

**B. Sc. CHEMISTRY**  
**(MODEL I & MODEL II)**  
**(2017 Admissions onwards)**

**PROGRAMME OBJECTIVES (POs)**

The main objective is to provide to the students an in-depth understanding of the basic concepts of chemical sciences and enable them with tools needed for the practice of chemistry, which remains a discipline with much stress on experimentation. It attempts to provide a detailed knowledge of the terms, concepts, methods, principles and experimental techniques of chemistry.

- To provide a broad foundation in chemistry that stresses scientific reasoning and analytical problems.
- To provide students with the skills required to succeed in graduate school, the chemical industry.
- To expose the students to a breadth of experimental techniques using modern instrumentation.
- The student will acquire a foundation of chemistry of sufficient breadth and depth to enable them to understand and critically interpret the primary chemical literature.

**PROGRAMME SPECIFIC OUTCOMES (PSOs)**

- Global level research opportunities to pursue master programmes in chemistry or industrial chemistry across the globe.
- Clear to Joint Admission for Masters (JAM) exam conducted by IITs, IISc and IISERs and other entrance exams pursue master degree or integrated Ph. D. programmes in reputed institutes or universities in India.
- Job opportunities at all level of chemical, pharmaceutical, food products, material

- and plastic industries.
- Chemistry specific competitive exams conducted by government bodies.

## **COURSE OUTCOMES (COS)**

### **B.Sc Chemistry (CORE COURSES)**

#### **SEMESTER I**

#### **GENERAL AND ANALYTICAL CHEMISTRY (CHE1CRT0117)**

- To be able to identify and describe methods within the philosophy of science like observation, induction, scientific explanations and rationality.
- To demonstrate an understanding of the limits and possibilities for research in science.
- To be able to analyze the structure of atom.
- To be able to have an understanding of subatomic particles and their interaction with electromagnetic radiation.
- To be able to calculate the radius, velocity and energy associated electrons and analyze the fine structure of one electron systems.
- Understand and evaluate the development and need for the periodic table and identify the properties and locations of families on the periodic table.
- To predict the properties like atomic, ionic, covalent and Van der waals radii, electro positivity, electronegativity, electron affinity, ionization energy etc along a period and down the group in the periodic table.
- To analyze the exceptions and other unusual change in properties in the periodic table by a cause effect strategy.
- To evaluate the properties of various blocks of elements in the periodic table.
- To evaluate data derived from analysis.
- To evaluate the importance of significant digits and there by finding the error limits in analysis.
- To understand acid-base reactions, redox reactions, complexometric reactions and apply them in quantitative analysis of compounds or ions.
- To analyze the cause of radioactivity and its application in finding the age of samples.

## **SEMESTER II**

### **THEORETICAL AND INORGANIC CHEMISTRY (CHE2CRT0117)**

By the end of this students will be able to:

- Understand and analyze the common themes running through ionic, covalent and metallic descriptions of chemical bonding.
- Understand and evaluate how the concept of electronegativity and its variation over the periodic table can be used to rationalize the nature of the bonding in substances.
- Evaluate and appreciate how chemical substances can be described and classifies in terms of structure and bond type.
- Understand and analyze the secondary bonding interactions.
- Apply the strategies of bonding to interhalogens and noble gases and predict their structures.
- Understand the basic metallurgical processes.
- Understand and analyze the importance of metal ions in the body.
- Understand and evaluate the transport of oxygen and nutrients to body.
- Understand the essential metal ions in our body, various metalloenzymes and recognize their role.

### **SEMESTER I AND II - CORE CHEMISTRY PRACTICALS**

#### **VOLUMETRIC ANALYSIS (CHE1CRP0117/CHE2CRP0117)**

After the end of first two semesters, the students

- Acquire thorough knowledge on the basics principles behind volumetric analysis.
- Will be able to decide the choice of indicator for different volumetric estimations.
- Will be confident to make solutions of desired concentration for estimation of any unknown acid/base.

- Will be efficient in determining the hardness of water.
- Will be able to ascertain the Ca content in various food products and thereby hinting about adulteration if any.
- Will be able to quantify the amount of Fe present in various salts/minerals encountered in routine life.
- Will be able to quantify the presence of oxidizing/reducing agents by redox titration.

