

# PALAMURU UNIVERSITY

## Department of Chemistry

### Programme outcomes:-

The student after completing this programme, will be able to

1. Design solutions for complex problems and design system components, processes to meet the specifications with consideration for the public health and safety, and the cultural, societal, and environmental considerations.
2. Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
3. Understand the impact of the professional scientific solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
4. Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.
5. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### Program Specific outcomes:

Upon completion of the M.Sc. Organic Chemistry students will:

1. Able to design, carry out, record and analyze the results of chemical experiments.
2. Able to use modern instrumentation and classical techniques, to design experiments, and to properly record the results of their experiment.
3. Be skilled in problem solving, critical thinking and analytical reasoning.
4. Know and follow the proper procedures and regulations for safe handling and usage of chemicals under various conditions while performing the experiments.
5. Understand the ethical, historic, philosophical, and environmental dimensions of problems and issues facing chemists.
6. Able to get into professional employment or doctoral studies in the area of synthetic Organic chemistry

## COURSE OUTCOMES

### **Semester-1 Theory**

#### **Paper-I Inorganic Chemistry**

Upon completion of the course student will

1. Understand the symmetry of molecules and Point groups
2. Able to understand in bonding in metal complexes
3. Understand coordination equilibrium
4. Able to Understand Ligational aspects of Diatomic molecules

#### **Paper-II Organic Chemistry**

After the completion of Organic chemistry course the students:

1. Basic concepts of Stereochemistry
2. Able to understand, determine and can write Reaction Mechanism.
3. Understand the fundamental concepts regarding aromatic, aliphatic substitution and neighboring group participation.
4. Understand the Nomenclature, Synthesis and Reactivity of Heterocyclic

compounds

### **Paper-III Physical Chemistry**

After the completion of Physical chemistry course the students:

1. Able to know the concepts and Laws of Thermodynamics.
2. Able to understand the Applications of Electrochemical cells
3. Understand the Postulates in theories of Quantum Mechanics.
4. Knowledge about the theories, Principles and Postulates of Chemical reactions.

### **Paper-IV Analytic Techniques and Spectroscopy-I**

After the completion of General Chemistry course the students:

1. Able to know the basic techniques of Chromatography.
2. Understand the concepts of  $H^1NMR$
3. Able to know the applications of Microwave, Vibrational and Raman Spectroscopy
4. Able to know the Application of Electronic Spectroscopy.

### **Semester-I Practical:**

**After the completion of Inorganic chemistry practical course the students:**

1. Able to know the calibrations,
2. Estimation of Ions
3. Preparation of Complexes

**After the completion of Organic Chemistry Practical course the students:**

1. Able to the synthesize the Organic compounds,
2. recrystallization methods
3. Yield calculations.
4. Determine the Physical Constants for the synthesized molecules

**After the completion of Physical Chemistry practical course the students:**

1. Student will be able to understand the Quantitative analysis.
2. Able to perform the Kinetic studies of chemical reactions
3. Able to do Partition ratio of solute between two phases
4. Able to know the adsorption phenomena of solute on the surface of the solid.

### **Semester-II Theory**

#### **Paper-1 Inorganic Chemistry**

After the completion of the course the students:

1. Able to know the Reaction Mechanisms of Transition Metal complexes

2. Able to Understand the Bonding in metal complexes
3. Able to write the structures of Metal clusters.
4. Knowledge about Bio coordination chemistry in Biological systems

### **Paper-II Organic Chemistry**

After the completion of the course the students:

1. Able to understand the concepts in conformational analysis of acyclic and cyclic systems
2. Able to understand the concepts in conformational analysis of larger cyclic systems, and will be able to understand ORD and CD spectroscopy.
3. Gain the knowledge about reactive Intermediates and various types of molecular rearrangements
4. Able to know about Natural products.

### **Paper-III Physical Chemistry**

After the completion of the course the students:

1. Understand the properties of Ideal and Non Ideal solutions and partition functions.
2. Knowledge in basics of Photo chemistry
3. Application of Quantum Mechanical Laws to the many electronic systems
4. Able to know the electronic properties of solid materials, understand nanoparticles and their applications.

### **Paper-IV Analytic Techniques and Spectroscopy-II**

After the completion of the course the students:

1. Understand the types and classifications of Electroanalytical Techniques
2. Understand the applications of  $H^1$ ,  $F^{19}$  and  $P^{31}$  spectroscopic methods
3. Analyze the fragmentations of molecules by Mass spectrometry methods.
4. Understand the concepts of Photo electron and ESR spectroscopy

### **Semester-II Practical:**

After the completion of the course the students:

#### **Inorganic Practical:**

1. To Analyze Gravimetric estimations in different component mixtures
2. Able to Analyze two component mixtures
3. Able to Analyze three component mixtures
4. Able to perform Ion exchange methods of Analysis
5. Inorganic Praticles:

#### **Organic chemistry Practical:**

- 1 Able to Identify the purity of compounds by Physical Parameters
- 2 Able to do Qualitative Analysis of Organic compounds
- 3 Able to prepare derivatives of Organic compounds
- 4 Understand the basic information of spectral data for the Identification of

## Organic compounds

### Physical chemistry Particles:

1. Student will be able to understand the Quantitative mixture analysis.
2. Able to perform the Kinetic studies by using Isolation and Initial rate methods.
3. Able to calculate equilibrium constant by distribution.
4. Able to prepare buffer solutions by P<sup>H</sup> metry.

