



SHRI GAVISIDDHESHWAR ARTS, SCIENCE AND COMMERCE COLLEGE, KOPPAL - 583231

DEPARTMENT OF CHEMISTRY

Curriculum Plan Document for the academic year 2019-20

Course	: BACHELOR OF SCIENCE (B. Sc)	Semester	: First Semester
Title of the Paper	: Paper - I : Organic Chemistry-1	Paper Code	: CHT-101
Name of the Faculty	: Dr. S. B. Ummapure	Credits	: 4

Objectives	: To understand the basics of chemistry about structure and bonding in organic molecules, Organic reactions and their mechanism, Stereochemistry of organic reactions.
Pedagogy	: Combination of lectures, assignment, group discussion, laboratory experiments on different of chemical estimations, etc.

Chapter	Syllabus	Curriculum Plan	Method of Teaching	Cross Cutting Issues	Outcomes	Assessment of Outcomes
Structure and bonding in organic molecules	Causes of bond formation, types of bonds: ionic, covalent and coordinate – definition with examples. Bond length, bond angle, bond energy and bond order – definition with examples. Hybridization in carbon – definition. Explanation of sp ³ , sp ² , sp hybridizations by taking methane, ethylene and acetylene molecules respectively, sigma and pi bonds definition & examples	To enable the students to recollect the basics of structure and bonding in organic molecules by bond formation and different types of hybridization involved.	Chalk and talk, method, PowerPoint presentations, seminars, assignments, Discussion, subject related videos. Google classroom etc.	Structure, bonding, and hybridization in organic molecules.	Understanding of basics and importance of bonding and hybridization.	IA Test, Question and answer, seminars, assignments, laboratory experiments etc.,

<p style="text-align: center;">Organic reactions and their mechanism</p>	<p>Types of organic reactions: Substitution, addition, elimination, rearrangement, hydrolysis, oxidation, reduction – definition with examples. Types of bond cleavage: Homolytic & heterolytic fission – definition with examples.</p> <p>Types of reagents: Electrophiles and nucleophiles – definition with examples. Reactive intermediates: Carbonium ions, carbanions – definition, methods of generation and stability. Free radicals and carbenes – definition with examples. Types of reaction mechanisms (Ionic and free radical mechanisms).</p>	<p>Develop students to understand the Types of reactions, bonds cleavage, reagents in organic synthesis and mechanism.</p>	<p>Chalk and talk, method, PowerPoint presentations, seminars, assignments, Discussion, subject related videos. Google classroom etc.</p>	<p>Different Types of organic reactions, bond cleavage, reagents, reactive intermediates and reaction mechanism.</p>	<p>Basics for organic reaction mechanism understanding.</p>	<p>IA Test, Question and answer, seminars, assignments, laboratory experiments etc.,</p>
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<p>Stereochemistry of organic reactions</p>	<p>Concept of isomerism and types. Optical isomerism, Optical activity, chiral carbon, and molecular dissymmetry. Elements of symmetry: plane of symmetry, and center of symmetry. Optical isomerism in tartaric acid. Enantiomers, diastereomers, mesocompound, racemic mixture meaning & example. Geometrical isomerism: definition with examples (maleic & fumaric acids) E-Z nomenclature with examples Conformation isomers: Definition with examples. Conformational analysis of ethane.</p>	<p>Make the students to understand the isomerism, isomers, chiral carbon, E-Z nomenclature, Conformational analysis of organic molecules.</p>	<p>Chalk and talk, method, PowerPoint presentations, seminars, assignments, Discussion, subject related videos. Google classroom etc.</p>	<p>Types of isomers, elements of symmetry, optical isomerism, E-Z nomenclature, Conformational analysis</p>	<p>Fundamentals of isomerism and its use in nomenclature and structural confirmation</p>	<p>IA Test, Question and answer, seminars, assignments, laboratory experiments etc.,</p>
<p>Laboratory: Titrimetric estimations</p>	<p>Titrimetric estimations of sodium hydroxide, oxalic acid, Fe in Mohr's salt, calcium content in lime stone, copper in copper sulphate, Fe in FeCl₃, hardness of water, Zn in Zinc sulphate, phenol, glucose, vitamin C, aldehyde and ketone, percentage of hydroxyl groups, amines, saponification value, dissolved oxygen (DO) in water.</p>	<p>The students will get skill in the quantitative analysis by doing titrations in the volumetric analysis.</p>	<p>Chalk and talk, method, demonstration, discussion, assignments.</p>	<p>Titrimetric estimations</p>	<p>Development of laboratory skill for quantitative analysis by volumetric titrations</p>	<p>IA Test, Question and answer, assignments, laboratory experiments etc.,</p>



