

## **Course Outcomes**

### **SEMESTER – I**

#### **Course I (Inorganic & Physical Chemistry)**

##### **Course outcomes:**

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

1. Understand the basic concepts of p-block elements
2. Explain the difference between solid, liquid and gases in terms of intermolecular interactions.
3. Apply the concepts of gas equations, pH, and electrolytes while studying other chemistry courses.

### **LABORATORY COURSE -I**

#### **Practical-I Analysis of SALT MIXTURE**

##### **Course outcomes:**

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

1. Understand the basic concepts of qualitative analysis of inorganic mixture
2. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
3. Apply the concepts of common ion effect, solubility product and concepts related to qualitative analysis

### **SEMESTER – II**

#### **Course II – (Organic & General Chemistry)**

##### **Course outcomes:**

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

1. Understand and explain the differential behavior of Organic compounds based on fundamental concepts learnt.
2. Formulate the mechanism of organic reactions by Recalling and correlating the fundamental properties of the reactants involved.
3. Learn and identify many organic reaction mechanisms including Free Radical

Substitution, Electrophilic Addition and Electrophilic Aromatic Substitution.

4. Correlate and describe the stereochemical properties of organic compounds and reactions.

## **LABORATORY COURSE-II**

### **Practical-II Volumetric Analysis**

#### **Course outcomes:**

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

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
2. Understand and explain the volumetric analysis based on fundamental

Concepts learnt in ionic equilibria

3. Learn and identify the concepts of a standard solutions, primary and secondary standards
4. 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.

## **SEMESTER - III**

### **Course III (ORGANIC CHEMISTRY & SPECTROSCOPY)**

#### **Course outcomes:**

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

1. Understand preparation, properties and reactions of halo alkanes, halo arenes and Oxygen containing functional groups.
2. Use the synthetic chemistry learnt in this course to do functional group transformations.
3. To propose plausible mechanisms for any relevant reaction

## **LABORATORY COURSE -III**

### **Practical Course-III Organic preparations and IR Spectral Analysis**

#### **Course outcomes:**

Upon the completion of the course, the student will be able to do the following:

1. how to use glassware, equipment and chemicals and follow experimental procedures in the laboratory
2. how to calculate limiting reagent, theoretical yield, and percent yield
3. how to engage in safe laboratory practices by handling laboratory glassware, equipment, and chemical reagents appropriately
4. how to dispose of chemicals in a safe and responsible manner
5. how to perform common laboratory techniques including reflux, distillation, recrystallization, vacuum filtration.
6. how to create and carry out work up and separation procedures
7. how to critically evaluate data collected to determine the identity, purity, and percent yield of products and to summarize findings in writing in a clear and concise manner.++++

## **SEMESTER - IV**

### **Course IV (INORGANIC, ORGANIC, AND PHYSICAL CHEMISTRY)**

#### **Course outcomes:**

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

1. To learn about the laws of absorption of light energy by molecules and the subsequent photo chemical reactions.
2. To understand the concept of quantum efficiency and mechanisms of photochemical reactions.

#### **LABORATORY COURSE -IV**

### **Practical Course-IV Organic Qualitative Analysis**

#### **Course outcomes:**

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

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
2. Determine melting and boiling points of organic compounds
3. Understand the application of concepts of different organic reactions studied in theory part of organic chemistry

## **SEMESTER - IV**

### **Course V (INORGANIC & PHYSICAL CHEMISTRY)**

#### **Course outcomes:**

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

1. Understand concepts of boundary conditions and quantization, probability distribution, most probable values, uncertainty and expectation values
2. Application of quantization to spectroscopy.
3. Various types of spectra and their use in structure determination.

## **SEMESTER - IV**

### **Course V LABORATORY COURSE**

#### **Practical-Course –V Conductometric and Potentiometric Titrimetry.**

##### **Course outcomes:**

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

1. Use glassware, equipment, and chemicals and follow experimental procedures in the laboratory
2. Apply concepts of electrochemistry in experiments
3. Be familiar with electroanalytical methods and techniques in analytical chemistry which studies an analyte by measuring the potential ( volts) and/or current ( amperes) in an electrochemical cell containing the analyte.

