

Department of Chemistry

Bhairab Ganguly College

Course Outcomes – B.Sc. Chemistry

The CBCS Course curriculum of undergraduate Chemistry course is well designed and very promising. The core course would enrich the subject knowledge of the students and increase their level of confidence in both academia and industry. Generic elective subjects make integration among various interdisciplinary fields to fulfill the vision and mission of CBCS Course. The introduction of Skill Enhancement Courses (SEC) would help the students to acquire more powerful knowledge not only in their core Chemistry subject but also in interrelated multidisciplinary subjects both theoretically and practically. Inclusion of the Discipline Specific Courses (DSE) is a big opportunity in front of students to gain knowledge about various naturally and industrially useful materials and also helps them to become familiar and expert in handling different chemistry based software/programme after proper training. In short a student graduated with this type of diverse curriculum would be able to disseminate subject knowledge along with necessary skills to suffice his capabilities for academia, entrepreneurship and industry.

After careful analysis of the course, the department of Chemistry has pointed out the following outcomes of the course.

Course Specific Outcomes – B.Sc. Chemistry (HONOURS)

SEMESTER-I

CEMACOR01T: ORGANIC CHEMISTRY-I:

On completion of the course, students are able to

- Learn the basics concepts of organic chemistry specially on chemical bonding and physical properties.
- Learn about structure and bonding in organic molecules.
- Learn about the effect of electronic displacement in their chemical properties.
- Acquire knowledge about the basic concepts of Molecular Orbital Theory (MO) of organic molecular system.
- Have a concept on the effect of structure on the physical properties of the molecules such as melting point and boiling point etc.

- Learn about basic of different reactive intermediates in the common organic reactions and their generation, stability, and reactivity.
- Know the basic of stereochemistry of Organic molecules.
- Able to identify the symmetry properties of organic molecules and presence of symmetry element in the molecules.
- Learn about Relative and absolute configurations such as E/Z, D/L and R/S of stereoisomers as well as stereocentres.
- Acquire knowledge about Optical activity of chiral compounds and their measurements.
- Also know about the concepts racemisation and resolution of enantiomeric mixtures.

CEMACOR01P: ORGANIC CHEMISTRY-I LAB:

On completion of the course, students are able to

- Learn about the separation of binary organic mixture by solvent extraction method
- Determination of melting point of solid organic compounds and boiling points of liquid organic sample
- Know the experimental procedures of qualitative estimation of solid and liquid pure organic compounds.

CEMACOR02T: PHYSICAL CHEMISTRY-I

This part of the syllabus will help the students to

- Recapitulate the basic concepts of kinetic theory of gas.
- Understand the concept of pressure and temperature of gas from molecular level.
- Understand and calculate collision number, mean free path and frequency of binary collision.
- Gain the concept of Maxwell's speed distribution and its use.
- Recapitulate the basic concepts of thermodynamics.
- Understand the concept and calculate heat, work, internal energy, enthalpy and heat capacities.
- Gain knowledge of different laws of thermodynamics and their application.
- Know about Carnot cycle and its application.
- Recapitulate the basic concepts of chemical kinetics.
- Gain knowledge about order of a reaction and its determination.
- Gain knowledge about kinetics of complex reactions.

CEMACOR02P: PHYSICAL CHEMISTRY-I LAB

On performing the listed experiments students

- Get a clear idea about heat of reaction, procedure of its measurement and calculations involved.
- Acquire the proficiency to perform kinetic study of different chemical reactions and calculate the rate constant.
- Get practical knowledge of how to make buffer solutions.

SEMESTER-II

CEMACOR03T: INORGANIC CHEMISTRY-I

Expected Outcome: Students will gain an understanding of the following topics

- Atomic theory and its evolution.
- Variations of orbital energy with atomic number.
- Properties of elements, atomic radii, ionic radii, size effect of ionic bond etc.
- Modern periodic table and its consequence.
- Physical and chemical characteristics of elements in various groups and periods according to ionic size, charge, etc. and position in periodic table.
- Different theory on acid and base.
- Concept of acid base titration and indicators.
- Balancing a redox reaction in term of ion-exchange method.
- Solubility product concept and its application in qualitative analysis.

CEMACOR01P: INORGANIC CHEMISTRY-I LAB

Upon successful completion students should be able to know the followings:

- How to work effectively as a member of a team.
- How to maintain a detailed scientific notebook.
- How to use of chemicals in a safe and responsible manner.
- Facilitate the learner to make solutions of various molar concentrations. This may include: The concept of the mole; Converting moles to grams; Converting grams to moles; Defining concentration; Dilution of Solutions; Making different molar concentrations.
- Understand the difference between primary and secondary standard substance.
- Determine the amount of a substance in a given sample.

