**UNION CHRISTIAN COLLEGE, ALUVA**

**Department of Chemistry**

**CH1CMT01 – Basic Theoretical and Analytical Chemistry (Complementary-Botany)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Apply the basic knowledge about the atomic structure and chemical bonding | Assignment/Seminar, Test |
| CO2 | Practice the fundamental concepts of chemistry including periodic properties, chemical and ionic equilibrium  | Assignment/Seminar, Test |
| CO3 | Compare and analyze the various analytical techniques involved in the laboratory. | Assignment/Seminar, Test |
| CO4 | Use different types of chromatographic techniques and the principle behind chromatography | Assignment/Seminar, Test |

**CH1CMT01 – Basic Theoretical and Analytical Chemistry (Complementary- Zoology)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Apply the basic knowledge about the atomic structure and chemical bonding | Assignment/Seminar, Test |
| CO2 | Practice the fundamental concepts of chemistry including periodic properties, chemical and ionic equilibrium  | Assignment/Seminar, Test |
| CO3 | Compare and analyze the various analytical techniques involved in the laboratory. | Assignment/Seminar, Test |
| CO4 | Use different types of chromatographic techniques and the principle behind chromatography | Assignment/Seminar, Test |

**CH1CMT01 – Basic Theoretical and Analytical Chemistry (Complementary- Physics)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Apply the basic knowledge about the atomic structure and chemical bonding | Assignment/Seminar, Test |
| CO2 | Practice the fundamental concepts of chemistry including periodic properties, chemical and ionic equilibrium  | Assignment/Seminar, Test |
| CO3 | Compare and analyze the various analytical techniques involved in the laboratory. | Assignment/Seminar, Test |
| CO4 | Use different types of chromatographic techniques and the principle behind chromatography | Assignment/Seminar, Test |

**CH1CRT01 – General and Analytical Chemistry (Core)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Understand the methodology of chemistry  | Assignment/Seminar, Test |
| CO2 | Practice the fundamental concepts of chemistry including periodic properties | Assignment/Seminar, Test |
| CO3 | Apply the basic knowledge about analytical techniques used in chemical laboratory | Assignment/Seminar, Test |
| CO4 | Use different types of chromatographic techniques and the principle behind chromatography | Assignment/Seminar, Test |
| CO5 | Evaluate analytical data  | Assignment/Seminar, Test |

**CH2CMT02-BASIC ORGANIC CHEMISTRY(Complementary-Botany)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Understand the fundamental concepts of organic chemistry  | Assignment/Seminar, Test |
| CO2 | Explain organic reactions (SN1, SN2, E1 and E2) and its mechanism | Assignment/Seminar, Test |
| CO3 | Differentiates stereoisomers and describe stereochemistry of organic compounds  | Assignment/Seminar, Test |
| CO4 | Distinguish between natural and synthetic polymers, evaluate the environmental hazards of polymer revolution and recycling of plastics | Assignment/Seminar, Test |

**CH2CMT02 - BASIC ORGANIC CHEMISTRY(Complementary-Zoology)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Understand the fundamental concepts of organic chemistry  | Assignment/Seminar, Test |
| CO2 | Explain organic reactions (SN1, SN2, E1 and E2) and its mechanism | Assignment/Seminar, Test |
| CO3 | Differentiates stereoisomers and describe stereochemistry of organic compounds  | Assignment/Seminar, Test |
| CO4 | Distinguish between natural and synthetic polymers, evaluate the environmental hazards of polymer revolution and recycling of plastics | Assignment/Seminar, Test |

**CH2CMT02 - BASIC ORGANIC CHEMISTRY(Complementary-Physics)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Understand the fundamental concepts of organic chemistry  | Assignment/Seminar, Test |
| CO2 | Explain organic reactions (SN1, SN2, E1 and E2) and its mechanism | Assignment/Seminar, Test |
| CO3 | Differentiates stereoisomers and describe stereochemistry of organic compounds  | Assignment/Seminar, Test |
| CO4 | Distinguish between natural and synthetic polymers, evaluate the environmental hazards of polymer revolution and recycling of plastics | Assignment/Seminar, Test |