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Course	: BACHELOR OF SCIENCE (B. Sc)	Semester	: Third Semester
Title of the Paper	: Paper - III : Organic Chemistry - 3	Paper Code	: CHT-301
Name of the Faculty	: Dr. S. B. Ummature	Credits	: 4

Objectives	: To study and critically analyse the basic concepts of Organic halogen compounds, alcohols, phenols, Carboxylic acids and acid derivatives.
Pedagogy	: Combination of lectures, assignment, group discussion, laboratory experiments on Inorganic semi micro qualitative analysis of binary mixture, etc.

Chapter	Syllabus	Curriculum Plan	Method of Teaching	Cross Cutting Issues	Outcomes	Assessment of Outcomes
Organic halogen compounds	Alkyl halides, alkenyl halides & acyl halides-definition with examples. Alkyl halides: Classification with examples. Mechanism of SN ¹ and SN ² reactions by taking hydrolysis of tertiary butyl bromide and methyl bromide as examples. E ¹ and E ² reactions of alkyl halides with mechanism. Aryl halides: Methods of formation, Nucleophilic displacement reactions with NaOH, NH ₃ and KCN. Wurtz-Fitting reaction and Ullmann reaction (C ₆ H ₅ Cl)	To promote understanding classification, methods of formation, SN ¹ and SN ² reactions, E ¹ and E ² reactions, Wurtz-Fitting reaction and Ullmann reaction of organic halogen compounds	Chalk and talk, method, PowerPoint presentations, seminars, assignments, Discussion, subject related videos. Google classroom etc.	Definition, Classification SN ¹ , SN ² , E ¹ , E ² reactions. Wurtz-Fitting reaction and Ullmann reaction	Enables the students to get a clear idea about Methods of formation, Nucleophilic displacement reactions of Alkyl and aryl halides	IA Test, Question and answer, seminars, assignments, laboratory experiments etc.,

