

**M.Sc. Chemistry**  
Syllabus From the Academic Year  
2023-2024

Madurai Kamaraj University

Madurai – 625 021

## **Programme Outcomes (Pos)**

**PO1: Problem Solving Skill:** Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context.

**PO2: Decision Making Skill:** Foster analytical and critical thinking abilities for data-based decision-making.

**PO3: Ethical Value:** Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities.

**PO4: Communication Skill:** Ability to develop communication, managerial and interpersonal skills.

**PO5: Individual and Team Leadership Skill:** Capability to lead themselves and the team to achieve organizational goals.

**PO6: Employability Skill:** Inculcate contemporary business practices to enhance employability skills in the competitive environment.

**PO7: Entrepreneurial Skill:** Equip with skills and competencies to become an entrepreneur.

**PO8: Contribution to Society:** Succeed in career endeavors and contribute significantly to society.

**PO 9 Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective.

**PO 10: Moral and ethical awareness/reasoning:** Ability to embrace moral/ethical values in conducting one's life.

## **Programme Specific Outcomes (PSOs)**

**PSO1 – Placement:** To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions.

**PSO 2 – Entrepreneur:** To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.

**PSO3 – Research and Development:** Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards

growth and development.

**PSO4 – Contribution to Business World:** To produce employable, ethical and innovative professionals to sustain in the dynamic business world.

**PSO 5 – Contribution to the Society:** To contribute to the development of the society by collaborating with stakeholders for mutual benefit.

## **ORGANIC REACTION MECHANISM – I**

### **Course Learning Outcomes (for Mapping with POs and PSOs)**

Students will be able

**CLO1:** To recall the basic principles of organic chemistry.

**CLO2:** To understand the formation and detection of reaction intermediates of organic reactions.

**CLO3:** To predict the reaction mechanism of organic reactions and stereochemistry of organic compounds.

**CLO4:** To apply the principles of kinetic and non-kinetic methods to determine the mechanism of reactions.

**CLO5:** To design and synthesize new organic compounds by correlating the stereochemistry of organic compounds.

### **CO-PO Mapping (Course Articulation Matrix)**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO 1</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>
<b>CO 2</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>
<b>CO 3</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>
<b>CO 4</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>
<b>CO 5</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>

**Strong - 3**

**Medium-2**

**Low-1**

### Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

### STRUCTURE AND BONDING IN INORGANIC COMPOUNDS

#### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able

**CO1:** Predict the geometry of main group compounds and clusters.

**CO2:** Explain about the packing of ions in crystals and apply the radius ratio rule to predict the coordination number of cations.

**CO3:** Understand the various types of ionic crystal systems and analyze their structural features.

**CO4:** Explain the crystal growth methods.

**CO5:** To understand the principles of diffraction techniques and microscopic techniques.

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

### Level of Correlation between PSO's and CO's

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

## ORGANIC CHEMISTRY PRACTICAL

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:** To recall the basic principles of organic separation, qualitative analysis and preparation.

**CO2:** To explain the method of separation and analysis of separated organic mixtures and convert them as derivatives by suitable preparation method.

**CO3:** To determine the characteristics of separation of organic compounds by various chemical reactions.

**CO4:** To develop strategies to separate, analyze and prepare organic compounds.

**CO5:** To formulate a method of separation, analysis of organic mixtures and design suitable procedure for organic preparations.

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>CO 1</b>	S	S	S	S	M	S	S	S	S	M
<b>CO 2</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 3</b>	S	S	M	S	S	S	S	M	S	S
<b>CO 4</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 5</b>	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

### Level of Correlation between PSO's and CO's

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weighted percentage of Course Contribution to Pos</b>	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

## PHARMACEUTICAL CHEMISTRY

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:** To identify the suitable drugs for various diseases.

**CO2:** To apply the principles of various drug action and drug design.

**CO3:** To acquire the knowledge on product development based on SAR.

**CO4:** To apply the knowledge on applications of computers in chemistry.

**CO5:** To synthesize new drugs after understanding the concepts SAR.

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>CO 1</b>	S	S	S	S	M	S	S	S	S	M
<b>CO 2</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 3</b>	S	S	M	S	S	S	S	M	S	S
<b>CO 4</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 5</b>	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

### Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weighted percentage of Course Contribution to Pos</b>	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

## NANO MATERIALS AND NANO TECHNOLOGY

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:** To explain methods of fabricating nanostructures.

