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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: B.Sc Chemistry

S No	Title of the Paper	Course Code	Course Objectives	Course Outcomes	Relevance
1	VOLUMETRIC ANALYSIS	PCH209	<ul style="list-style-type: none">To understand and apply the principle of volumetric analysisTo differentiate substances as primary and secondary standardsTo learn the concept of indicators and their uses in volumetric analysis.To learn to handle chemicals and apparatus related to volumetric analysisTo learn to develop methodologies to estimate the amount of unknown substancesTo differentiate the types of titration and their utilization in the estimations	<ul style="list-style-type: none">On successful completion of this Course, students will be able toMatch the theoretical aspects including principle with practicalDifferentiate substances as primary and secondary standards and prepare them in required concentration.Analyze the water samples for its hardness and other water quality parameters.Classify the different types of volumetric estimations and the indicators required for themCalculate the amount of substances and interpret the results.Develop methods for the estimation of substances volumetrically	National developmental needs

2	ALLIED CHEMISTRY - II (BIOCHEMISTRY)	ACH210	<ul style="list-style-type: none"> To define and understand the basic principles of chromatography and separation techniques. To learn the role of electrophoresis in biochemistry To understand the basics of nuclear chemistry and its importance in biomedical field To correlate the chemistry of carbohydrates and their structural differences To link structure and function relations of proteins in biological systems To learn the importance of coordination chemistry in biochemistry 	<ul style="list-style-type: none"> On successful completion of this Course, students will be able to Define and understand the fundamental principles of chromatography and its separation techniques. Correlate the Structural chemistry of carbohydrates in aldoses and ketoses Relate the structure and functions of proteins in biological systems Explain the structural diversity of aminoacids based on various medium (neutral, acidic, basic) and proteins 3D-structures in biochemistry Apply the concept of metal-protein coordination chemistry in oxygen transport and photosynthesis process. Detect the half-life time of radioactivity and devise transmutation of radioactive nucleus 	National developmental needs
3	ALLIED CHEMISTRY LAB WORK (BIOCHEMISTRY)	PACH209	<ul style="list-style-type: none"> To prepare acid and base solutions with various concentrations To understand and select the suitable acid-base indicators and redox indicator based on titration type To analyze the special elements present in the unknown organic compound To differentiate aromatic/aliphatic compounds 	<ul style="list-style-type: none"> On successful completion of this Course, students will be able to Prepare and standardize acid and base solutions with various concentrations Understand and select the suitable acid-base indicators and redox indicator based on titration type Analyze the presence of special elements in the organic compound Identify functional group present in any organic compound 	National developmental needs

			<p>with chemical tests</p> <ul style="list-style-type: none"> To identify functional group present in any organic compound systematically To estimate the concentration of the unknown solution under study 	<p>systematically</p> <ul style="list-style-type: none"> Analyze the concentration of the unknown solutions under study Apply the concepts of organic chemistry reactions in determining organic compound 	
4	INORGANIC CHEMISTRY – II	CH317	<ul style="list-style-type: none"> To have a sound knowledge about structure and shape using VB and MO theory To know about Chemistry of group-14 and 15 and its applications To understand the importance of Nuclear chemistry and its applications 	<ul style="list-style-type: none"> The general characteristics, electronic configuration, and oxidation states of Group 14 and Group 15 elements are introduced to students. Using VB and MO theory, the learner can comprehend the molecule's structure and shape. The relevance of nuclear chemistry and its applications can be comprehended by the learner. Students can demonstrate the manufacture and structure of oxo acids of nitrogen and phosphorus. Students can use the 'Q' Value to calculate the amount of energy produced in a nuclear reaction. Students will be able to detect and quantify radioactivity, as well as determine the use of particle accelerators and radioisotopes as tracers. 	National developmental needs
5	PHYSICAL CHEMISTRY – II	CH417	<ul style="list-style-type: none"> To understand the important laws of thermodynamics and their implications in chemical systems To learn the importance of chemical potential and its significance 	<ul style="list-style-type: none"> Understand the laws of thermodynamics and apply in to simple chemical system Describe and illustrate the importance of chemical potential and analyse their significance in simple chemical reaction 	National developmental needs