### **SEMESTER III**

#### **ORGANIC CHEMISTRY - I: (CHE3CRT0117)**

When this course is successfully completed, the learners would have acquired first-hand information and knowledge on –

- Nomenclature of Organic compounds.
- Types of Reactions, Types of Reagents, Reactive Intermediates and Electron Displacement Effects.
- Aliphatic and aromatic hydrocarbons and halides
- Aromaticity and various types of aromatic compounds.
- Stereochemistry of Organic compounds.
- Pericyclic reactions

### **SEMESTER IV**

#### **ORGANIC CHEMISTRY - II: (CHE4CRT0117)**

When this course is successfully completed, the learners would have acquired first-hand information and knowledge on –

- Preparation and properties of alcohols, diols, triols and phenols.
- Preparation and properties of Carbonyl compounds and some of their condensation reactions.
- Preparation and properties of Carboxylic acids, Sulphonic acids and their derivatives.
- Uses of some synthetic organic reagents.
- Introductory organometallic compounds

## **SEMESTER III AND IV CORE CHEMISTRY PRACTICALS**

### **ORGANIC CHEMISTRY PRACTICALS I: QUALITATIVE ORGANIC ANALYSIS (CHE3CRP0117/CHE4CRP0117)**

- To gain experience in the identification of organic compounds.
- Determine the functional group of an unknown compound by using different classification tests.
- Know the fundamental principles of chemistry of various types of organic reactions and mechanism of organic reactions.
- Able to write down the structure of different organic compounds like carboxylic acids, amines, amides, esters, aldehydes, ketones, phenols etc.
- Understand the preparation of a derivative for a given organic compound.
- Understand the physical properties of organic compounds.

## **SEMESTER V**

### **ENVIRONMENTAL STUDIES AND HUMAN RIGHTS (CHE5CRT0117)**

- Understand the importance of environmental and ecological protection
- Gain knowledge of methods in solving environmental problems.
- Apply methodologies to analyze and understand interactions between social and environmental processes.
- Practice a green strategy and promote among others the need for environmental protection.
- Understand the various forms of pollutions and methods to minimize them.
- Understand the rights and duties prescribed in the constitution.
- Understand the need for human rights and analyze the role of human rights commissions.
- Understand the rights of women and children.

### **ORGANIC CHEMISTRY - III (CHE5CRT0217)**

When this course is successfully completed, the learners would have acquired first-hand information and knowledge on –

- Organic compounds with functional groups containing nitrogen atoms, their preparation, properties and applications.
- Interpretation of spectroscopic data of simple compounds and their structures.
- Organic photochemical reactions.
- Idea on the structure and synthesis of organic polymers, Drugs, Dyes.
- Synthetic organic reagents containing active methylene compounds.
- Basic heterocyclic chemistry.

### **PHYSICAL CHEMISTRY - I (CHE5CRT0317)**

At the end of the course, the student will be able to:

- Explain the properties and characteristics of three states of matter.
- Develop a detailed understanding of different types of crystal systems.
- Acquainted with surface phenomena, their importance and properties of colloids.
- Solve numerical problems related to states of matter, adsorption etc.

### **PHYSICAL CHEMISTRY - II (CHE5CRT0417)**

After the end of the course, the student will be able to:

- Solve Schrodinger equation.
- Understand the basic principles and the physical implications of quantum mechanics
- Interpret and explain basic principles of microwave, IR, UV-Visible, ESR and mass spectroscopy.
- Predict the signals observed in the rotational, vibrational , electronic and NMR spectrum of various materials.
- Solve numerical problems related to different spectroscopic methods.

### **SEMESTER V: OPEN COURSE**

## **CHEMISTRY IN EVERYDAY LIFE (CHE5COT0117)**

- Familiarize with the food additives, soaps and detergents and cosmetics.
- Recognize the role of chemistry in day to day life.
- Evaluate the role of chemistry with regard to medicines.
- Evaluate the role of chemistry with regard to agriculture.
- Understand nanomaterials and their applications in diagnosis and treatment.

## **NANOSCIENCE AND NANOTECHNOLOGY (CHE5COT0217)**

- Understand the basic principles of nanotechnology
- Knowledge about various instruments used to characterize nanomaterials.
- Understand nanomaterials and their applications in diagnosis and treatment.
- Relate nanomaterials with technology development.

## **SEMESTER VI**

### **INORGANIC CHEMISTRY (CHE6CRT0117)**

- Understand various ligands and analyze their various modes of coordination to the metal centers.
- Understand and analyze various theories of bonding in coordination compounds and predict their spectral and magnetic properties.
- Examine various reaction mechanisms associated with coordination complexes.
- Understand organometallic chemistry and its applications in hydrogenation reactions.