**CO2:** To relate the unique properties of nanomaterials to reduce dimensionality of the material.

**CO3:** To describe tools for properties of nanostructures.

**CO4:** To discuss applications of nanomaterials.

**CO5:** To understand the health and safety related to nanomaterial.

### **CO-PO Mapping (Course Articulation Matrix)**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO 1</b>	S	S	S	S	M	S	S	S	S	M
<b>CO 2</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 3</b>	S	S	M	S	S	S	S	M	S	S
<b>CO 4</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 5</b>	M	S	M	S	S	M	S	M	S	S

**3 – Strong, 2 – Medium, 1 - Low**

### **Level of Correlation between PSO's and CO's**

<b>CO /PO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weighted percentage of Course Contribution to Pos</b>	3.0	3.0	3.0	3.0	3.0

**3 – Strong, 2 – Medium, 1 - Low**

## ELECTROCHEMISTRY

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:** To understand the behaviour of electrolytes in solution and compare the structures of electrical double layer of different models.

**CO2:** To predict the kinetics of electrode reactions applying Butler-Volmer and Tafel equations

**CO3:** To study different thermodynamic mechanism of corrosion,

**CO4:** To discuss the theories of electrolytes, electrical double layer, electrostatics and activity coefficient of electrolytes

**CO5:** To have knowledge on storage devices and electrochemical reaction mechanism.

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

### Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

## MOLECULAR SPECTROSCOPY

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:** To understand the importance of rotational and Raman spectroscopy.

**CO2:** To apply the vibrational spectroscopic techniques to diatomic and polyatomic molecules.

**CO3:** To evaluate different electronic spectra of simple molecules using electronic spectroscopy.

**CO4:** To outline the NMR,  $^{13}\text{C}$  NMR, 2D NMR – COSY, NOESY, and Introduction to  $^{31}\text{P}$ ,  $^{19}\text{F}$ NMR and ESR spectroscopic techniques.

**CO5:** To develop the knowledge on principle, instrumentation and structural elucidation of simple molecules using Mass Spectrometry, EPR and Mossbauer Spectroscopy techniques.

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

### Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15

<b>Weighted percentage of Course Contribution to Pos</b>	3.0	3.0	3.0	3.0	3.0
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**3 – Strong, 2 – Medium, 1 - Low**

## **ORGANIC REACTION MECHANISM-II**

### **Course Learning Outcomes (for Mapping with POs and PSOs)**

Students will be able:

**CO1:** To recall the basic principles of aromaticity of organic and heterocyclic compounds.

**CO2:** To understand the mechanism of various types of organic reactions.

**CO3:** To predict the suitable reagents for the conversion of selective organic compounds.

**CO4:** To correlate the principles of substitution, elimination, and addition reactions.

**CO5:** To design new routes to synthesis organic compounds.

### **CO-PO Mapping (Course Articulation Matrix)**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO 1</b>	S	S	S	S	M	S	S	S	S	M
<b>CO 2</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 3</b>	S	S	M	S	S	S	S	M	S	S
<b>CO 4</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 5</b>	M	S	M	S	S	M	S	M	S	S

**3 – Strong, 2 – Medium, 1 - Low**

### **Level of Correlation between PSO's and CO's**

<b>CO /PO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weighted percentage of Course Contribution to Pos</b>	3.0	3.0	3.0	3.0	3.0

**3 – Strong, 2 – Medium, 1 – Low**

## PHYSICAL CHEMISTRY-I

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:** To explain the classical and statistical concepts of thermodynamics.

**CO2:** To compare and correlate the thermodynamic concepts to study the kinetics of chemical reactions.

**CO3:** To discuss the various thermodynamic and kinetic determination.

**CO4:** To evaluate the thermodynamic methods for real gases and mixtures.

**CO5:** To compare the theories of reaction rates and fast reactions.

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

### Level of Correlation between PSO's and CO's

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

## INORGANIC CHEMISTRY PRACTICAL

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:** To identify the anions and cations present in a mixture of salts.

**CO2:** To apply the principles of semi micro qualitative analysis to categorize acid radicals and basic radicals.

**CO3:** To acquire the qualitative analytical skills by selecting suitable confirmatory tests and spot tests.

**CO4:** To choose the appropriate chemical reagents for the detection of anions and cations.

**CO5:** To synthesize coordination compounds in good quality.

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

## MEDICINAL CHEMISTRY

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:** Predict a drug's properties based on its structure.

**CO2:** Describe the factors that affect its absorption, distribution, metabolism, and excretion, and hence the considerations to be made in drug design.