CEMACOR04T: ORGANIC CHEMISTRY-II :

On completion of the course, students are able to

- Learn about of Chirality arising out of stereoaxis such stereoisomerism in allenyl and biphenyl systems.
- Learn the concept of prostereoisomerism and concepts of topicity of ligands, faces.
- Determination of configurational descriptor Pro-R/Pro-S, Pro-E/Pro-Z etc.
- Acquire basic concepts of conformational analysis arising out of C-C bond rotation in organic molecules.
- Understand the Reaction thermodynamics, concepts of enthalpy, entropy, and activation energy of an organic reaction.
- And also the concepts of reaction kinetics such as rate law, rate equation, order and molecularity of a chemical reaction.
- Know the concepts of organic acids and bases and their Pka, Pkb values.
- Learn the concepts of tautomerism show by organic compounds.
- Gain knowledge about the very important substitution/eliminations reaction like SN1, SN2, E1, E2, E1cB etc. and their various aspects.

CEMACOR04P: ORGANIC CHEMISTRY-II LAB:

On completion of the course, students are able to

- Carryout hand on organic chemical reaction in laboratory methods such as Nitration of Organic compounds, Oxidation of Side chain, Hydrolysis of Amide, ester etc.
- Isolation and purification of crude products of the reactions and their % yield calculations.
- Recrystallization and their melting point identification.

SEMESTER-III

CEMACOR05T: PHYSICAL CHEMISTRY-II

On completion of this part of the syllabus students will be able to

- Gain knowledge about different transport processes from molecular level.
- Gain the concept of viscosity of liquids and gases.
- Obtain the knowledge of conductance of electrolytic solutions in detail.
- Perform calculations related to conductance measurement.
- Apply the knowledge of thermodynamics to open systems.
- Gain idea about chemical potential and its application.
- Obtain the concept of chemical equilibrium.
- Know the thermodynamical aspect of chemical equilibrium.
- Gain idea about wave functions and its nature.

- Know different quantum mechanical operators and their applications.
- Obtain knowledge about postulates of quantum mechanics and Schrodinger equation.
- Setup of S.E. for one-dimensional well, particle in a box and find out their solutions.

CEMACOR05P: PHYSICAL CHEMISTRY-II LAB

On performing the listed experiments students

- Can measure the viscosity of a liquid at a particular temperature.
- Can find out equilibrium constant of a reaction by using partition coefficient data.
- Can measure conductance of solutions using a digital conductometer and hence carry out different conductometric titrations.

CEMACOR06T: INORGANIC CHEMISTRY-II

Expected Outcome: Students will gain an understanding of the following topics

- Characterize bonding between atoms, molecules, interaction and energetics.
- Importance of hydrogen bonding, metallic bonding.
- Prediction of geometry of molecules using hybridization concept, VBT and VSEPR theory.
- Defining isotopes, isobar and isotone.
- The concept of molecular orbital theory and radioactivity.
- The actual reason of nuclear stability.

CEMACOR06P: INORGANIC CHEMISTRY-II LAB

Upon successful completion students should have knowledge of the following:

- Iodometric and iodimetric titration principle.
- Component of steel and cement.
- Determination of metal ion component in steel and cement.

CEMACOR07T: ORGANIC CHEMISTRY-III:

On completion of the course, students are able to

- Understand the chemistry and different reactions of alkene and alkynes and their application organic chemistry
- Learn the basic idea of aromatic electrophilic and aromatic nucleophilic substitution reactions and their applications in organic synthesis.
- Know the chemistry of carbonyl compounds and their chemical reactions like nucleophilic/electrophilic additions and their application chemical world.
- Reactions of unsaturated carbonyl compounds and their applications.
- Apply of Green Chemistry approach apart from conventional chemistry for the reduction of chemical pollution out of chemical processes and restoration of natural environmental balance.
- Understand the powerful application of Organometallic reagents such as Grignard reagents, Organo Li, Cu, Zn reagents in organic transformations.

CEMACOR07P: ORGANIC CHEMISTRY-III LAB:

On completion of the course, students are able to

- Carry out Qualitative Analysis of Single Solid Organic Compounds.
- Detect of special elements present in the molecules.
- Detect of functional groups present in the molecules.
- Prepare of derivatives and recrystallization, melting point determination.
- Identification of the Organic Sample by literature survey.