**CH2CRT02 – THEORETICAL AND INORGANIC CHEMISTRY (CORE)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 |  Apply the basic knowledge about the atomic structure | Assignment/Seminar, Test |
| CO2 | Understand various theories of chemical bonding  | Assignment/Seminar, Test |
| CO3 |  Practice the fundamental concepts of chemistry including periodic properties of s-block and p-block elements  | Assignment/Seminar, Test |
| CO4 | Practice the fundamental concepts of chemistry including periodic properties, synthesis method and general characteristics of s-block, p-block, d-block and f-block elements  | Assignment/Seminar, Test |

**CH2CMP01 – VOLUMETRIC ANALYSIS (Complementary-Botany)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Develop basic skill in titration | Test |
| CO2 | Apply the basic principles of volumetric analysis for estimating the amount of analyte in solution  | Test |

**CH2CMP01 – VOLUMETRIC ANALYSIS(Complementary-Zoology)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Develop basic skill in titration | Test |
| CO2 | Apply the basic principles of volumetric analysis for estimating the amount of analyte in solution  | Test |

**CH2CMP01 – VOLUMETRIC ANALYSIS (Complementary-Physics)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Develop basic skill in titration | Test |
| CO2 | Apply the basic principles of volumetric analysis for estimating the amount of analyte in solution  | Test |

**CH2CMP01 – VOLUMETRIC ANALYSIS (Core)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Get practice with acidimetry, alkalimetry, complexometry and redox titrations  | Test |
| CO2 | Able to apply the volumetric knowledge in commercial samples.  | Test |

**CH3CRT03- ORGANIC CHEMISTRY I**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Illustrate the basic concepts of organic reactions, intermediates and their mechanisms. | Assignment/Seminar, Test |
| CO2 | Apply IUPAC nomenclature rules to different organic compounds and their derivatives | Assignment/Seminar, Test |
| CO3 | Appreciating the beauty of stereochemistry of organic molecules in terms of various conformations, configurations and their stability  | Assignment/Seminar, Test |
| CO4 | Distinguish aliphatic, aromatic and nonaromatic hydrocarbons and apply the concepts studied in predicting the products of reactions and its mechanisms. | Assignment/Seminar, Test |
| CO5 | Familiarising the basics of pericyclic reactions with examples  | Assignment/Seminar, Test |

**CH3CMT04: Inorganic and Organic Chemistry (Complementary-Zoology)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Identifying and familiarizing heterocyclic compounds Furan, Pyrrole, Pyridine and Indole and their chemical properties.  | Assignment/Seminar, Test |
| CO2 | Understanding the importance of chemistry and role of metal ions in biological systems  | Assignment/Seminar, Test |
| CO3 | Developing a critical understanding about the role and application of pesticides, fungicides and Insecticides | Assignment/Seminar, Test |
| CO4 | Enhancing the fundamental understanding of nucleus and nuclear forces in terms of nuclear chemistry  | Assignment/Seminar, Test |
| CO5 | Appreciating the chemistry of drugs and its pharmacological applications  | Assignment/Seminar, Test |

**CH3CMT04: Inorganic and Organic Chemistry (Complementary- Botany)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Identifying and familiarizing heterocyclic compounds like Furan, Pyrrole, Pyridine and Indole and their chemical properties.  | Assignment/Seminar, Test |
| CO2 | Understanding the importance of chemistry and role of metal ions in biological systems  | Assignment/Seminar, Test |
| CO3 | Developing a critical understanding about the role and application of pesticides, fungicides and insecticides | Assignment/Seminar, Test |
| CO4 | Enhancing the fundamental understanding of nucleus and nuclear forces in terms of nuclear chemistry  | Assignment/Seminar, Test |
| CO5 | Appreciating the chemistry of drugs and its pharmacological applications  | Assignment/Seminar, Test |