- Understand the preparation and structure of metal carbonyl compounds and their importance.
- Recognize basic inorganic chemistry in biological systems.
- Recognize the importance of boron, interhalogen and noble gas compounds

### **ORGANIC CHEMISTRY - IV: (CHE6CRT0217)**

When this course is successfully completed, the learners would have acquired first-hand information and knowledge on -

- Terpenoids, steroids, alkaloids, vitamins, lipids, Hormones - their classification, properties and structure.
- Amino acids, proteins, nucleic acids and enzymes - their classification, properties.
- Understand the fundamentals of supramolecular chemistry
- Recognize certain strategies of photo induced organic reactions.
- Perform simple structure elucidation of organic compounds using the spectroscopic techniques of UV, IR, NMR and Mass.

### **PHYSICAL CHEMISTRY - III (CHE6CRT0317)**

After the end of the course, the student will be able to

- Analyse different laws of thermodynamics.
- Describe various thermodynamic properties such as entropy, enthalpy, spontaneity of physical and chemical changes.
- Describe the significance of  $\Delta G$  for physical and chemical changes.
- Explain the basic concept of phase rule and its applications.
- Interpret phase diagram of simple eutectic systems
- Describe rate laws and factors affecting rate of the reaction
- Determine the order and molecularity of any reaction.
- Describe the effect of a catalyst on rate of reaction.

## **PHYSICAL CHEMISTRY - IV (CHE6CRT0417)**

After this, the student will be able to

- Discuss the properties of solutions and various methods of expressing concentrations of solutions
- Explain applications of colligative properties.
- Differentiate between ideal and non-ideal solution and to understand the significance of Critical solution temperature.
- Distinguish between fractional distillation, steam distillation and its applications.
- Explain various terms such as specific conductance, equivalent conductance and molar conductance
- Understand the applications of conductometric measurements.
- Explain the representation and working of different electrochemical cells.
- Understand the thermodynamic significance of cell potential
- Know the applications of emf measurements.
- Get an idea about different types of corrosion and its prevention.
- Identify most important photochemical reactions and principles of photochemistry.
- Make out distinction between symmetry of different molecules.

## **SEMESTER V & VI PRACTICALS**

### **QUALITATIVE INORGANIC ANALYSIS (CHE5CRP0117/CHE6CRP0117)**

- Adequate understanding of reactions of cationic and anionic radicals with a view to their identification and confirmation.
- Acquire the Skill to analyze qualitatively the mixtures containing acid and basic radicals.
- Attain competency to systematically analyze mixtures of acid and basic radicals containing one interfering radical by Semi-micro method.

**ORGANIC PREPARATIONS & BASIC LABORATORY TECHNIQUES  
(CHE5CRP0217/CHE6CRP0217)**

- Acquire ample expertise in Basic laboratory techniques such as Crystallisation, Distillation, Solvent extraction, Separation and Purification
- Competent enough to perform organic reactions involving Oxidation, Hydrolysis, Nitration, Halogenation, Acylation, Esterification, Side chain oxidation, condensation etc.
- Trained to perform separation and identification of organic compounds using TLC and Column Chromatography.
- Acquire knowledge on Rf value.

**PHYSICAL CHEMISTRY PRACTICALS (CHE5CRP0317/CHE6CRP0317)**

- Students will have a firm foundation in the fundamentals and application of current chemical and scientific theories in physical chemistry.
- Students will be able to explore new areas of research in both chemistry and allied fields of science and technology.
- Students will gain an understanding of chemical kinetics and able to determine the order of chemical reactions.
- Able to handle viscometer in order to measure the viscosity of an unknown solution
- Gain knowledge on heat of solution and neutralization.
- Acquire knowledge on electrochemical cells using conductometric and potentiometric titrations and able to measure the concentration of an unknown sample.
- Gain knowledge on transition temperature and able to measure it.

**GRAVIMETRIC ANALYSIS (CHE6CRP0417)**

- Competent enough to perform the quantitative estimation of the metals such as Nickel, Copper, Iron, Barium and radicals such as sulphate gravimetrically.

## **SEMESTER VI: CHOICE BASED COURSES**

### **POLYMER CHEMISTRY (CHE6CBT0117)**

- Understand the need for polymers in everyday life.
- Analyze various mechanisms for the formation of polymers.
- Understand the reactions and properties of polymers.
- Gain basic knowledge about carbon based polymers.