CEMSSEC001– BASIC ANALYTICAL CHEMISTRY

Expected Outcome: Students will gain an understanding of the following topics

- The principles and applications of modern chemical instrumentation, experimental design and data analysis.
- Presentation of experimental data and results, from the point of view of significant figures.
- Concept of pH and pH measurement, Complexometric titrations, Chelation, Chelating agents.
- Identification of adulterants in some common food items like coffee powder, chilli powder, turmeric powder etc.
- Qualitative and quantitative aspect of solvent extraction, chromatographic method of analysis -TLC.
- Be familiar with calculations in analytical chemistry, be able to calculate titration errors for method evaluation, and perform statistical evaluation of results from classical and instrumental chemical experiments and analyses

SEMESTER-IV

CEMACOR08T: PHYSICAL CHEMISTRY-III

On completion of this portion of the syllabus, students will be able to

- Gain concept about ideal solution and its behaviour.
- Apply the concept of thermodynamics in explaining various colligative properties of solutions.
- Apply the observations from colligative properties to calculate molar masses of solutes.
- About the behaviour of ions in solutions.
- Obtain an idea of quantum mechanical concept of angular momentum.

- Have a knowledge of Rigid rotator model of rotation of diatomic molecule and Schrödinger equation.
- Solve the Schrödinger equation of Hydrogen and likewise atoms.
- Have an insight of LCAO-MO treatment of hydrogen molecule.

CEMACOR08P: PHYSICAL CHEMISTRY-III LAB

On performing the listed experiments students

- Can measure emf's of different electrochemical cells using a digital potentiometer and hence calculate standard electrode potentials of various systems.
- Can measure pH of a solution using digital pHmeter and hence perform pH metric titrations.
- Gain a knowledge of practical application of concepts of ionic equilibrium and Debye-Huckel limiting law.
- Can carry out experiments to draw a phase diagram of binary liquid mixture.

CEMACOR09T: INORGANIC CHEMISTRY-III

Expected Outcome: Students will gain an understanding of the following topics

- Predict the purification of metal, study of compounds with emphasis on structure, bonding, preparation and properties.
- Real world applications, shapes etc of noble gas.
- Structural aspects and applications of inorganic polymer.
- Concept of allotropy and catenation.
- General properties of s and p block elements.
- IUPAC nomenclature of coordination complexes and concept of coordination bonding.
- Isomerism in coordination compounds.

CEMACOR09P: INORGANIC CHEMISTRY-III LAB

Upon successful completion students should have knowledge of the following:

- Explain the theoretical principles and important applications of classical analytical methods within complexometric titration.
- Separation of mixture of ions by employing complexometric titration method.
- Concept of hardness in water.
- Synthetic procedure of different synthetic inorganic complex.
- How to create and carry out work up and separation procedures.

CEMACOR10T: ORGANIC CHEMISTRY-IV:

On completion of the course, students are able to

- Have sound knowledge about the chemistry of nitrogen containing organic compounds.
- Chemistry of aliphatic and aromatic Amines, Nitro compounds and their reactions.

- Chemistry of diazonium and related compounds and their applications in chemistry.
- Under the Mechanism with evidence and stereochemical features for the different molecular rearrangements in organic chemistry.
- Have profound knowledge about organic retrosynthesis analysis approach and its application to organic synthesis.
- Gain the concepts of Asymmetric synthesis.
- Would gain sound knowledge about organic spectroscopic methods for structural identification of organic compounds by UV, IR and NMR spectroscopy.

CEMACOR10P: ORGANIC CHEMISTRY-IV LAB:

On completion of the course, students are able to

- Perform the Quantitative Estimations of amino acids, Glucose, Vit-C etc.
- Quantify the amount of phenol, amine provided in a given organic sample by quantitative experimental estimations.

CEMSSEC002–ANALYTICAL CLINICAL BIOCHEMISTRY

Upon successful completion students should have knowledge of the following:

- Biological importance of carbohydrates and isolation and characterization of polysaccharides.
- Classification, biological importance of proteins.
- Structure of protein.
- Nomenclature and characteristics feature of enzyme.
- Structure of DNA (Watson-Crick model) and RNA.
- Identification and estimation of carbohydrate, protein.