**CH3CMT03 - Physical Chemistry – I (Complementary- Physics)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Understand and study the properties of solids, behaviour of liquids and solutions and gases. | Assignment/Seminar, Test |
| CO2 | Gain basic understanding about the different types of adsorption, colloids – types, properties and applications  | Assignment/Seminar, Test |
| CO3 | Familiarize phase rule and phase equilibria of one and two-component system, Nernst Distribution law and its applications | Assignment/Seminar, Test |

**CH4CRT04- ORGANIC CHEMISTRY II**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Examine the structure and identify the reaction mechanism of organic compounds such as alcohols, diols, and phenols including their applications | Assignment/Seminar, Test |
| CO2 | Distinguish the structure and reaction mechanisms of ethers and epoxides | Assignment/Seminar, Test |
| CO3 | Predict the products and interpret the mechanisms of reactions of carbonyl compounds | Assignment/Seminar, Test |
| CO4 |  Deduce the structure, properties and reaction mechanisms of carboxylic acids, sulfonic acids and its derivatives. | Assignment/Seminar, Test |

**CH4CMT05 - PHYSICAL CHEMISTRY – II (Complementary- Physics)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Apply the basic facts and concepts of spectroscopy. | Assignment/Seminar, Test |
| CO2 | Understand the basics and preparation methods of nanocompounds. | Assignment/Seminar, Test |
| CO3 | Summarize the concepts of kinetics, Catalysis and Photochemistry. | Assignment/Seminar, Test |
| CO4 | Explain and apply the concepts of electrochemistry | Assignment/Seminar, Test |

**CH4CMT06-Advanced Bio-organic Chemistry (Complementary -Zoology)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Examine the structure and identify the physiological activities of various natural product | Assignment/Seminar, Test |
| CO2 | Understanding the various classifications of lipids and soaps, its chemical properties and environmental impact of detergents | Assignment/Seminar, Test |
| CO3 | Deducing the synthesis of amino acids, polypeptides and differentiating various structures of proteins | Assignment/Seminar, Test |
| CO4 |  Recognizes enzymes, cofactors, coenzymes, structure of DNA, RNA and its replication. | Assignment/Seminar, Test |
| CO5 | Identifying energy rich molecules, vitamins, steroids and Hormones, their structure and functions | Assignment/Seminar, Test |
| CO6 | Differentiate carbohydrates, gain detailed understanding of their cyclic structures and the industrial applications of cellulose | Assignment/Seminar, Test |

**CH4CMT06-Advanced Bio-organic Chemistry (Complementary -Botany)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Examine the structure and identify the physiological activities of various natural product | Assignment/Seminar, Test |
| CO2 | Understanding the various classifications of lipids and soaps, its chemical properties and environmental impact of detergents | Assignment/Seminar, Test |
| CO3 | Deducing the synthesis of amino acids, polypeptides and differentiating various structures of proteins | Assignment/Seminar, Test |
| CO4 | Recognizes enzymes, cofactors, coenzymes, structure of DNA, RNA and its replication. | Assignment/Seminar, Test |
| CO5 | Identifying energy rich molecules, vitamins, steroids and Hormones, their structure and functions | Assignment/Seminar, Test |
| CO6 | Differentiate carbohydrates, gain detailed understanding of their cyclic structures and the industrial applications of cellulose | Assignment/Seminar, Test |

**CH4CRP02 - QUALITATIVE ORGANIC ANALYSIS**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Systematically analyse organic compound and preparation of solid derivative  | Test |
| CO2 | To determine the physical constants of solids and liquids – melting and boiling points | Test |
| CO3 | To understand the reactions of various functional groups  | Test |

**CH4CMP03 - Organic Chemistry Practicals (Complementary- Zoology)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Detect the different functional groups of organic compounds | Test |
| CO2 | Examine the physical constants like melting point and boiling point | Test |

**CH4CMP03 - Organic Chemistry Practicals (Complementary- Botany)**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Detect the different functional groups of organic compounds | Test |
| CO2 | Examine the physical constants like melting point and boiling point | Test |