### **NANOCHEMISTRY AND NANOTECHNOLOGY (CHE6CBT0217)**

- Understand the basic principles of nanotechnology
- Knowledge about various instruments used to characterize nanomaterials.
- Understand nanomaterials and their applications in diagnosis and treatment.
- Relate nanomaterials with technology development.
- Understand electrical and optical properties of nanomaterials.

## **B. Sc. CHEMISTRY (COMPLEMENTARY COURSES)**

### **SEMESTER I**

#### **BASIC THEORETICAL AND ANALYTICAL CHEMISTRY (CHE1CMT0117)**

When this course is successfully completed, the learners would have the acquired following:

- Adequate understanding of the fundamentals and concepts of quantum

chemistry

- Insight into the types and theories of chemical bonding and bonding interactions.
- Strong understanding on the periodic properties of elements table and ability to identify locations of elements and their families on the periodic table.
- The knowledge and understanding of the basic tools of importance to analytical chemists.
- To calculate the relative strengths of acids and bases
- To apply and calculate the concentration of solutions by various units.
- Awareness on laboratory safety and first aid.
- Acquaintance on Laboratory Operations
- Knowledge on reporting of Analytical Data: the importance of significant digits and there by finding the error limits in analysis.
- Understand various methods of analysis
- Knowledge on the basic principle and application of various separation and chromatographic purification techniques.

## **SEMESTER II**

### **BASIC ORGANIC CHEMISTRY (CHE2CMT0117)**

At the end of this, the learners would have the acquired following

- Knowledge to name the organic compounds according to IUPAC.
- Understanding of the different Types of organic reactions.
- Understand the reaction mechanisms of organic reactions and their applications.
- To identify the Stereochemistry of Organic Compounds.
- Understanding of Geometrical Isomerism, Optical Isomerism and Conformations.
- Knowledge on the various Classifications of polymers.
- Understand the distinction between plastics, elastomers and fibres.
- Knowledge on Polymerization reactions and biodegradable polymers.
- Awareness on the biodegradability of polymers and environmental hazards.

**SEMESTER III**  
**INORGANIC AND ORGANIC CHEMISTRY (CHE3CMT0117)**

(For students who have opted Life Sciences as core)

- Attained insight into the cause of radioactivity.
- Understand the applications of radioactivity in Tracer techniques, Radio diagnosis and radiotherapy.
- Develop deep insight into the thermodynamics of living cell.
- Acquainted the metal ions in biological systems and their biochemistry.
- Recognize the various types of fertilizers such as NPK, superphosphates, triple super phosphate, micronutrients etc.
- Understand the various classifications and sub classifications of pesticides.
- Understand the concept of aromaticity applied to heterocyclic compounds.
- Understand the preparation, properties and structure of various heterocyclic compounds.
- Acquire knowledge of the Classification, Structure, therapeutic uses and mode of action of various classes of drugs; their addiction and abuse alongside prevention and treatment.
- Familiarize with the chemistry of food Additives and Cosmetics.

**PHYSICAL CHEMISTRY - I (CHE3CMT0217)**

(For students who have opted Physical Sciences as Main)

After the end of the course, the student will be able to

- Explain the properties and characteristics of three states of matter.
- Analyse the differences between solids, liquids and gases.
- Develop a detailed understanding of different types of crystal systems.
- Familiarize the concepts about the three states of matter.
- Evaluate the surface phenomena, their importance and characteristics of colloids and how they can be applied in day to day life.
- Solve problems related to three states of matter, adsorption etc.

## **SEMESTER IV**

### **ADVANCED BIO-ORGANIC CHEMISTRY (CHE4CMT0117)**

(For students who have opted Life Sciences as core)

- Attained insight into the chemistry of natural products such as Terpenoids and Alkaloids.
- Understand the chemistry of fats, oils and waxes and their chemical distinction.
- Recognize the distinction between soaps and detergents; their classification and cleansing action.
- Acquire knowledge on the various classification, synthesis and general characteristics of aminoacids.
- Understand the different levels of structural organization of protein- Denaturation of proteins – Tests for proteins.
- Broad understanding of Nomenclature, classification and characteristics of enzymes, the theories of enzyme action; nucleic acid.
- Strong understanding of the fundamentals of carbohydrate chemistry.
- Understand the classification, structure, biological functions and deficiency diseases of steroids, vitamins and hormones.