## **SEMESTER – V**

### *Course6-A: Synthetic Organic Chemistry*

##### **Course outcomes:**

Students after successful completion of the course will be able to:

1. Identify the importance of reagents used in the synthesis of organic compounds.
2. Acquire knowledge on basic concepts indifferent types of pericyclic reactions.
4. Understand the importance of retro synthesis in organic chemistry.
5. Comprehend the applications of different reactions in synthetic organic chemistry.

### *Course6-A: Synthetic Organic Chemistry-PRACTICAL SYLLABUS*

#### **IV. Learning Outcomes:**

On successful completion of this practical course, student shall be able to:

1. Perform the organic qualitative analysis for the detection of N, S and halogens using the green procedure.
2. Learn the procedure for the separation of mixture famine acids using paper Chromatography.
3. Prepare the TLC plates for TLC chromatography.
4. Acquire skills in conducting column chromatography for the separation of dyes in the given mixture.

### *Course7-A: Analysis of Organic Compounds*

##### **Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Identify the importance of mass spectrometry in the structural elucidation of organic compounds.
2. Acquire the knowledge on structural elucidation of organic compounds.
3. Understand various chromatography methods in the separation and identification of organic compounds.
4. Demonstrate the knowledge gained in solvent extraction for the separate the organic compounds.

### ***Course7-A: Analysis of Organic Compounds - PRACTICAL SYLLABUS***

#### **Learning Outcomes:**

On successful completion of this practical course, student shall be able to:

1. Prepare acetanilide using the green synthesis.
2. Demonstrate the preparation of anazodye.
3. Acquire skills in the separation of organic compounds in the given mixture using solvent extraction

### ***Course6-B: Analytical Methods in Chemistry-1***

#### **Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Identify the importance of solvent extraction and ion exchange method.
2. Acquire knowledge on the basic principles of volumetric analysis and gravimetric analysis.
3. Demonstrate the usage of common laboratory apparatus used in quantitative analysis.
4. Understand the theories of different types of titrations.
5. Gain knowledge on different types of errors and their minimization methods.

### ***Course6-B: Analytical methods in chemistry-1-PRACTICAL SYLLABUS***

#### **Learning Outcomes:**

On successful completion of this practical course, student shall be able to:

1. Estimate Iron(II) using standard Potassium dichromate solution
2. Learn the procedure for the estimation of total hardness of water
3. Demonstrate the determination of chloride using Mohr's method
4. Acquire skills in the operation and calibration of pH meter
5. Perform the strong acid vs strong base titration using pH meter

### ***Course7-B: Analytical Methods in Chemistry-2***

#### **Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Identify the importance of chromatography in the separation and identification of compounds in a mixture
2. Acquire a critical knowledge on various chromatographic techniques.
3. Demonstrate skills related to analysis of water using different techniques.
4. Understand the principles of spectro chemistry in the determination of metal ions.

5. Comprehend the applications of atomic spectroscopy.

### ***Course7-B: Analytical Methods in Chemistry-2- PRACTICAL SYLLABUS***

#### **V. Learning Outcomes:**

On successful completion of this practical course, student shall be able to:

1. Perform the separation of a given dye mixture using TLC
2. Learn the preparation of TLC plates
3. Demonstrate the separation of mixture of amino acids using paper chromatography
4. Acquire skills in using column chromatography for the separation of dye mixture

### ***Course6-C: Industrial Chemistry-1***

#### **Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Identify the importance of different surface coatings.
2. Acquire a critical knowledge on manufacture of ceramics and cement.
3. Understand various steps in the manufacture of cane sugar.
4. Explain the manufacture of pulp and paper.

### ***Course6 C: Industrial Chemistry-1- PRACTICAL SYLLABUS***

#### **Lab work-Skills Outcomes:**

On successful completion of this practical course, student shall be able to:

1. Determine free acidity in ammonium sulphate fertilizer.
2. Learn the procedure for the Estimation of Calcium in Calcium ammonium nitrate fertilizer.
3. Demonstrate skills on Estimation of phosphoric acid in superphosphate fertilizer.
4. Acquire skills in using colorimetry for the estimation of sucrose.