**CH4CMP02 - PHYSICAL CHEMISTRY PRACTICALS**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Determine viscosity, CST, Transition temperature etc  | Test |
| CO2 | Find the heat of neutralization, kinetics of a reaction  | Test |
| CO3 | Estimate the mass of ion or compound using conductometric and potentiometric titrations | Test |

**CH5CRT05-ENVIRONMENT, ECOLOGY AND HUMAN RIGHTS**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Understand the fragility and sensitivity of our environment and the importance of its protection.  | Assignment/Seminar, Test |
| CO2 | Discuss ways to promote environmental awareness  | Assignment/Seminar, Test |
| CO3 | Recognize environmental responsibility and proactive citizenship | Assignment/Seminar, Test |
| CO4 | Understand the concept of Human rights in the context of Indian constitution, UN and Universal environmental treaties  | Discussion/Seminar, Test |

**CH5CRT06– ORGANIC CHEMISTRY -III**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Develop concrete idea about nitrogen containing compounds and their synthesis | Assignment/Seminar, Test |
| CO2 | Recognise the importance of heterocyclic compounds | Assignment/Seminar, Test |
| CO3 | Apply the chemistry of active methylene compounds for the synthesis of non-hetero molecules | Assignment/Seminar, Test |
| CO4 | Develop an aptitude towards the structure, synthesis and industrial applications of carbohydrates  |  |
| CO5 | Understand the structure and synthesis of drugs, polymers and dyes | Assignment/Seminar, Test |

**CH5CRT07 – PHYSICAL CHEMISTRY – I**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Behaviour of ideal gases and the real gases. A deeper look on the distribution of velocities and energies among the molecules, an overview on the collision properties.  | Assignment/Seminar, Test |
| CO2 | Develop a qualitative idea about the intermolecular forces in liquid, to know in detail about viscosity and surface tension and its determination  | Assignment/Seminar, Test |
| CO3 | Review on the nature of solid state, different crystal systems, analysis of cubic crystals, to have a deep idea on the different types of ionic compounds and to know in detail about the liquid crystals.  | Assignment/Seminar, Test |
| CO4 | Discover and analyse the interfacial phenomenon of adsorption, explains different types of adsorptions and its significance, enumerate the nature of colloidal state, its preparation and properties.  | Assignment/Seminar, Test |

**CH5CRT08 - PHYSICAL CHEMISTRY – II**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO 1 | Create a strong foundation in Quantum chemistry | Assignment/Seminar, Test |
| CO 2 | Use scientific knowledge to link experiment with theory | Assignment/Seminar, Test |
| CO 3 | Describe the fundamentals of various spectroscopic techniques  | Assignment/Seminar, Test |
| CO 4 | Apply the basic skills in analyzing and interpreting spectrum | Assignment/Seminar, Test |
| CO 5 | Compare and analyze the basic principles of NMR and ESR spectroscopy  | Assignment/Seminar, Test |

**CH5OPT01 - CHEMISTRY IN EVERYDAY LIFE (OPEN COURSE)**

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| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Understand the basic concepts of Food Additives, Soaps, Detergents and Cosmetics. | Assignment/Seminar, Test |
| CO2 | Describe about Plastics, Paper, Dyes and Drugs | Assignment/Seminar, Test |
| CO3 | Summarize about Nanomaterials and the interdependence between Chemistry and Agriculture | Assignment/Seminar, Test |

**CH6CRT09 - INORGANIC CHEMISTRY**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Apply the knowledge of coordination chemistry for industrially relevant compounds | Assignment/Seminar, Test |
| CO2 | Examine and analyse organometallic compounds | Assignment/Seminar, Test |
| CO3 | Compare and categorize the importance of metals in bioinorganic chemistry | Assignment/Seminar, Test |
| CO4 | Analyse and categorize Boron compounds, Interhalogen and Noble gas Compounds | Assignment/Seminar, Test |