**CO3:** Explain the relationship between drug's chemical structure and its therapeutic properties.

**CO4:** Designed to give the knowledge of different theories of drug actions at molecular level.

**CO5:** To identify different targets for the development of new drugs for the treatment of infectious and GIT.

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>CO 1</b>	S	S	S	S	M	S	S	S	S	M
<b>CO 2</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 3</b>	S	S	M	S	S	S	S	M	S	S
<b>CO 4</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 5</b>	M	S	M	S	S	M	S	M	S	S

**3 – Strong, 2 – Medium, 1 - Low**

### Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weighted percentage of Course Contribution to Pos</b>	3.0	3.0	3.0	3.0	3.0

**3 – Strong, 2 – Medium, 1 - Low**

## GREEN CHEMISTRY

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:** To recall the basic chemical techniques used in conventional industrial preparations and in green innovations.

**CO2:** To understand the various techniques used in chemical industries and in laboratory.

**CO3:** To compare the advantages of organic reactions assisted by renewable energy sources and non-renewable energy sources.

**CO4:** To apply the principles of PTC, ionic liquid, microwave and ultrasonic assisted organicsynthesis.

**CO5:** To design and synthesize new organic compounds by green methods.

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>CO 1</b>	S	S	S	S	M	S	S	S	S	M
<b>CO 2</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 3</b>	S	S	M	S	S	S	S	M	S	S
<b>CO 4</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 5</b>	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

### Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weighted percentage of Course Contribution to Pos</b>	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

## BIO-INORGANIC CHEMISTRY

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:** The students will be able to analyses trace elements.

**CO2:** Students will be able to explain the biological redox systems.

**CO3:** Students will gain skill in analyzing the toxicity in metals.

**CO4:** Students will have experience in diagnosis.

**CO5:** Learn about the nitrogen fixation and photosynthetic mechanism.

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>CO 1</b>	S	S	S	S	M	S	S	S	S	M
<b>CO 2</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 3</b>	S	S	M	S	S	S	S	M	S	S
<b>CO 4</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 5</b>	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

### Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weighted percentage of Course Contribution to Pos</b>	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

## MATERIAL SCIENCE

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:** To understand and recall the synthesis and characteristics of crystal structures, semiconductors, magnets, nanomaterials and renewable energy materials.

**CO2:** To integrate and assess the structure of different materials and their properties.

**CO3:** To analyse and identify new materials for energy applications.

**CO4:** To explain the importance of crystal structures, piezoelectric and pyroelectric materials, nanomaterials, hard and soft magnets, superconductors, solar cells, electrodes, LEDs, structures and synthesis.

**CO5:**To design and develop new materials with improved property for energy applications.

**CO-PO Mapping (Course Articulation Matrix)**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO 1</b>	S	S	S	S	M	S	S	S	S	M
<b>CO 2</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 3</b>	S	S	M	S	S	S	S	M	S	S
<b>CO 4</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 5</b>	M	S	M	S	S	M	S	M	S	S

**3 – Strong, 2 – Medium, 1 - Low**

**Level of Correlation between PSO's and CO's**

<b>CO /PO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weighted percentage of Course Contribution to Pos</b>	3.0	3.0	3.0	3.0	3.0

**3 – Strong, 2 – Medium, 1 – Low**

**ORGANIC SYNTHESIS AND PHOTOCHEMISTRY**

**Course Learning Outcomes (for Mapping with POs and PSOs)**

Students will be able:

**CO1:**To recall the basic principles of organic chemistry and to understand the various reactions of organic compounds with reaction mechanisms.

**CO2:**To understand the versatility of various special reagents and to correlate their reactivity with various reaction conditions.

**CO3:**To implement the synthetic strategies in the preparation of various organic compounds.

**CO4:**To predict the suitability of reaction conditions in the preparation of tailor-made organic compounds.

**CO5:**To design and synthesize novel organic compounds with the methodologies learnt during the course

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>CO 1</b>	S	S	S	S	M	S	S	S	S	M
<b>CO 2</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 3</b>	S	S	M	S	S	S	S	M	S	S
<b>CO 4</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 5</b>	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

### Level of Correlation between PSO's and CO's

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weighted percentage of Course Contribution to Pos</b>	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

## COORDINATION CHEMISTRY – I

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:**Understand and comprehend various theories of coordination compounds.