			<ul style="list-style-type: none"> To understand the basic concepts and importance of phase equilibria To learn the basics of colloids, surfactants and solutions 	<ul style="list-style-type: none"> Relate K_p, K_c and K_x and evaluate free energy and equilibrium constant for chemical reactions Understand the basic concepts in phase equilibrium and construct the two-component phase diagram for simple eutectic system Know the basic concepts in colloids and surfactants and illustrate the electrochemical properties in colloids Derive and interpret the laws of solutions and apply in to solvent extraction and determine the hydrolysis constant 	
6	QUALITATIVE INORGANIC ANALYSIS	PCH408	<ul style="list-style-type: none"> To enable the student to systematically identify the cations and anions present in a inorganic mixture To know the appropriate chemical procedures and apply them to prepare some familiar complexes 	<ul style="list-style-type: none"> Understand the systematic inorganic salt analysis based on interfering and non-interfering acid radicals and their elimination procedure Justify the progress of group specific cations with specific reagents present for specific cations Integrate the importance of pH concepts involved in group separation and on solubility Predict the appropriate reactions and reagents for specific cation with group specific reagents Adapt various interfering elimination procedure for the attainment of original solution and cationic radicals Adapt appropriate complexation process for the attainment of various metal complexes 	National developmental needs

7	ALLIED CHEMISTRY - II (MATHS AND PHYSICS)	ACH409	<ul style="list-style-type: none"> To understand the principles of rate of chemical reactions and thermodynamics To understand the basic electrochemistry, pH and buffer solutions To learn the basic nuclear chemistry and its applications To learn the chemistry of carbohydrate, amino acids, proteins and enzymes 	<ul style="list-style-type: none"> Describe the concepts of chemical kinetics and classify chemical reactions Understand the scope of thermodynamics and apply them for practical utilities Explain the various electrochemical processes and compare them Tabulate materials as acids and bases and summarize their applications Differentiate types of nuclear reactions and evaluate their adverse effects Explain the role of biomolecules and classify them 	National developmental needs
8	INORGANIC CHEMISTRY - III	CH416	<ul style="list-style-type: none"> To study the chemistry of main groups elements To understand the variation in the periodic behavior To learn the methods of extraction of lanthanides and actinides 	<ul style="list-style-type: none"> Students comprehend why and how lanthanide and actinide contractions occur. The chemistry of ozone, as well as allotropes of oxygen and sulphur, may be mastered by students. By studying the synthesis, characteristics, and structure of interhalogen compounds, students will grasp and appreciate the differences in electronegativity among halogens. The students can assess periodic trends, chemical reactivity and physical properties of d and f-block elements Students are able to tell the difference between 3d and 4f block components. The variations in ionic radius, 	National developmental needs

				coordination number, metal-metal bonding, and oxidation state between 3d, 4d, and 5d block elements can be compared and contrasted by students.	
9	PHYSICAL CHEMISTRY - III	CH547	<ul style="list-style-type: none"> To have a good foundation about the quantum chemistry and learn the application to simple system To learn the concepts regarding chemical kinetics and apply them for kinetics related problems in chemical reactions To learn the importance of photophysical and photochemical processes 	<ul style="list-style-type: none"> illustrate the concepts of conductance, their measurement and their applications Possess ability to enumerate the applications of ionic equilibria like buffer, hydrolysis of salts illustrate the foundations of electrochemistry, the reactions of a cell and different electrodes apply Nernst equation and also demonstrate the applications of electrochemical series. demonstrate the applications of electrochemistry like Fuel cells 	National developmental needs
10	ANALYTICAL CHEMISTRY - II	CH548	<ul style="list-style-type: none"> To study the basics, principles and instrumentation of spectroscopy. To learn the basics, principles of polarography and amperometric techniques. 	<ul style="list-style-type: none"> Explain and evaluate the principle and instrumentation of colorimetric analysis and UV-Visible spectroscopy, various factors involved in analysis and its applications. Understand the fundamentals of mass spectrometry including fragmentation pattern of simple molecules and how to determine molecular formula and molecular weight of various compounds. Understand about the molecular vibrations in IR and Raman spectroscopies and applied to structural elucidation, detection of presence of hydrogen bonding etc. 	National developmental needs