SEMESTER-V

CEMACOR11T: INORGANIC CHEMISTRY-IV

Expected Outcome: Students will gain an understanding of the following topics

- Valence bond theory and its consequence.
- Crystal field theory and splitting of different d^n electronic configurations in octahedral, square planar and tetrahedral fields.
- Octahedral site stabilization energy.
- Explaining magnetic properties in the light of crystal field theory.
- Magnetism and origin of color for coordination compounds.
- General comparative studies of 3d, 4d and 5d elements.
- General comparative studies on lanthanides and actinides.

CEMACOR11P: INORGANIC CHEMISTRY-IV LAB

Upon successful completion students should have knowledge of the following:

- Separation of metal ions from a mixture by using chromatographic techniques.
- Principle of gravimetric analysis.
- Gravimetric estimation of different metal ions.
- Measurement of $10Dq$ by spectrophotometric method.
- Determination of λ_{\max} of different metal complexes.

CEMACOR12T: ORGANIC CHEMISTRY-V:

On completion of the course, students are able to

- Understand the basic chemistry and reactions of Polynuclear hydrocarbons and their derivatives.
- Know the chemistry of 5- and 6- member heterocyclic compounds like furan, pyrrole, thiophene, pyridine, quinoline, isoquinoline etc.
- Synthesis and application of furan, pyrrole, thiophene, pyridine, quinoline, isoquinoline in chemistry and biology.
- Concepts of cyclic stereochemistry particularly in cyclohexane system.
- Know the basic principle and applications of atom economic pericyclic reactions such as Diels-Alder reaction, Sigmatropic reactions.
- Chemistry of sugars e.g. mono-saccharides, di-saccharides.
- Chemistry and property of amino acids, Nucleic acids, peptides, proteins, enzymes.

CEMACOR12P: ORGANIC CHEMISTRY-V LAB:

On completion of the course, students are able to

- Perform Chromatographic Separations of mixtures of organic compounds such mixture of amino acids, pigments etc.
- Use TLC, column chromatographic techniques for separation and purification of desired organic compounds in mixture.
- Perform Spectroscopic Analysis of Organic Compounds by using UV, IR, NMR spectral data for structure determination of an unknown organic compounds.

CEMADSE01T: ADVANCED PHYSICAL CHEMISTRY

On completion of this portion of the syllabus, students will be able to

- Provides a deep knowledge of solid state of matter.
- Enables the students to understand the basics of crystallography.
- Imparts knowledge about different crystal structures and perform calculations related to it.
- Provides an introductory knowledge of statistical thermodynamics.

- Gives knowhow about various concepts like thermodynamic probability, canonical ensemble, partition function etc.
- Enables the students to derive expressions for thermodynamical properties using the concept of partition function.

CEMADSE01P: ADVANCED PHYSICAL CHEMISTRY LAB

This portion of the syllabus enables the students to set computer programmes in FORTRAN language based on numerical methods and use them to perform simple calculations and henceforth calculating various results of physical chemistry learnt so far.

CEMADSE02T: ANALYTICAL METHODS IN CHEMISTRY

Expected Outcome: Students will gain an understanding of the following topics

- Familiarization with fundamentals of analytical chemistry.
- The principles and applications of modern chemical instrumentation, experimental design and data analysis.
- Qualitative and quantitative aspect of solvent extraction, chromatographic method of analysis -TLC & HPLC.
- Basics of spectroscopic, thermal, electrochemical techniques.
- Understanding principles of thermo-gravimetric analysis and study of thermal decomposition of materials/characterization of materials.
- Understanding principles of separation technology and its use in advanced instrumentations.

CEMADSE02P: ANALYTICAL METHODS IN CHEMISTRY LAB

Upon successful completion students should have knowledge of the following:

- Separation and identification of the monosaccharides present in the given mixture by paper chromatography.
- Chromatographic separation of the active ingredients of plants, flowers and juices by TLC.
- Extracting the Ni²⁺-DMG complex in chloroform, and determine its concentration by spectrophotometry.
- Biological oxygen demand and chemical oxygen demand.
- Cation exchange resins and anion exchange resins.

SEMESTER-VI

CEMACOR13T: INORGANIC CHEMISTRY-V

Expected Outcome: Students will gain an understanding of the following topics

- Elementary concept of a new area of chemistry i.e. bioinorganic chemistry.

- Predicting metal ion present in biological systems and its toxicity effect.
- Use of chelating agents in medicine.
- Understanding the transition metals stability in reactions.
- Organometallic chemistry and compounds and its applications.
- General principles and properties of catalysts, homogenous catalysis.