**CO2:** Understand the spectroscopic and magnetic properties of coordination complexes.

**CO3:** Explain the stability of complexes and various experimental methods to determine the stability of complexes.

**CO4:** Predict the electronic transitions in a complex based on correlation diagrams and UV-visible spectral details.

**CO5:** Comprehend the kinetics and mechanism of substitution reactions in octahedral and square planar complexes.

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>CO 1</b>	S	S	S	S	M	S	S	S	S	M
<b>CO 2</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 3</b>	S	S	M	S	S	S	S	M	S	S
<b>CO 4</b>	M	S	S	S	S	M	S	S	S	S
<b>CO 5</b>	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

### Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weighted percentage of Course Contribution to Pos</b>	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

## PHYSICAL CHEMISTRY PRACTICAL

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:** To recall the principles associated with various physical chemistry experiments.

**CO2:** To scientifically plan and perform all the experiments.

**CO3:** To observe and record systematically the readings in all the experiments.

**CO4:** To calculate and process the experimentally measured values and compare with graphical data.

**CO5:** To interpret the experimental data scientifically to improve students' efficiency for societal developments.

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

### Level of Correlation between PSO's and CO's

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 – Low

## CORE INDUSTRIAL MODULES

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:** know about raw materials , synthesis , testing and applications of different cements

**CO2:** understand and prepare the biofertilizers and biopesticides

**CO3:** Explain the different methods of water treatment

**CO4:**To identify different traditional medicinal plants and their applications for different diseases.

**CO5:**To understand the theory behind the processing and testing of methods of plastics

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 – Low

### Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

## PHARMOCOGNOSY AND PHYTOCHEMISTRY

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:**To recall the sources of natural medicines and analysis of crude drugs.

**CO2:** To understand the methods of evaluation based on various parameters.

**CO3:**To analyze the isolated drugs

**CO4:**To apply various techniques to discover new alternative medicines.

**CO5:**To evaluate the isolated drugs for various pharmacological activities

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

### Level of Correlation between PSO's and CO's

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

## BIOMOLECULES AND HETEROCYCLIC COMPOUNDS

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:** To understand the basic concepts of biomolecules and natural products.

**CO2:** To integrate and assess the different methods of preparation of structurally different biomolecules and natural products.

**CO3:** To illustrate the applications of biomolecules and their functions in the metabolism of living organisms.

**CO4:** To analyse and rationalise the structure and synthesis of heterocyclic compounds.

**CO5:** To develop the structure of biologically important heterocyclic compounds by different methods.

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

### Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

## COORDINATION CHEMISTRY – II

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:** Understand and apply 18 and 16 electron rule for organometallic compounds

**CO2:** Understand the structure and bonding in olefin, allyl, cyclopentadienyl and carbonyl containing organometallic compounds

**CO3:** Understand the reactions of organometallic compounds and apply them in

**CO4:** Understanding the catalytic cycles

**CO5:** Identify / predict the structure of coordination complexes using spectroscopic tools such as IR, NMR, ESR, Mossbauer and optical rotatory dispersion studies to interpret the structure of molecules by various spectral techniques.

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

### Level of Correlation between PSO's and CO's

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

## PHYSICAL CHEMISTRY-II

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:** To discuss the characteristics of wave functions and symmetry functions.

**CO2:** To classify the symmetry operation and wave equations.

**CO3:** To apply the concept of quantum mechanics and group theory to predict the electronic structure.

**CO4:** To specify the appropriate irreducible representations for theoretical applications.

**CO5:** To develop skills in evaluating the energies of molecular spectra.

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

### Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

## ANALYTICAL INSTRUMENTATION TECHNIQUES

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:** To recall the principles associated with various inorganic organic and physical chemistry experiments

**CO2:** To scientifically plan and perform all the experiments

**CO3:** To observe and record systematically the readings in all the experiments

**CO4:** To calculate and process the experimentally measured values and compare with graphical data.

**CO5:** To interpret the experimental data scientifically to improve students efficiency for societal developments.

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

### Level of Correlation between PSO's and CO's

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

## CHEMISTRY OF NATURAL PRODUCTS

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:** To understand the biological importance of chemistry of natural products.

**CO2:** To scientifically plan and perform the isolation and characterization of synthesized natural products.

**CO3:** To elucidate the structure of alkaloids, terpenoids, carotenoids, flavonoids and anthocyanins.

**CO4:** To determine the structure of phytochemical constituents by chemical and physical methods.

**CO5:** To interpret the experimental data scientifically to improve biological activity of active components.

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

### Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

## POLYMER CHEMISTRY

### Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

**CO1:** To understand the bonding in polymers.

**CO2:** To scientifically plan and perform the various polymerization reactions.

**CO3:** To observe and record the processing of polymers.

**CO4:** To calculate the molecular weight by physical and chemical methods.

**CO5:** To interpret the experimental data scientifically to improve the quality of synthetic polymers.

### CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

### Level of Correlation between PSO's and CO's

CO / PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low