				<ul style="list-style-type: none"> • Illustration of NMR spectroscopy and application for structural elucidation and ESR spectroscopy for coordination compounds. • Comparing Atomic Absorption spectroscopy and Atomic Emission spectroscopy. Application of AAS like Determination of Mg in water and Lead in Petrol by AAS. • Evaluation of polarographic waves for qualitative and quantitative applications. Explore amperometric titration and its applications. 	
11	ELECTIVE PAPER- FORENSIC CHEMISTRY	CH549B	<ul style="list-style-type: none"> • To understand the basic knowledge about forensic. • To learn how chemistry supports in crime scene investigation and detection. • To understand the determination of the crime using serology and identification of drugs usage. 	<ul style="list-style-type: none"> • The relevance of chemistry in forensic science is well grasped by the students. • The students will be able to distinguish between the tests that were employed to obtain the fingerprint for analysis. • The students will comprehend the procedures for gathering material evidence from various things such as paint and glass. • The students can explain the notion of antigen–antibody interactions and how it may be used to identify species and drugs present in the body. • The students can describe the various forensic tests which are used to identify a stain in blood. • Students will be able to define standard field sobriety tests used to evaluate drug impairment, as well as the societal implications of drug 	National developmental needs

				and importance of chemistry in toxicology.	
12	BIOINORGANIC CHEMISTRY	CH549C	<ul style="list-style-type: none"> To understand the scope of bioinorganic chemistry To learn the chemistry of metalloporphyrin, metalloenzymes. To know the significance of metals in medicine 	<ul style="list-style-type: none"> Compare the scope of bioinorganic chemistry Discover the chemistry of metalloporphyrin Describe the chemistry of metalloenzymes Explain the significance of metals in medicine Define nitrogen fixation and photosynthesis Creating awareness and diagnosis, therapy for cancer 	National developmental needs
13	APPLIED CHEMISTRY	CH550A	<ul style="list-style-type: none"> To inculcate the latest sophisticated analytical techniques To characterize the solid state materials which found applications in day-to-day life. 	<ul style="list-style-type: none"> Gain knowledge about the latest sophisticated analytical techniques Correlate the amount of calcium and magnesium in soil and water Relate and assess the applications of voltammetry Analyse the solid materials which found application in our day-to-day life Understand and analysis of the food products, food adulteration and preservation Develop innovation methods to produce soft water for industrial use and potable water at cheaper cost 	National developmental needs
14	INORGANIC CHEMISTRY - IV	CH545	<ul style="list-style-type: none"> To study the chemistry of coordination compounds and organometallic compounds To understand the chemistry of bioinorganic molecules and chemistry of solids. 	<ul style="list-style-type: none"> Using diverse theories of coordination compounds, students may acquire the fundamentals concepts of ligand types, coordination numbers, and complicated geometries. 	National developmental needs

				<ul style="list-style-type: none"> • Students can differentiate between low spin and high spin complexes, as well as analyze the applications of spectrochemical series, Jahn-Teller distortion, and Trans effect • Students can learn about the various organometallic compounds and their synthetic applications such as Wilkinson catalyst and Fischer-Tropsch reaction • Students will be able to comprehend the significance of nitrogen fixation and cycle, as well as the structure and functions of porphyrin ring systems and metalloenzyme biochemistry. • In solid states, students can describe the fundamental crystal systems and their symmetries. • To get a better understanding of the structural and chemical characteristics of organometallics, which serve as a link between inorganic and organic chemistry. 	
15	PHYSICAL CHEMISTRY - IV	CH641	<ul style="list-style-type: none"> • To know the fundamentals theories that govern the electrolytic conductance in solids and solutions and apply them to solve problems related to it. • To learn about the acids and base equilibria • To know about the different types of electrochemical cells and their importance 	<ul style="list-style-type: none"> • illustrate the concepts of conductance, their measurement and their applications • enumerate the applications of ionic equilibria like buffer, hydrolysis of salts • illustrate the foundations of electrochemistry, the reactions of a cell and different electrodes • apply Nernst equation and also demonstrate the applications of electrochemical series. 	National developmental needs