Alcohols	Classification with examples. Monohydric alcohols-classification with examples. Isomerism in monohydric alcohols up to C ₅ . Methods of preparation of monohydric alcohols by hydrolysis of alkyl halides, hydroboration-oxidation of alkenes and reduction of aldehydes and ketones. Distinguishing tests for primary, secondary and tertiary alcohols by Lucas test and dichromate test. Mechanism of pinacol-pinacolone rearrangement	To enable the students about classification, isomerism, preparation, Distinguishing tests for alcohols and mechanism of rearrangement.	Chalk and talk, method, PowerPoint presentations, seminars, assignments, Discussion, subject related videos. Google classroom etc..	Classification, isomerism, methods of preparation, distinguishing tests, pinacolone rearrangement mechanism.	Promotes understanding about Methods of formation, Distinguishing tests for alcohols and rearrangement.	IA Test, Question and answer, seminars, assignments, laboratory experiments etc.,
Phenols	Classification with examples, manufacture of phenol by Cumene and Dow process. Acidity of phenol. Effect of substituents on acidity. Mechanism of Reimer-Tiemann and Kolbe reactions. Gattermann reaction and Fries rearrangement.	Make students to understand the synthesis, acidic character, and named reactions of phenols.	Chalk and talk, method, PowerPoint presentations, seminars, assignments, Discussion, subject related videos. Google classroom etc..	Cumene and Dow process. Acidic character, effect of substituents, and mechanism of named reactions.	Students get a clear idea about synthesis, acidity of phenol, effect of substituent and named reactions of phenols with mechanism.	IA Test, Question and answer, seminars, assignments, laboratory experiments etc.,
Carboxylic acids and acid derivatives	Carboxylic acids: Introduction, Classification into aliphatic & aromatic acids with examples. Methods of preparation of aliphatic monocarboxylic acids from alcohols, cyanides, esters and Grignard reagent. Acidity of carboxylic acids. Effect of substituents on acidity. Reactions of acids (salt formation, formation of acid halides, esters and amides) Hell-Volhard-Zelinsky (HVZ) reaction. Acid derivatives: Definition with examples of different acid derivatives of acids. Preparation and reactions of acid chloride (acetyl chloride) and acid amides.	To promote understanding classification, methods of formation, acidity, reactions, HVZ reaction, and acid derivatives with examples.	Chalk and talk, method, PowerPoint presentations, seminars, assignments, Discussion, subject related videos. Google classroom etc..	Classification, preparation by alcohols, cyanides, esters, acidic character, HVZ reaction and acid derivatives.	Enables the students to get a clear idea about classification Methods of formation, acidity and preparation of acid derivatives.	IA Test, Question and answer, seminars, assignments, laboratory experiments etc.,

<p>Laboratory: Inorganic semi micro qualitative analysis of binary mixture</p>	<p>Systematic semi micro qualitative analysis of mixture of two simple inorganic salts (containing two basic radicals and two acidic radicals). Acidic radicals: CO₃, Cl, Br, I, NO₃, SO₄, BO₃, acetate & oxalate Basic radicals: NH₄, Cu, Bi, Al, Fe, Cr, Mn, Zn, Ni, Co, Ba, Sr, Ca, Mg, K, Na & Li.</p>	<p>Understanding Basic principles of qualitative analysis: Solubility, common ion effect, complex formation etc. and various reaction equations for acidic radicals tests, basic radicals group pptn. and cause of flame coloration.</p>	<p>Chalk and talk, method, demonstration, discussion, assignments.</p>	<p>Semimicro qualitative analysis of mixture of two simple inorganic salts.</p>	<p>To impart the knowledge of Systematic qualitative analysis of mixtures containing two acid and two basic radicals with interfering radical.</p>	<p>IA Test, Question and answer, assignments, laboratory experiments etc.,</p>
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Course	: BACHELOR OF SCIENCE (B. Sc)	Semester	: Fifth Semester
Title of the Paper	: Paper - V : Organic Chemistry – 5.1	Paper Code	: CHT-501
Name of the Faculty	: Dr. S. B. Ummapure	Credits	: 4

Objectives	: To study and critically analyse the basic concepts of Spectroscopy, Organo-sulphur compounds and Amino acids
Pedagogy	: Combination of lectures, assignment, group discussion, laboratory experiments on Organic mixture separation and analysis of single compound, etc.

Chapter	Syllabus	Curriculum Plan	Method of Teaching	Cross Cutting Issues	Outcomes	Assessment of Outcomes
Spectroscopy	Introduction and types of spectroscopic methods, advantages of spectroscopic methods, general principles of spectroscopy, basic components of spectrophotometer. Salient features and applications of Infra red (IR) spectroscopy. Nuclear magnetic resonance (NMR) spectroscopy: Principle and instrumentation of NMR spectroscopy, salient features and applications. Meaning of the terms equivalent and nonequivalent protons, chemical shift, down-field shift, spin-spin coupling and (n+1) rule in NMR spectra.	To promote understanding spectroscopic methods, principle, components of spectrophotometer, applications of IR and HNMR	Chalk and talk, method, PowerPoint presentations, seminars, assignments, Discussion, subject related videos. Google classroom etc.	Spectroscopic methods, advantages, principle, components of spectrophotometer. Salient features and applications of IR and NMR spectroscopy.	Enables the students to get an idea about types, principle, instrument and applications of IR and HNMR spectroscopy.	IA Test, Question and answer, seminars, assignments, laboratory experiments etc.,