CEMACOR13P: INORGANIC CHEMISTRY-V LAB

Upon successful completion students should have knowledge of the following:

- Concept of acid and basic radicals.
- Specific identification procedure for different cations and anions.
- Interfering radicals and its separation.

CEMACOR14T: PHYSICAL CHEMISTRY- IV

On completion of this portion of the syllabus, students will be able to

- Obtain a deep insight of molecular spectroscopy which is subdivided into rotational, vibrational, Raman, NMR and ESR spectroscopy.
- Understand the basics of spectroscopy from classical and quantum mechanical view point.
- Have idea about application of spectroscopy in analysing chemical samples.
- Provides a deep insight on the basic principles of photochemistry and various photochemical processes.
- Explain different photochemical reactions and perform related calculations.
- Make the students to understand the important role of photochemical reactions in biochemical processes.
- Recapitulate their idea about surface tension and surface energy.
- Go deep into the molecular aspect of various surface properties.
- Understand surface phenomenon of adsorption.
- Gain knowledge of colloidal particles, its nature and applications.

CEMACOR14P: PHYSICAL CHEMISTRY- IV LAB

On performing the listed experiments students

- Can determine surface tension of liquids using a stalagmometer
- Can perform kinetic study chemical reactions using colorimeter and spectrophotometer.
- Can find out Critical micellar concentration using both stalagmometer and spectrophotometer.

CEMADSE04T: GREEN CHEMISTRY:

On completion of the course, students are able to

- Understand the basic definition and concepts of Green Chemistry approach in chemistry for prevention of natural environment.
- Know the Principles of Green Chemistry and their application in Designing a Chemical synthesis for clean and green environment.
- Study some Examples of Green Synthesis/ Reactions and some real world cases causing less chemical hazards to society and environment in which we live.
- Know the Future Trends in Green Chemistry for benefit of well being of living world.

CEMADSE04P: GREEN CHEMISTRY LAB:

On completion of the course, students are able to

- Prepare and characterize nanoparticles of gold using tea leaves.
- Preparation of biodiesel from vegetable/ waste cooking oil
- Solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper (II).
- Use of enzymes as catalysts in chemical process e.g. Benzoin condensation using Thiamine Hydrochloride as a catalyst instead of cyanide

CEMADSE05T: INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE

Expected Outcome: Students will gain an understanding of the following topics

- Scientific techniques of industrial Chemistry.
- Educate and train Chemists to acquire a meaningful picture of Chemical industries.
- Understanding composites and their industrial applications.
- Battery components and their role.
- Fuel cells, Solar cell and polymer cell.
- Composition and properties of different types of steels.
- General principles and properties of catalysts, homogenous catalysis.
- Origin of explosive properties in organic compounds.

CEMADSE05P: INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE LAB

Upon successful completion students should have knowledge of the following:

- Determination of free acidity in ammonium sulphate fertilizer.
- Estimation of Calcium in Calcium ammonium nitrate fertilizer.
- Composition of dolomite.
- Analysis of Cement.
- Preparation of pigment (zinc oxide).

Course Specific Outcomes – B.Sc. with Chemistry

Semester-I

CEMGCOR01T, CEMGCOR01P

Students will gain an understanding of the following topics

- Learn the basics concepts of organic chemistry specially on chemical bonding and physical properties.
- Learn about structure and bonding in organic molecules.
- Learn about the effect of electronic displacement in their chemical properties.
- Learn about basic of different reactive intermediates in the common organic reactions and their generation, stability, and reactivity.

- Atomic theory and its evolution.
- Variations of orbital energy with atomic number.
- Properties of elements, atomic radii, ionic radii, size effect of ionic bond etc.
- Modern periodic table and its consequence.
- Concept of acid base titration and indicators.
- Balancing a redox reaction in term of ion-exchange method.
- Facilitate the learner to make solutions of various molar concentrations. This may include: The concept of the mole; Converting moles to grams; Converting grams to moles; Defining concentration; Dilution of Solutions; Making different molar concentrations.
- Understand the difference between primary and secondary standard substance.
- Determine the amount of a substance in a given sample.

SEMESTER-II

CEMGCOR02T, CEMGCOR02P

Upon successful completion students should have knowledge of the following:

- Characterize bonding between atoms, molecules, interaction and energetics.
- Prediction of geometry of molecules using hybridization concept, VBT and VSEPR theory.
- Concept of resonance and predicting the stability on the basis of resonance.
- The concept of molecular orbital theory and radioactivity
- Comparative study of p-block elements.
- Concept of pressure and temperature; Collision of gas molecules etc.