### Semester-III Theory

After the completion of the course the students:

#### Paper-1 Conformational Analysis

1. Able to study the concepts of Conformational analysis of Cyclic systems
2. Understand the Basic principles of Asymmetric synthesis
3. Able to apply methodologies of Asymmetric synthesis
4. Gain the knowledge of Bio Molecules.

#### Paper 2– CH (OC) 302T: Modern Organic Synthesis

After the completion of the course the students will :

1. Understand the concepts of Synthetic reagents
2. Apply the knowledge of Synthetic reagents
3. Understand the Importance of New Synthetic reactions
4. Understand the New techniques and concepts in organic synthesis

#### Paper 3: CH (OC) 303T: Organic Spectroscopy and Pericyclic reactions.

After the completion of the course the students:

1. Analyze and understand the applications of <sup>13</sup>C NMR spectroscopy
2. Analyze and apply the concepts of 2D NMR techniques and ORD
3. Understand the Basics of Pericyclic reactions
4. Applications of Pericyclic reactions to molecular Orbitals

#### Paper-4 CH (OC) 304T: Photochemistry, synthetic strategies and Green Chemistry

After the completion of the course the students:

1. Apply the knowledge of Photochemistry to Organic molecules
2. Understand the Basic approach for Disconnections
3. Applications of various strategies for synthesis
4. Understand the principles of Green synthetic approaches to replace the conventional synthesis methods.

### LABORATORY COURSES

#### PAPER-V CH (O) 351P: Separation and identification of organic compounds

After the completion of the course the students:

1. Able to Identify types of Organic mixtures
2. Learn and able to perform separation methods of Organic Compounds
3. Able to prepare derivatives of Organic functional groups
4. Identification of compounds by Physical parameters

**PAPER VICH (O) 352P: Synthesis of organic molecules & isolation of natural products**

After the completion of the course the students:

1. Able to perform the synthesis of compounds for Named reactions.
2. Able to perform functional group Inter conversions by different reagents
3. Able to learn the Extraction methods of Natural Products
4. Able to Isolate Natural Products

**M.Sc. ORGANIC CHEMISTRY SPECIALISATION  
IV SEMESTER SYLLABUS**

**Paper-1 CH (OC) 401T: Drug Design and Drug Discovery**

After the completion of the course the students:

1. Understand the basic principles of drug design and drug discovery
2. Able to know the Lead modification strategies and SAR Studies
3. Apply the QSAR studies to drug molecules
4. Gain the knowledge of Combinatorial Synthesis

**Paper CH (OC) 402T: Drug synthesis and mechanism of action**

After the completion of the course the students:

1. Able to understand basics of drugs acting on metabolic process, cell wall and specific enzymes
2. Able to know about drugs acting on genetic material and immune system
3. Apply the concepts of drugs acting on receptors and ion channels
4. Gain the knowledge and importance of Chiral drugs

**Paper-3 CH (OC) 403T: Advanced Heterocyclic Chemistry**

After the completion of the course the students:

1. Able to understand the types of strains, interactions and synthesis in Non aromatic heterocyclics
2. Get the knowledge of Five and six membered heterocyclics with two hetero atoms
3. Able to know the synthesis and properties of Heterocyclics with more than two hetero atoms
4. Get the knowledge about the stability, structure and synthesis of Larger ring heterocycles.

**Paper-4 – CH (OC) 404(CB1)T: Advanced Natural Products**

After the completion of Advanced Natural Products course the students:

1. Able to get the knowledge on biosynthesis of natural products
2. Understand the Structure determination and stereochemistry of natural products by chemical methods.
3. Able to identify the methods in Structure determination and stereochemistry of natural products by spectral methods.
4. Get the knowledge on Total stereo selective synthesis of natural products.

## **Laboratory courses**

### **PAPER-V CH (OC) 451P: Spectroscopic identification of organic compounds and Chromatography.**

After the completion of the practical course the students:

1. Able to analyze the spectral data Unknown compounds.
2. Able to Identify the structure unknown compounds from spectral data
3. Able to Indentify the number of components in the reaction mixture
4. Able to separate individual component from the mixture.

### **PAPER-VI CH (OC) 452P: Synthesis and analysis of drugs**

After the completion of the practical course the students:

1. Able to synthesize the Drugs
2. Able to Indentify the purity of the Drugs
3. Able to perform the qualitative analysis of Drugs
4. Able to perform the quantitative analysis of Drugs