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Every Good Work

SACRED HEART COLLEGE (AUTONOMOUS)

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A Don Bosco Institution of Higher Education, Founded in 1951 * Affiliated to Thiruvalluvar University, Vellore * Autonomous since 1987

Accredited by NAAC (4th Cycle – under RAF) with CGPA of 3.31 / 4 at 'A+' Grade

Name of the Programme: M Sc. Chemistry

S No	Title of the Paper	Course Code	Course Objectives	Course Outcomes	Relevance
1	ORGANIC CHEMISTRY – I	CH716	<ul style="list-style-type: none">To know about the nature of aromaticity in the compoundsTo learn the kinetic and non-kinetic methods of determining organic reaction mechanism.To understand the substitution in aromatic and aliphatic reactions.	<ul style="list-style-type: none">Define and distinguish the organic compounds based on the nature of aromaticity and characterizing them using NMR techniqueInterpret the intermediates involved in various organic reactions and integrate the kinetic and non-kinetic methods in determining organic reaction mechanism.Relate and categorize the nucleophilic substitutions in aromatic and aliphatic molecules with mechanismPredict the product between electrophilic substitution in aromatic and aliphatic molecules reactivity and products formation with mechanismPredict and write the addition and elimination reactions and their	Regional developmental needs

				<p>mechanisms</p> <ul style="list-style-type: none"> • Formulate the synthetic routes based on addition/elimination reactions in synthetic organic chemistry 	
2	ELECTIVE – I: ANALYTICAL CHEMISTRY	CH719A	<ul style="list-style-type: none"> • To study the different types of molecular spectroscopy and NMR spectroscopy and its applications • To study the analytical techniques, instrumentation and applications 	<ul style="list-style-type: none"> • Explain and evaluate the theory and principle of electro analytical techniques, various factors involved in analysis and its applications. • Understand the fundamentals of microwave spectroscopy and how to identify molecules using structural factors like moment of inertia and intermolecular distances. • Explore the vibrating diatomic molecule, the simple harmonic oscillator, the anharmonic oscillator, and their applications in spectroscopy. • Illustration of Infrared Spectroscopy - Group frequencies Rotational and Vibrational Raman • Application of advanced chromatographic separation technique principles for isolation and characterization of compounds. • Identify and structurally categorize new using X-ray diffraction. Analyze nanomaterials using advanced electron microscopy characterization techniques. 	Regional developmental needs
3	ELECTIVE – III: PHARMACEUTIC AL CHEMISTRY	CH719C	<ul style="list-style-type: none"> • To understand the composition and the kinetics of drugs 	<ul style="list-style-type: none"> • Learn the terminologies and mechanism of action of drugs and analyse them • Discuss about the different types of 	Regional developmental needs

			<ul style="list-style-type: none"> To know the different types of drugs and its composition 	<p>drugs and their applications and evaluate their structures</p> <ul style="list-style-type: none"> Explain the causes of certain ailments and treatment and relate them Understand the extraction and uses of some specific drugs and categorize them Enumerate various therapeutic agents and combine them for potential applications Tabulate the various haematological factors assess their effects on human body 	
4	ORGANIC CHEMISTRY PRACTICAL – I	PCH813	<ul style="list-style-type: none"> To learn the separation of an organic compound from the mixture and identify them using various chemical tests. To enable the student to learn the methods of preparation for some organic compounds. 	<ul style="list-style-type: none"> Identify and relate the nature of the organic compound mixture given based on solubility and reactivity Demonstrate the systematic analysis and separation of organic compound mixture into individual components Experimenting organic chemistry theoretical knowledge into laboratory tests with respect to addition, oxidation, substitution reactions and other reactions Correlate functional group and corresponding derivatives formed during qualitative analysis in the laboratory Implement synthetic approach with single stage preparations in laboratory using oxidation, reduction etc. Build and reflect the synthetic ability to prepare and purify organic compounds from single stage reactions 	Regional developmental needs

5	REAGENTS IN ORGANIC CHEMISTRY SSP	CH817SP1	<ul style="list-style-type: none"> To know the mechanism of organic reaction by using the various reagents To understand the concept of stereochemistry of reactions 	<ul style="list-style-type: none"> Choose appropriate reagent based on the structure and functional group of the reactant molecule. Deduce mechanistic route for the reaction of reagent with reactant molecule and formation of products Detect the formation of products with specific stereochemistry in organic molecules based on the reaction type. 	Regional developmental needs
6	INORGANIC CHEMISTRY – III	CH919	<ul style="list-style-type: none"> To study about the basic theory of Inorganic spectroscopy. To illustrate the UV, IR and Raman spectral properties of some inorganic compounds and complexes. To study and illustrate the different types of magnetic behaviour in inorganic materials. To learn the basic concepts of superconductivity behaviour in the materials To apply the NMR, NQR, ESR and Mossbauer techniques in to simple inorganic systems. To learn the instrumentation of advance inorganic spectroscopy techniques. 	<ul style="list-style-type: none"> Students can recognize and interpret the spectroscopic techniques in terms of interaction of electromagnetic radiation with molecules Students can infer about the magnetic properties and superconductivity of materials and can able to calculate the magnetic susceptibility of the materials. Students can describe the principles and to interpret the instrumentation of various spectroscopic techniques. Students can illustrate the principle involved in ESR, NQR and Mossbauer Spectroscopy and distinguish chemical species using these spectroscopy Students can apply the principles of spectroscopy to predict the structure of compounds and analyse the various spectra of complexes Students can able to propose and formulate the structure of a new compound based on the spectroscopic 	local, regional ,national and global developmental needs