- Deviation of gases from ideal behavior; compressibility factor; Boyle temperature; Andrew's and Amagat's plots etc.
- Surface tension and viscosity measurement.
- Specific qualitative determination of ions from mixture of ions

SEMESTER-III

CEMGCOR03T, CEMGCOR03P

Upon successful completion students should have knowledge of the following:

- Learn the basic idea of aromatic electrophilic and aromatic nucleophilic substitution reactions and their applications in organic synthesis.
- Know the chemistry of carbonyl compounds and their chemical reactions like nucleophilic/electrophilic additions and their application chemical world.
- Reactions of unsaturated carbonyl compounds and their applications.
- Understand the powerful application of Organometallic reagents such as Grignard reagents.
- Intensive and extensive variables; state and path functions.
- First and second laws of thermodynamics.
- Definitions of equilibrium constants (K_P , K_C and K_X) and relation among them.
- Determination of heat capacity of calorimeter for different volumes.
- Determination of enthalpy of ionization of acetic acid.
- Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos etc.
- Study of the solubility of benzoic acid in water.
- Identification of a pure organic compound.

CEMSSEC001– BASIC ANALYTICAL CHEMISTRY

Expected Outcome: Students will gain an understanding of the following topics

- The principles and applications of modern chemical instrumentation, experimental design and data analysis.
- Presentation of experimental data and results, from the point of view of significant figures.
- Concept of pH and pH measurement, Complexometric titrations, Chelation, Chelating agents.
- Identification of adulterants in some common food items like coffee powder, chilli powder, turmeric powder etc.
- Qualitative and quantitative aspect of solvent extraction, chromatographic method of analysis -TLC.

- Be familiar with calculations in analytical chemistry, be able to calculate titration errors for method evaluation, and perform statistical evaluation of results from classical and instrumental chemical experiments and analyses

SEMESTER-IV

CEMGCOR04T, CEMGCOR04P

Expected Outcome: Students will gain an understanding of the following topics

- Concept of ideal and non ideal solutions.
- Effect of impurity on partial miscibility of liquids.
- Nernst distribution law and its applications.
- Phases, components and degrees of freedom of a system.
- Variation of specific and equivalent conductance with dilution for strong and weak electrolytes.
- Faraday's laws of electrolysis.
- Reversible and irreversible cells.
- Primary and secondary standard substances.
- Column chromatography and thin layer chromatography.
- Composition and structure of the atmosphere.
- Green house effect.
- Construction of the phase diagram of a binary system.
- Determination of dissociation constant of a weak acid.

CEMSSEC002–ANALYTICAL CLINICAL BIOCHEMISTRY

Upon successful completion students should have knowledge of the following:

- Biological importance of carbohydrates and isolation and characterization of polysachharides.
- Classification, biological importance of proteins.
- Structure of protein.
- Nomenclature and characteristics feature of enzyme.
- Structure of DNA (Watson-Crick model) and RNA.
- Identification and estimation of carbohydrate, protein.

SEMESTER-V

CEMGDSE02T, CEMGDSE02P

Expected Outcome: Students will gain an understanding of the following topics

- Understand the basic definition and concepts of Green Chemistry approach in chemistry for prevention of natural environment.
- Know the Principles of Green Chemistry and their application in Designing a Chemical synthesis for clean and green environment.
- Study some Examples of Green Synthesis/ Reactions and some real world cases causing less chemical hazards to society and environment in which we live.
- Know the Future Trends in Green Chemistry for benefit of well being of living world.
- Prepare and characterize nanoparticles of gold using tea leaves.
- Preparation of biodiesel from vegetable/ waste cooking oil
- Solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper(II).
- Use of enzymes as catalysts in chemical process e.g. Benzoin condensation using Thiamine Hydrochloride as a catalyst instead of cyanide

SEMESTER-VI

CEMGDSE04T, CEMGDSE04P

Expected Outcome: Students will gain an understanding of the following topics

- Elementary concept of a new area of chemistry i.e. bioinorganic chemistry.
- Predicting metal ion present in biological systems and its toxicity effect.
- Use of chelating agents in medicine.
- Understanding the transition metals stability in reactions.
- Organometallic chemistry and compounds and its applications.
- General principles and properties of catalysts, homogenous catalysis.
- Application of Spectroscopy to Simple Organic Molecules.
- Paper chromatographic separation of Fe^{3+} , Al^{3+} and Cr^{3+} etc.
- Systematic Qualitative Organic Analysis of Organic Compounds.