### ***Course7-C: Industrial Chemistry-2***

#### **Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Identify the importance of industrial waste management.
2. Acquire a critical knowledge on the preparation and applications of organic polymers.
3. Demonstrate the analysis of water quality parameters.
4. Explain the sources of air pollution.

### ***Course7-C: Industrial Chemistry-2-PRACTICAL SYLLABUS***

#### **Lab work-Skills Outcomes:**

On successful completion of this practical course, the student shall be able to:

1. Learn the procedures for the determination of BOD and COD.
2. Demonstrate skills in the determination of chloride in the given water sample.
3. Acquire skills in determining the hardness of water.

## **Course6-D: Environmental Chemistry**

### **Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Understand the environment functions and how it is affected by human activities.
2. Acquire chemical knowledge to ensure sustainable use of the world's resources and ecosystems services.
1. Engage in simple and advanced analytical tools used to measure the different types of pollution.
4. Explain the energy crisis and different aspects of sustainability.
5. Analyze key ethical challenges concerning biodiversity and understand the moral principles, goals and virtues important for guiding decisions that affect Earth's plant and animal life.

## **Course6-D: Environmental Chemistry – Practical syllabus**

### **IV. Lab work-Skills Outcomes:**

On successful completion of this practical course, student shall be able to:

1. List out, identify and handle various equipment in Chemistry lab.
2. Learn the procedures of preparation of standard solutions.
3. Demonstrate skills in operating instruments.
4. Acquire skills in handling spectrophotometer.
5. Analyse water and soil samples.

## **Course7- D: Green Chemistry and Nanotechnology**

### **Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Understand the importance of Green chemistry and Green synthesis.
2. Engage in Microwave assisted organic synthesis.
3. Demonstrate skills using the alternative green solvents in synthesis.
4. Demonstrate and explain enzymatic catalysis.
5. Analyse alternative sources of energy and carry out green synthesis.
6. Carry out the chemical method of nanomaterial synthesis.

### **Lab work - Skills Outcomes:**

On successful completion of this practical course, student shall be able to:

1. List out, identify and handle various equipment in the laboratory.
2. Learn the procedures of green synthesis.
3. Demonstrate skills in the preparation of Nanomaterials.

4. Acquire skills in Microwave assisted organic synthesis.
5. Perform some applications of Nanomaterials.

## **Course6-E: Analytical Methods in Chemistry**

### **Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Understand the various methods involved in Quantitative analysis.
2. Acquire a critical knowledge on separation techniques.
3. Demonstrate skills related to Chromatographic techniques through hands on experience.
4. Able to engage in safe and accurate laboratory practices by handling laboratory glassware,

Equipment and chemical reagents appropriately.

5. Comprehend the applications of Chromatographic techniques in different fields.

### **Lab work-Skills Outcomes:**

On successful completion of this practical course, student shall be able to:

1. List out, identify and handle various equipment in Analytical Chemistry lab.
2. Learn the procedures of preparation of primary and secondary standard solutions.
3. Demonstrate skills in the preparation of Paper, Thin layer and column Chromatography.
4. Acquire skills in observing the Chromatogram.
5. Perform some separation techniques of Organic compounds.

## **Course7- E: Cosmetics and Pharmaceutical Chemistry**

### **Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Explain the principles of formulation and application of Cosmetics & perfumes.
2. Acquire a critical knowledge on synthetic techniques of drugs.
3. Demonstrate skills in various aspects of fermentation technology and apply them for production.
4. Comprehend the applications offer mentation.

### **Lab work-Skills Outcomes:**

On successful completion of this practical course, the student shall be able to:

1. The ability to develop comprehensive product development programs to meet new product criteria and timing.
2. Acquire skills in the preparation of Cosmeceuticals.
3. Demonstrate proficiency in the experimental techniques for fermentation and microbial production of enzymes.
4. Carry out perfume testing with the knowledge of perfumes.
5. Learn the procedure of synthesis of drugs.
6. Critically develop, apply, report, interpret and reflect on strategies for collecting data in the lab and field.