<p>Organo-sulphur compounds</p>	<p>Thiols: Nomenclature, methods of preparations and chemical reactions of thiols Thioethers: Nomenclature, methods of preparation and chemical reactions of thioethers.</p>	<p>To enable the students about nomenclature, reactions synthesis and reactions of organosulphur compounds.</p>	<p>Chalk and talk, method, PowerPoint presentations, seminars, assignments, Discussion, subject related videos. Google classroom etc..</p>	<p>Nomenclature, methods of preparation, and chemical reactions.</p>	<p>Promotes understanding about Methods of naming, formation, and reactions of thiols and thioethers.</p>	<p>IA Test, Question and answer, seminars, assignments, laboratory experiments etc.,</p>
<p>Amino acids</p>	<p>Introduction, classification and structure of amino acids. Synthesis of α-amino acids (from acids, Strecker & Gabriel's pthalimide method). Acid-base behavior and isoelectric point of amino acid.</p>	<p>Make students to understand the synthesis, structure and acid-base behavior of amino acid.</p>	<p>Chalk and talk, method, PowerPoint presentations, seminars, assignments, Discussion, subject related videos. Google classroom etc..</p>	<p>Classification, methods of preparation, structure and isoelectric point.</p>	<p>Imparts the students thorough idea in chemistry of amino acids</p>	<p>IA Test, Question and answer, seminars, assignments, laboratory experiments etc.,</p>
<p>Laboratory: Organic mixture separation and analysis of single compound</p>	<p>Separation of mixture containing two solid compounds. Analysis of any one compound with preparation of derivative. The mixtures may be A+N, P+N and B+N combinations. Acids: Benzoic, Salicylic, Cinnamic and Pthalic acid. Phenols: α-naphthol, β-naphthol and resorcinol. Bases: p-Toluidine, o-Toluidine, m-Toluidine, Neutrals: Naphthalene, Diphenyl, m-Dinitrobenzene. Acetanilide.</p>	<p>Separation of mixture containing two different type solid compounds. basis of separation and reactions of elements tests and functional group tests and preparation of derivative.</p>	<p>Chalk and talk, method, demonstration, discussion, assignments.</p>	<p>Separation of mixture containing two different nature solid compounds and analysis.</p>	<p>To impart the knowledge of separation of mixture. Analysis of functional group and preparation of derivative.</p>	<p>IA Test, Question and answer, assignments, laboratory experiments etc.,</p>



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Course	: BACHELOR OF SCIENCE (B. Sc)	Semester	: Fifth Semester
Title of the Paper	: Paper - V : Organic Chemistry – 5.2	Paper Code	: CHT-502
Name of the Faculty	: Dr. S. B. Ummapure	Credits	: 4

Objectives	: To study and critically analyse the basic concepts of
Pedagogy	: Combination of lectures, assignment, group discussion, physical chemistry instrumental experiments etc.

Chapter	Syllabus	Curriculum Plan	Method of Teaching	Cross Cutting Issues	Outcomes	Assessment of Outcomes
Organic synthesis via Enolates	Reactive methylene compounds – Introduction. Acidity of α -H atoms in ethyl acetoacetate. Synthesis of ethyl acetoacetate (mechanism of Claisen condensation). Ketoenol tautomerism in ethylacetoacetate. Synthetic applications of ethyl acetoacetate	To promote understanding methylene compounds. Acidity of α -H atoms, Synthesis of EAA, tautomerism EAA and applications	Chalk and talk, method, PowerPoint presentations, seminars, assignments, Discussion, subject related videos. Google classroom etc.	methylene compounds, acidity, synthesis, tautomerism and applications.	Enables the students to get an idea about methylene, acidic character, preparation, tautomerism and uses.	IA Test, Question and answer, seminars, assignments, laboratory experiments etc.,