				<ul style="list-style-type: none"> demonstrate the applications of electrochemistry like Fuel cells 	
16	INDUSTRIAL AND ENVIRONMENT CHEMISTRY	CH642B	<ul style="list-style-type: none"> To introduce the students about industrial extraction processes. The pollution induced by the industrial development and the care towards the environment is focused. 	<ul style="list-style-type: none"> Understand and explain the various processes involved in chemical industries Observe and apply the chemical principles of metallurgical process Compare the causes of various types of pollution its effects and propose to adapt eco-friendly practices to mitigate pollution Survey the extent of aquatic pollution and devise methods to sustain the aquatic ecosystem Observe the factors responsible for aquatic and air pollution and compare them Develop methods to mitigate aquatic and air pollution 	National developmental needs
17	MATERIALS CHEMISTRY	CH642D	<ul style="list-style-type: none"> To understand the basic concepts of crystal structures and their characterization To learn about different properties of solid state materials and their characteristic structural features 	<ul style="list-style-type: none"> Explain and rationalise chemical bonding in the solid state and how structure affects the properties of materials. Understand basic crystallographic and crystal chemical concepts such as unit cells, Bravais lattices and apply the Bragg's equation. Elucidate and contemplate the physical properties of a range of functional materials including superconductors, semi-conductors, ferroelectric and piezoelectric materials Synthesis and analyse of nanomaterials by gas phase and chemical methods. 	National developmental needs

				<ul style="list-style-type: none"> Analyse and understand the size relationships of chemistry of nanomaterials properties and its applications. Evaluate the properties of nanomaterials based on quantum size effect and physical properties and to relate the uses Formulate and validate the chemical and catalytic aspects of nanostructured adsorbent materials. 	
18	CHEMISTRY OF DRUG DESIGN	CH642F	<ul style="list-style-type: none"> Introduce the basic concepts of drug design and discovery process Learn the techniques of SAR/QSAR Introduce the concepts of molecular modeling Introduce the concepts of receptor inhibition and enzyme inhibition in drug design On successful completion of this Course, students will be able to 	<ul style="list-style-type: none"> Explain the general concepts of drug design and discovery Illustrate the essential concepts of SAR/QSAR Explain the different concepts of computer aided drug design Demonstrate how receptors and enzymes can act as targets for drug discovery 	National developmental needs
19	CHEMISTRY LAB WORK - IV PHYSICAL CHEMISTRY EXPERIMENTS	PCH622	<ul style="list-style-type: none"> To understand about physical behaviour of compounds. To impart sound practical knowledge in understanding the reaction pathways and calculations involved in them. 	<ul style="list-style-type: none"> apply the theoretical knowledge to measuring and determining the rate, order, rate constants of chemical reactions use the concept of distribution coefficient Apply the concept of optical activity to measure the rate constant for hydrolysis of sucrose Know and illustrate the working principle and functions polarimeter, conductometer, potentiometer, 	National developmental needs

				<p>colorimeter and pH meter</p> <ul style="list-style-type: none"> • enumerate the basics in electrochemistry and calculate the dissociation constant and equivalent conductance of a given solution • Construct the TC diagram for phenol water system and estimate the CST 	
20	CHEMISTRY OF DRUGS & DISEASES	NCH504	<ul style="list-style-type: none"> • To learn the basic scientific facts about common drugs. • To understand about different types of diseases and their treatments for a healthy living. 	<ul style="list-style-type: none"> • Define the terms used in pharmaceutical chemistry and be able to identify them in day to day life • Identify some common drugs and their uses of specific diseases • Recognize the cause, symptoms of various diseases and learn to apply them • Describe the role of some indian medical plants and their uses and to summarize the benefits of medicinal compounds • Differentiate the types of drugs available and choose to use them appropriately • Understand and analyze the first aid procedures available and plan to utilize them efficiently 	National developmental needs