

SHIVAJI UNIVERSITY, KOLHAPUR

# DEPARTMENT OF CHEMISTRY

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**Academic Year 2018-2019**

**PART – A**

**Name of Department:** Department of Chemistry

**Department Vision:** Engender Human Resource to Lead the Competitive Science World for Nation Building

**Department Mission:** Impart most advanced scientific knowledge and training to the students so that genuine researchers and skilled scientists of world standard will be made available for the advancement of national science and technology programs as well as to cater the needs of industrial and pharma sectors

**Name of Program:** M.Sc. Organic Chemistry

The M.Sc. Organic Chemistry program offered by Shivaji University is a Two Years full time program. In order to make students more careers oriented and nurturing their scientific temperaments, students will get exposure to the depth of core understanding of various dimensions of organic chemistry during these two years the study.

- PO1. Students will be able to acquire in depth knowledge about fundamental as well as applied organic chemistry concepts.
- PO2. Students will be able to solve various problems by identifying the essential parts of a problem, formulate strategy for solving the problem, applying appropriate techniques to arrive at a solution, test the precision and accuracy of the solution and interpret the results.
- PO3. Students will be able to acquire domain specific knowledge and technical skills needed for employment in industries, teaching fields and pursue research.
- PO4. Students will be able to apply the fundamental knowledge to address the cross-cutting issues such as sustainable development.
- PO5. Students will get perfect insight into organic chemistry research ethics for production of quality research.
- PO6. Students will be able to communicate effectively i. e. being able to comprehend and write effective reports, make effective presentations and documentation and capable of expressing the subject through technical writing as well as through oral presentation.

## Program Specific Outcomes (M. Sc. Organic Chemistry)

- PSO 1. Students will be able to qualify competitive examinations like NET, SET, GATE, etc.
- PSO 2. Students will have opportunities to serve in different Chemical, Pharmaceutical as well as food and agrochemical industries.
- PSO 3. Students will have global level research opportunities in Ph.D. programme.
- PSO 4. Collaborate effectively on team-oriented projects in the field of Chemistry or other related fields.
- PSO 5. Students can start their own chemical industry / business (entrepreneurship).
- PSO 6. Students will be able to interpret NMR, MS, IR for structural elucidation.

## Course Outcomes

### M.Sc.I, Organic Chemistry Sem-I; Paper-II

- CO 1: Students will be able to differentiate between various organic reactive intermediates.
- CO 2: Students can recognize, classify, explain, and apply fundamental organic reactions.
- CO 3: Students will have ability to distinguish between different kinds of isomers.
- CO 4: Course will develop interest in writing and finding mechanisms of new reactions.

POs/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
COs												
CO1	3	3	3	3	3	3	3	3	3	3	2	2
CO2	3	3	3	3	3	3	3	3	3	3	2	2
CO3	3	2	2	3	3	3	3	3	3	3	2	2
CO4	3	1	2	3	3	3	3	3	3	3	2	3

Correlations between contributions of COs for fulfillment of POs are defined using numbers: 0-No correlation; 1-Small correlation; 2-Large correlation; 3-full correlation

### M.Sc.I, Organic Chemistry Sem-II; Paper-VI

- CO 1: Illustration of modern synthetic methods and applications of reagents.
- CO 2: Provide knowledge of different organometallic compounds and various coupling reactions.
- CO 3: Understand principle and applications of protection and deprotection of various functional groups.
- CO 4: It will elaborate to understand the concept of chemoselectivity, regioselectivity and antioselectivity.

POs/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
COs												
CO1	3	3	3	3	3	3	3	3	3	3	1	2
CO2	3	3	2	3	3	3	3	3	3	2	2	2
CO3	3	2	2	3	2	3	3	2	3	3	2	2
CO4	3	1	2	3	3	3	3	3	3	3	2	2

Correlations between contributions of COs for fulfillment of POs are defined using numbers: 0-No correlation; 1-Small correlation; 2-Large correlation; 3-full correlation

### M.Sc.I Organic Chemistry Sem-I, Practical –I and II

- CO1: Independently perform two or more step organic synthesis.
- CO2: Identify organic compounds by TLC and purify them by various techniques.
- CO3: The application of analytical methods based on titrations, isolation, separations, etc.
- CO4: Describe disposal techniques and laboratory emergency procedures

POs/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
COs												
CO1	3	3	3	3	3	3	1	3	3	3	1	3
CO2	3	3	3	3	3	3	2	3	3	2	2	3
CO3	3	2	3	3	2	3	2	2	3	3	2	3
CO4	3	1	2	3	3	3	2	3	3	3	2	3

Correlations between contributions of Cos for fulfillment of Pos are defined using numbers: 0-No correlation; 1-Small correlation; 2-Large correlation; 3-full correlation

## M. Sc.II Organic Chemistry Sem-III

### Paper-IX: Organic reaction mechanism:

- CO1: Develop an ability to use effective written and/or oral communication through the application of organic chemistry concepts.
- CO2: Gives a basic understanding of how organic chemistry impacts the natural and biological environments.
- CO3: This course gives wide understanding about the organic reaction mechanism.
- CO4: This course will give an idea about pericyclic reactions.