				data	
7	SPECTROSCOPY	CH920	<ul style="list-style-type: none"> To understand the concepts of spectral techniques To apply these techniques for the quantitative and structural analysis of organic compounds 	<ul style="list-style-type: none"> Demonstrate the understanding of electromagnetic spectrum and applied to study of chemical molecules. Validate knowledge of the principles of mass spectrometry and instrumentation. Predict number of signals, splitting pattern in the proton NMR of a compound and interpret NMR spectra of simple molecules. Identify the absorption frequencies of major functional groups and comprehend the electronic absorption and apply to interpret IR and UV-Vis spectra of simple organic compounds. Develop an ability for combined usage of mass spectrometry, UV-Vis., IR and NMR for structural elucidation. Analyse, evaluate and interpret the spectroscopic data effectively 	Regional developmental needs
8	ORGANIC CHEMISTRY – IV	CH1017	<ul style="list-style-type: none"> To know modern synthetic methods and synthetic strategies. This help in planning the synthesis of any types of organic compounds. To learn the synthesis and bio-synthesis of heterocyclic products. 	<ul style="list-style-type: none"> Define the modern synthetic terminologies/methods and build the synthetic strategies incorporated in retrosynthesis of various types of organic molecules Identify suitable protecting reagents for the protection of multifunctional organic molecules and predicting suitable deprotecting reagents after the completion of desired reaction. 	Regional developmental needs

				<ul style="list-style-type: none"> • Sketch various heterocyclic compounds structure with numbering and their interaction with various chemical reagents in detail. • Illustrate the importance of environmentally benign solvents and their role in synthetic organic reactions. • Validate the structure of various natural organic molecules and confirming their structure through total synthesis • Build the synthetic route theoretically for a given target molecule in retrosynthetic way with theoretical justification. 	
9	INORGANIC CHEMISTRY – IV	CH1018	<ul style="list-style-type: none"> • To illustrate the structure and bonding nature of Organometallic compounds and their reactions. • To study the various industrial importance and applications of organometallic compounds. • To study the fundamentals of nuclear chemistry and learn about the working principle of nuclear reactor. • To learn the MO theory and spectral behaviour in coordination compounds. • To learn the structure and function of bio – inorganic compounds. 	<ul style="list-style-type: none"> • Explain the bonding in organometallic compounds and illustrate the different types of reactions of complexes • analyze the catalytic properties of organometallic compounds and to integrate the application of these compounds in catalysis. • Discuss the aspects of nuclear chemistry and applications of nuclear fission and fusion reactions • Understand and apply the MO theory and construct the Orgel and Sugano - Tanabe diagrams for coordination complexes • Analyse the electronic spectra of complexes and can able to evaluate the Δ_0 and β 	Regional developmental needs

			<ul style="list-style-type: none"> To study the application of metals in medical field 	<ul style="list-style-type: none"> Review the importance of metallo biochemistry and conclude the role of metals in medicine 	
10	ORGANIC CHEMISTRY PRACTICAL – II	PCH1013	<ul style="list-style-type: none"> To learn practical skills about the estimation of some organic compounds using chemical procedures 	<ul style="list-style-type: none"> Analyze the unknown concentration of the given substance Synthesis and prepare simple organic compounds using a two stage process Relate and articulate the fundamental principles of volumetric estimations Examine and evaluate data collected to determine the identity, purity, and yield of products Develop methods for the estimation of organic substances volumetrically Investigate and interpret simple organic compounds using IR, UV, Mass and NMR spectroscopic data 	Regional developmental needs
11	INORGANIC CHEMISTRY PRACTICAL – II	PCH1014	<ul style="list-style-type: none"> To learn the methods and techniques to estimate inorganic metals. 	<ul style="list-style-type: none"> Learn about the methods and techniques to estimate inorganic metals Analyse the complex materials, alloys or ores and ions Detect the amount of mixtures of iron - magnesium, iron – nickel, copper - nickel and copper – zinc by Gravimetric and Volumetric Understand the principles of photo colorimetric method and be able to apply it for metal estimations Solve the spectra and interpreting it 	Regional developmental needs

12	PHYSICAL CHEMISTRY PRACTICAL- II	PCH1015	<ul style="list-style-type: none"> • To understand the principles that govern the basic electrochemical experiments • To learn the physical methods used in determination of parameters such as pH, conductance and EMF etc. 	<ul style="list-style-type: none"> • Learn and apply the principles of conductometry and potentiometry effectively for various titrations • Explain the conductometric titration of strong acid, weak acid and mixture of acids with strong Base. • Determine the equivalent conductance of strong electrolytes at infinite dilution and dissociation constant of weak electrolyte • Calculate the pH of a buffer solution using emf measurements • Prepare a salt bridge for potentiometric experiments. • Verify the various laws like Ostwald's dilution law and Kohlrausch's law conductometrically and design working electrodes 	local, regional ,national and global developmental needs
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