### **PHYSICAL CHEMISTRY - II (CHE4CMT0217)**

(For students who have opted Physical Sciences as Main)

After the end of this, the student will be able to

- Explain basic principles of microwave, IR, UV-Visible, and rotational spectroscopy.
- Predict which signals are to be observed in the rotational, vibrational, electronic and NMR spectrum of various materials ranging from single to large molecules.
- Solve problems related to different spectroscopic methods.
- Discuss how spectroscopic methods are used for qualitative and quantitative analysis.

- Explain the basic principles of nanochemistry and its application
- Explain different varieties of electrodes, electrolytic cells etc.
- Discuss the principles behind potentiometric and conductometric titrations
- Acquire knowledge in chemical kinetics and basics of photochemistry.

## **COMPLEMENTARY PRACTICALS**

### **SEMESTER I & II**

#### **VOLUMETRIC ANALYSIS (CHE1CMP0117/CHE2CMP0117)**

(Common to Physical sciences and Life sciences)

When this course is successfully completed, the learners would have acquired the basic knowledge on -

- Acquire thorough knowledge on the basic principles/chemical changes that occur during a strong acid/strong base titration.
- Acquire thorough knowledge on the chemical change that occur during a weak acid/strong base (or strong acid/weak base) titration.
- Will be able to decide the choice of indicator for different volumetric estimations
- Will be confident to make solutions of desired concentration for estimation of any unknown acid/base
- Will be able to calculate the concentration in terms of molarity and hence the amount of an unknown acid/base in the given solution.
- Acquire thorough knowledge on the basic principle and chemical changes of redox titrations/redox indicators.
- Acquire thorough knowledge on oxidizing and self-indicating nature of  $\text{KMnO}_4$  in presence of acid medium.
- Will be able to calculate the concentration of an unknown  $\text{Fe}^{2+}$  solution using standard dichromate solution with the help of external and internal indicators.
- Will be able to determine the concentration of oxidising agents through indirect process involving iodine as the intermediary. In the presence of iodine, the thiosulphate ions oxidise quantitatively to the tetrathionate

ions.

## **SEMESTER III & IV**

### **ORGANIC CHEMISTRY PRACTICALS (CHE3CMP0117/CHE4CMP0117)**

(For students who have opted Biological Sciences as Main)

- To gain experience in the identification of organic compounds.
- Determine the functional group of an unknown compound by using different classification tests.
- Know the fundamental principles of chemistry of various types of organic reactions and mechanism of organic reactions.
- Able to write down the structure of different organic compounds like carboxylic acids, amines, amides, esters, aldehydes, ketones, phenols etc.
- Understand the preparation of a derivative for a given organic compound.
- Understand the physical properties of organic compounds.

### **PHYSICAL CHEMISTRY PRACTICALS (CHE3CMP0217/CHE4CMP0217)**

(For students who have opted Physical Sciences as Main)

- Students will have a firm foundation in the fundamentals and application of current chemical and scientific theories in physical chemistry.
- Students will be able to explore new areas of research in both chemistry and allied fields of science and technology.
- Students will gain an understanding of chemical kinetics and able to determine the order of chemical reactions.
- Able to handle viscometer in order to measure the viscosity of an unknown solution
- Gain knowledge on heat of solution and neutralization.
- Acquire knowledge on electrochemical cells using conductometric and potentiometric titrations and able to measure the concentration of an unknown sample.
- Gain knowledge on transition temperature and able to measure it.

## **B. Sc. INDUSTRIAL CHEMISTRY MODEL -II**

## **SEMESTER I**

### **INDUSTRIAL ASPECTS OF INORGANIC AND ORGANIC CHEMISTRY (CHE1CMT0217)**

At the end of this course the student should be able to:

- Recognize different fuels, their properties and applications.
- Understand the basic properties of fuels.
- Explain the chemistry underlying the properties and reactions of various food components
- Explain the principles behind analytical techniques associated with food.
- Select the appropriate analytical technique when presented with a practical problem.
- Identify various metals and alloys that are industrially applied.
- Select appropriate type of material for specific application.
- To understand/predict the behavior of a metallic material to a certain application.
- Understand the basic principles of nanotechnology
- Recognize various classes of nanomaterials and their applications.