Carbohydrates	Introduction and classification, mechanism of osazone formation. Interconversion of glucose into fructose and vice-versa, chain lengthening in aldoses (Killiani-Fischer synthesis). Chain shortening in aldoses (Ruff degradation) Epimerization and mutarotation. Elucidation of open-chain structure of D-glucose. Cyclic structures of glucose (Fischer & Haworth representations)	To enable the students osazone, interconversion, chain lengthening and shortening, epimers, structure of D-glucose	Chalk and talk, method, PowerPoint presentations, seminars, assignments, Discussion, subject related videos. Google classroom etc..	Osazone, glucose into fructose and vice-versa, chain lengthening/shortening,. structure of D-glucose.	Promotes understanding about chemistry of carbohydrates.	IA Test, Question and answer, seminars, assignments, laboratory experiments etc.,
Oils, fats, soaps and detergents	Oils & fats – composition of oils & fats. Determination of saponification number and iodine number of oils & fats. Soaps – Introduction, manufacture of soap by hydrolyser process. Synthetic detergents (syndets) – Introduction, synthesis of sodium lauryl sulfate and sodium dodecyl benzene sulfonate. Cleaning action of soaps.	Make students to understand composition, manufacture and uses of oil fat soap and detergents	Chalk and talk, method, PowerPoint presentations, seminars, assignments, Discussion, subject related videos. Google classroom etc..	Industrial process of oils fats soaps and detergents.	Imparts about the oils, fats, soaps and detergents industries chemistry.	IA Test, Question and answer, seminars, assignments, laboratory experiments etc.,
Synthetic polymers	Definition, classification with examples. Synthesis and uses of teflon, nylon and terylene. Thermoplastic & thermosetting polymers.	Understanding synthesis and uses of different types of polymers	Chalk and talk, method, PowerPoint presentations, seminars, assignments, Discussion, subject related videos. Google classroom etc..	Industrial methods for making of teflon, nylon and terylene.	Enables the students about preparation and uses of polymers.	IA Test, Question and answer, seminars, assignments, laboratory experiments etc.,

<p>Synthetic dyes</p>	<p>Introduction, Classification of dyes based on structure, chromophore & auxochrome theory of color & constitution. Synthesis of methyl orange, Bismarck brown & malachite green</p>	<p>Giving a idea about Different types of dyes and their composition.</p>	<p>Chalk and talk, method, PowerPoint presentations, seminars, assignments, Discussion, subject related videos. Google classroom etc..</p>	<p>Classification structure and synthesis of dyes.</p>	<p>Promotes the knowledge of color constitution and synthesis of dyes.</p>	<p>IA Test, Question and answer, seminars, assignments, laboratory experiments etc.,</p>
<p>Laboratory: Physical chemistry instrumental experiments part-I</p>	<p>Conductometric titrations, amount of Cu^{2+} in CuSO_4 (Beer-Lambert's law). Potentiometric estimations, Determining specific and molecular refractivities and density of two given liquids by Abbe's refractometer. specific rotation of cane-sugar solution using polarimeter, Conductometric precipitation, Preparation of buffer solutions and determination of their pH using pH meter, Estimation of vitamin C by UV spectrophotometer.</p>	<p>To enable students about the theory and principle of each experiment.</p>	<p>Chalk and talk, method, demonstration, discussion, assignments.</p>	<p>Theory, principle and handling of different types of instruments.</p>	<p>Imparts the knowledge of instruments and its uses in determining different physical aspects.</p>	<p>IA Test, Question and answer, assignments, laboratory experiments etc.,</p>