

**SRI PADMAVATI MAHILA VISVAVIDYALAYAM, TIRUPATI**  
**DEPARTMENT OF ORGANIC CHEMISTRY**

**OUTCOMES**

After completion of the program, the students are able to:

**Programme outcomes**

**PO1.** Work in the interdisciplinary and multidisciplinary areas of chemical sciences and its applications.

**PO2.** Acquire the ability to synthesize, separate and characterize compounds using laboratory and instrumentation techniques.

**PO3.** Employ critical thinking and the scientific knowledge to design, carry out, record and analyse the results of chemical reactions.

**PO4.** Helps to gain the knowledge in developing the green route for chemical reaction for sustainable development

**PO5.** Apply physical, theoretical and spectroscopic methods to chemical systems

**PO6.** Create an awareness of the impact of chemistry on the environment, society, and development outside the scientific community.

**Programme Specific Outcomes**

**PSO1.** Attain the skills in the preparation, estimation and characterization of organic compounds using chemical and instrumental methods.

**PSO2.** Design the methods for the synthesis of specific organic compounds and such methods are useful in pharmaceutical industry in the development of target oriented drug molecules.

**PSO3.** Analyse a mixture of organic compounds or inorganic compounds and identify the nature of components present in the mixture using chemical and instrumental methods.

**PSO4.** Understand the advanced concepts in quantum chemistry and molecular thermodynamics.

**PSO5.** Attain the practical skills in use of potentiometry, conductometry, colorimetry and spectrophotometric techniques for different applications.

**PSO6.** Acquire experimental skills in the measurement of rates of reactions and understand the mechanisms of complex reactions.

**PSO7.** Understand the structure of coordination compounds and the function of organo metallic reagents in organic synthesis.

**PSO8.** Understand the theory and the applications of different analytical, spectroscopic and separation techniques.

**PSO9.** Understand organic reaction mechanisms, apply novel strategies in the development of synthetic methods for new organic compounds.

**PSO10.** Elucidate the chemical structure of organic compounds using their spectra obtained from UV, IR, NMR and MS techniques.

**PSO11.** Study the occurrence, isolation, synthesis and structure of some naturally occurring compounds.

## COURSE OUTCOMES

After completion of the program, the students are able to:

### **CHE 101: INORGANIC CHEMISTRY – I**

**CO-1:** Apply the Crystal Field Theory to understand the properties of coordination compounds

**CO-2:** Evaluate the stability of metal complexes and to know the theory and applications of HSAB.

**CO-3:** Understand the reaction mechanisms of inert and labile transition metal complexes.

**CO-4:** Study the chemistry of metal carbonyls, nitrosyls and clusters and their properties.

### **CHE 102: ORGANIC CHEMISTRY – I**

**CO-5:** Understand the stability and reactivity of reactive intermediates.

**CO-6:** Familiarize the types of aliphatic and aromatic nucleophilic substitution reactions.

**CO-7:** Know the types of elimination reactions and their stereo chemical aspects with examples

**CO-8:** Learn the concept of stereochemistry to identify the stereo chemical notations and its importance in daily life.

### **CHE 103: PHYSICAL CHEMISTRY – I**

**CO-9:** Learn the significance of wave function and its application to simple systems.

**CO-10:** Apply the theories of reaction rate for gas phase reactions.

**CO-11:** Understand the classical and statistical thermodynamic concepts.

**CO-12:** Evaluate the conductivity, activity and activity coefficients in ionic solutions.

### **CHE 104: GENERAL CHEMISTRY – I**

**CO-13:** Apply the different statistical methods to test the significance of analytical data.

**CO-14:** Explain the theoretical principles of various separation techniques in chromatography, and typical applications of chromatographic techniques.

**CO-15:** Learn the principles and applications of spectroscopic techniques such as UV-Vis and Microwave spectroscopy.

**CO-16:** Understand the principles and applications of flame emission and atomic absorption spectroscopic techniques.

### **CHE 105: PRACTICAL-I (INORGANIC)**

**CO-17:** Identify inorganic salts present in a mixture by qualitative analysis.

**CO-18:** Determine the amount of inorganic salt present in a mixture by quantitative analysis.

### **CHE 106: PRACTICAL-II (ORGANIC)**

**CO-19:** Identify the type of organic compound present in a mixture by qualitative analysis.

### **CHE 201: INORGANIC CHEMISTRY – II**

**CO-20:** Understand the importance of organo-metallic reagents and their properties. Learn the fluxional behaviour of transition metal  $\eta$ -complexes.