## **SEMESTER II**

### **CHEMICAL INDUSTRIES AND INDUSTRIAL ASPECTS OF PHYSICAL CHEMISTRY (CHE2CMT0217)**

By the end of this, the student should be able to:

- Explain the relationship between polymer properties (thermal, rheological, mechanical), and polymer microstructure and molecular weight.
- Relate polymer properties to their processing and uses.
- Explain methods for determining the microstructure and molecular weight of polymers and describe the significance of polymer solubility, melting point and glass transition temperature.
- Make students aware of water pollution and to familiarize them with water purification tests

- Recognize different water quality standards, water treatment methods and purifiers.
- Provide basic knowledge about catalysts, their preparation and characterization,
- Recognize catalysts used for chemical, pharmaceutical and environment applications.
- Recognize various energy storage systems.

### **SEMESTER I & II PRACTICAL**

#### **INDUSTRIAL INORGANIC CHEMISTRY PRACTICAL (CHE1CMP0217/CHE2CMP0217)**

At the end of this course the student should be able to:

- Design, carry out and analyse the various experiments in industrial inorganic and organic chemistry.
- Perform the basic purification and separation experiments like distillation chromatography etc.
- Carry out hands on training in water analysis, ore analysis and alloy analysis.
- Identify the components present in various cement samples.
- Find out the percentage of acetic acid in vinegar and Iron in Mohrs Salt.

### **SEMESTER-III**

#### **UNIT OPERATIONS IN CHEMICAL INDUSTRY (CHE3CMT0317)**

At the end of the course, the students will be able to:

- Learn the basic concepts of process of various unit operations in chemical industry
- Perform distillation, crystallation etc.
- Design columns for separation purposes.
- Purify materials through distillation, crystallation, filtration etc.

#### **UNIT PROCESSES IN ORGANIC CHEMICALS MANUFACTURE (CHE3CMT0417)**

At the end of the course, the students will be able to:

- Understand the basic idea of various unit operations
- Identify the appropriate unit operations involved in process of manufacture of various materials
- Identify suitable unit operations in chemical industries.
- Apply the basic concepts for the development of different industrially important materials.

## **SEMESTER IV**

### **INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS - I (CHE4CMT0317)**

- Acquire a working knowledge of analytical instruments like UV-Visible spectroscopy, AAS, HPLC, GC etc.
- Demonstrate knowledge of sampling methods for all states of matter.
- Integrate a fundamental understanding of the underlining physics principles as they relate to specific instrumentation used for atomic, molecular, and mass spectrometry, and chromatography
- Understand and be able to apply the theory and operational principles of analytical instruments.
- Distinguish between qualitative and quantitative measurements and be able to effectively compare and critically select methods for elemental and molecular analysis.

## **SEMESTER IV**

### **INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS-II (CHE4CMT0417)**

- To provide working knowledge of analytical instrumentation like Surface analysis, thermogravimetric analysis, SFC, Polarimetry etc.
- To provide the student with an appreciation of the relative strengths and limitations of different instrumental based analysis methods.
- To provide the basic practical knowledge relevant to the analysis
- To develop an understanding of the range and theories of instrumental methods available in analytical chemistry.

- To develop knowledge pertaining to the appropriate selection of instruments for the successful analysis of complex mixtures.
- To develop an understanding of the role of the chemist in measurement and problem solving in chemical analysis.
- To provide an understanding of and skills in advanced methods of separation and analysis.
- To provide practical experience in selected instrumental methods of analysis.

### **SEMESTER III & IV PRACTICALS**

#### **INDUSTRIAL ORGANIC CHEMISTRY PRACTICAL (CHE3CMP0317/CHE4CMP0317)**

- At the end of the course, the students will be able to:
  - Be able to design and carryout various unit processes involving Nitration, Sulphonation, Hydrolysis, Oxidation and Halogenation.
  - To synthesise different polymers.
  - To determine the acid value, saponification value and iodine value of different oils.
  - To carry out hands-on training in the synthesis of soap.
  - To estimate the aspirin content in the given tablet.
  - To get hands-on training in the analysis of adulterants present in turmeric powder, milk and mustard oil.
  - To perform various purification methods of an organic compounds. (Thin Layer Chromatography and Column Chromatography).

#### **INDUSTRIAL PHYSICAL CHEMISTRY PRACTICAL (CHE3CMP0417/CHE4CMP0417)**

At the end of the course, the students will be able to:

- Acquire the foundation in the fundamentals and applications of Physical Chemistry.
- Explore the fundamentals of colorimetry.
- Perform conductometric and potentiometric titration.
- Find out the flash and fire point of an oil.

- Perform viscosity measurement with the help of Ostwald viscometer.
- Perform experiments related to surface tension and refractive index.

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