**CH6CRT10– ORGANIC CHEMISTRY -IV**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Introduce students to the world of natural products, lipids, vitamins, steroids and hormones. | Assignment/Seminar, Test |
| CO2 | Familiarize the concepts of amino acids, peptides, proteins, enzymes and nucleic acids | Assignment/Seminar, Test |
| CO3 | Provide an elementary idea about supramolecular chemistry. | Assignment/Seminar, Test |
| CO4 | Basic idea of organic photochemistry | Assignment/Seminar, Test |
| CO5 | Equip the students to interpret spectra of organic molecules using various spectroscopic tools like UV, IR, NMR and Mass. | Assignment/Seminar, Test |

**CH6CRT11-PHYSICAL CHEMISTRY –III**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | To learn in detail about the concepts and applications of thermodynamics. | Assignment/Seminar, Test |
| CO2 | To understand the basic concepts of Chemical, Ionic and Phase Equilibria | Assignment/Seminar, Test |
| CO3 | To get brief idea of Chemical Kinetics | Assignment/Seminar, Test |

**CH6CRT12– PHYSICAL CHEMISTRY – IV**

| CO Number | Description | CO Evaluation methods |
| --- | --- | --- |
| CO1 | Deduce critical knowledge of various binary solutions and their distillation behaviour | Assignment/Seminar, Test |
| CO2 | Apply Nernst distribution law to various system | Assignment/Seminar, Test |
| CO3 | Discuss the concept of chemical potential | Assignment/Seminar, Test |
| CO4 | Apply the electrical conductance and electrochemical cells | Assignment/Seminar, Test |
| CO5 | Analyze the laws of photochemistry  | Assignment/Seminar, Test |
| CO6 | Categorize various molecules into point groups based on group theory | Assignment/Seminar, Test |

**CH6CBT02 - NANOCHEMISTRY AND NANOTECHNOLOGY**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Provide basic understanding of nanomaterials and nanotechnology | Assignment/Seminar, Test |
| CO2 | Insight into the synthetic methodology, properties and applications of nanomaterials.  | Assignment/Seminar, Test |
| CO3 | Inculcate basic knowledge in the characterization techniques of nanomaterials | Assignment/Seminar, Test |
| CO4 | Detailed understanding of applications of nanomaterials in medical, industrial, biotechnology and environmental hazards | Assignment/Seminar, Test |

**CH6CRP04 - ORGANIC PREPARATIONS AND LABORATORY TECHNIQUES**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Operating laboratory techniques like crystallization, distillation, solvent extraction etc. | Test |
| CO2 | Implementing different types of Organic Preparations | Test |
| CO3 | Apply the basis of TLC and column Chromatography to separate a component from a mixture of compounds. | Test |

**CH6CRP03- QUALITATIVE INORGANIC ANALYSIS**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Understand a systematic way of analyzing inorganic mixtures using a semi micro method. | Test |
| CO2 | Identifies and differentiates the cations and anions present in a given mixture two acid and basic radicals  | Test |
| CO3 | Describes the methodologies used for the elimination of radicals from the inorganic mixtures  | Test |

**CH6CRP05 - PHYSICAL CHEMISTRY PRACTICALS**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Analyze the way of determining the viscosity of a solution. | Test |
| CO2 | Use calorimetric method in determining the heat of neutralization | Test |
| CO3 | Apply colligative property in finding the molecular weight solute | Test |
| CO4 | Analyze the concentration of a solution using conductometric and potentiometric titrations | Test |
| CO5 | Prepare graph by plotting experimental results using spreadsheet program | Test |

**CH6CRP06- GRAVIMETRIC ANALYSIS**

|  |  |  |
| --- | --- | --- |
| CO Number | Description | CO Evaluation methods |
| CO1 | Apply gravimetry as a tool for quantitative estimation.  | Test |
| CO2 | Competent enough to perform the quantitative estimation of the metals such as Nickel, Copper, Iron , Barium and radicals such as sulphate gravimetrically | Test |
| CO3 | Able to determine the atomic masses of many elements to four figure accuracy  | Test |