analgestic (Ibuprofen)
2. Drugs acting on PNS: Local anesthetic (Benzocaine)
3. Drugs acting on cardiovascular system: Metroprolol (antihypertensive agents), Nefidipine (antianginal and antihypertensive agent)
4. Drugs acting on renal system: Diuretics (Acetazolamide)

Drugs acting on metabolic processes

1. Vitamins: Common name, source, deficiency, Vitamin A, B2, B6, C, D, E and K- remedy.
2. Hormones: Function (brief)- Deficiency of hormones (Insulin, Testosterone and Osterone).

Varelly

BOOKS PRESCRIBED:

1. An Introduction to Medicinal Chemistry, Graham L. Patrick., 1995
2. Medicinal Chemistry: Principles and Practice Edited by F.D. King.,2002
3. Textbook of Organic Medicinal and Pharmaceutical Chemistry, Edited by Charles O. Wilson, Ole Gisvold, Robert F. Doerge, 2010.
4. Introduction to Medicinal Chemistry, Alex Gringuage, 1996.
5. Principles of Medicinal Chemistry, William O. Foye, Thomas L. Lemice and David A. Williams.
6. Introduction to Drug Design, S.S. Pandeya and J. R. Dimmock, New Age International.
7. Burger's Medicinal Chemistry and Drug Discovery, Vol-1 (Chapter-9 and Ch-14), Ed. M.E. Wolff, John Wiley.
8. Goodman and Gilman's Pharmacological Basis of Therapeutics, McGraw-Hill.
9. The Organic Chemistry of Drug Design and Drug Action, R.B. Silverman, Academic Press.
10. Strategies for Organic Drug Synthesis and Design, D. Lednicer, John Wiley.