**CO-21:** Study in detail about transition metal  $\pi$ -complexes and their properties.

**CO-22:** Apply the electronic spectra and Electron Spin Resonance (ESR) Spectra to transition metal complexes.

**CO-23:** Learn the magnetic properties of transition metal complexes.

### **CHE 202: ORGANIC CHEMISTRY – II**

**CO-24:** Learn the selective name reactions and their synthetic applications.

**CO-25:** Understand the types of addition reactions and their stereochemical aspects.

**CO-26:** Understand the pericyclic reactions and types of reactions

**CO-27:** Study the photochemical reactions of carbonyl compounds, alkenes, dienes, polyenes, and photo rearrangements.

### **CHE 203: PHYSICAL CHEMISTRY – II**

**CO-28:** Apply quantum mechanical methods to angular momentum, and molecular orbital theory.

**CO-29:** Understand the theories of adsorption of gases and liquids on solids and the conditions for micellisation.

**CO-30:** Study the equilibrium in three component systems using phase rule.

**CO-31:** Learn the concepts of irreversible electrodeprocess and polarographic techniques.

#### **CHE 204 A: GENERAL CHEMISTRY-II**

**CO-32:** Study the symmetry elements and symmetry operations. To apply the orthogonality theorem to derive character tables.

**CO-33:** Apply molecular spectroscopy, infrared spectroscopy and Raman spectroscopy for simple molecules.

**CO-34:** Apply thermal methods and radio analytical methods for clays and minerals.

**CO-35:** Understand the concepts of electroanalytical methods such as potentiometry, coulometry and voltammetry.

#### **CHE 205: PRACTICAL-I (ORGANIC)**

**CO-36:** Learn the separation and analysis of organic mixtures

#### **CHE 206: PRACTICAL-II (PHYSICAL)**

**CO-37:** Measure the end points using conductometric and potentiometric titrations, CST, phase diagram and adsorption etc.

#### **CHE 301: ORGANIC SYNTHESIS-I**

**CO-38:** Apply the organic reagents such as  $\text{AlCl}_3$ ,  $\text{BF}_3$ , diazomethane, DDQ, Merrifield resin etc. in organic synthesis.

**CO-39:** Learn in depth about the properties and applications of organometallic reagents in organic synthesis.

**CO-40:** Understand the molecular rearrangements and their mechanistic aspects

**CO-41:** Study asymmetric synthesis and their classification. Understand the terms Topocity, Prochirality and selectivity in stereochemical transformations.

#### **CHE 302: HETEROCYCLIC CHEMISTRY**

**CO-42:** Understand the systematic nomenclature for monocyclic, fused and bridged heterocycles.

**CO-43:** Study the synthesis and reactions of five membered heterocyclic compounds.

**CO-44:** Know the synthetic strategies, reactions and medicinal applications of Benzofused five membered heterocycles.

**CO-45:** Learn the synthesis and reactions of six membered Heterocycles with one or more hetero atoms.

#### **CHE 303: SPECTROSCOPY AND ITS APPLICATIONS (Skill Based)**

**CO-46:** Apply UV-Vis spectroscopy for organic molecules and to study the Woodward Fisher rules.

**CO-47:** Apply IR-spectra for the determination of functional groups inorganic molecules.

**CO-48:** Apply NMR spectra ( $^1\text{H}$  &  $^{13}\text{C}$  NMR) for structural elucidation of organic molecules.

**CO-49:** Study the fragmentation of organic compounds in mass spectrometry for structural determination.

#### **CHE 305: PRACTICAL-I (ORGANIC ESTIMATIONS)**

**CO-50:** Estimate the amounts of selective organic compounds

#### **CHE 306: PRACTICAL-II (ORGANIC PREPARATIONS)**

**CO-51:** Setup the apparatus and organic reactions for the preparation of different organic compounds using single step synthetic approach.

#### **CHE 401: ORGANIC SYNTHESIS-II**

**CO-52:** Apply organo boron, phosphorus, sulfur and silicon reagents for organic synthesis.

**CO-53:** Understand the reagents involved in oxidations and reductions and their mechanistic aspects including stereochemistry with examples.

**CO-54:** Apply the disconnection approach in synthetic organic chemistry and study of protecting groups with examples.

**CO-55:** Familiarize the concepts of newer methods in organic synthesis such as Phase Transfer Catalysis, Microwave induced reactions and enamine mediated reactions.

**CHE 402: Natural Products**

**CO-56:** Learn the occurrence, nomenclature and synthesis of Steroids and Hormones.

**CO-57:** Evaluate the structural elucidation and degradation of alkaloids. Study of structure, stereochemistry and synthetic aspects of alkaloids.

**CO-58:** Gain the knowledge about Structure determination, stereochemistry and synthesis of the terpenoids.

**CO-59:** Learn the structure determination and synthetic strategies of Flavonoids and Isoflavonoids.

**CHE 403: PRACTICAL-I (SPECTAL PROBLEMS)**

**CO-60:**Elucidate the structure of different organic compounds using spectroscopic data from literature

**CHE 404: PRACTICAL – II (MULTISTEP PREPARATIONS)**

**CO-61:**Handle and use of different organic reagents for the preparation of different organic compounds using two-step synthetic approach.