POs/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
COs												
CO1	3	3	3	3	3	3	1	3	3	3	1	3
CO2	3	3	3	2	3	3	3	3	3	2	2	3
CO3	3	2	3	3	2	3	3	2	3	3	2	3
CO4	3	2	2	3	3	3	2	3	3	3	2	3

Correlations between contributions of COs for fulfillment of POs are defined using numbers: 0-No correlation; 1-Small correlation; 2-Large correlation; 3-full correlation

### Paper-X: Advanced Spectroscopic Methods:

- CO1: Students will be able to identify different stretching and bending vibrational modes in IR spectroscopy and can apply their knowledge in interpretation of functional groups.
- CO2: Understand mass spectral fragmentation techniques with respect to structure determination.
- CO3: Understand how to interpret nuclear magnetic resonance spectrum from values of chemical shift
- CO4: Students will have an idea of Beer Lambert's law and its applications.

POs/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
COs												
CO1	3	3	3	3	3	3	2	3	3	3	3	3
CO2	3	3	2	2	3	3	3	3	3	2	2	3
CO3	3	2	3	3	2	3	3	2	3	3	2	3
CO4	3	2	2	3	2	3	2	3	3	3	2	3

Correlations between contributions of COs for fulfillment of POs are defined using numbers: 0-No correlation; 1-Small correlation; 2-Large correlation; 3-full correlation

### Paper XI: Advanced Synthetic methods

- CO1: The applications of the reagents help students in designing multistep organic synthesis.
- CO2: They can utilize advanced techniques like microwaves, ionic liquids, ultrasound etc during their higher studies.
- CO3: Knowledge of retro-synthetic analysis helps for the study and design of a new reaction.
- CO4: Students will have an ability to develop ecofriendly methods for organic transformations.

POs/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
COs												
CO1	3	3	3	3	3	3	2	3	3	3	3	3
CO2	3	3	2	2	2	3	3	3	3	2	2	3
CO3	2	2	3	3	2	3	3	2	3	3	2	3
CO4	3	2	2	3	2	3	2	3	3	3	3	3

Correlations between contributions of COs for fulfillment of POs are defined using numbers: 0-No correlation; 1-Small correlation; 2-Large correlation; 3-full correlation

### Paper XII: Drug and Heterocycles

- CO1: Able to correlate structure activity relationship of bioactive compounds
- CO2: Give idea of different classes of drugs for particular diseases.
- CO3: Utilize their knowledge in synthesis of various bioactive heterocycles.
- CO4: Able to recognize reactivity and applications of three, four, five, six and seven-member heterocycles.

POs/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
COs												
CO1	3	3	3	3	3	3	2	3	3	3	3	3
CO2	3	3	2	2	2	3	2	3	3	2	3	3
CO3	3	3	3	3	2	3	2	2	3	2	3	3
CO4	3	2	2	3	2	3	2	3	3	3	3	3

Correlations between contributions of COs for fulfillment of POs are defined using numbers: 0-No correlation; 1-Small correlation; 2-Large correlation; 3-full correlation

### M.Sc.II Organic Chemistry Sem-III, Practical –III and IV

- CO1: Separate and analyze the different component mixtures of simple organic compounds
- CO2: Students will be able to purify organic compounds employing different techniques.
- CO3: Students will have good experimental skills for qualitative and quantitative analysis.
- CO4: Independently perform synthesis of simple organic compounds.

POs/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
COs												
CO1	3	3	3	3	3	3	1	3	3	3	3	3
CO2	3	3	2	2	2	3	3	3	3	2	3	3
CO3	3	3	3	3	2	3	3	2	3	2	3	3
CO4	3	2	2	3	2	3	2	3	3	3	3	3

Correlations between contributions of COs for fulfillment of POs are defined using numbers: 0-No correlation; 1-Small correlation; 2-Large correlation; 3-full correlation

### Paper XII B – Polymer chemistry [Elective Paper]

- CO1: Students will acquire the knowledge of Techniques of polymerization.
- CO2: Students can identify stereochemistry of polymers.
- CO3: Students will be able to apply their knowledge of polymerization in industries.
- CO4: Students will have an idea regarding Chemical kinetics of polymers

POs/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
COs												
CO1	3	3	3	3	3	3	2	3	3	3	3	2
CO2	3	3	2	2	2	3	3	3	3	2	3	2
CO3	3	3	3	3	2	3	3	2	3	2	3	2
CO4	3	2	2	3	2	3	2	3	3	3	3	2

Correlations between contributions of Cos for fulfillment of Pos are defined using numbers: 0-No correlation; 1-Small correlation; 2-Large correlation; 3-full correlation

## M. Sc. Part –II (Semester – IV)

### Paper No. OCH -XIII: THEORETICAL ORGANIC CHEMISTRY

- CO 1: Students will apply principles of green chemistry in organic synthesis
- CO 2: Students will be able to identify aromatic compounds.
- CO 3: Students will get an idea of calculation of delocalization energy of organic compounds.
- CO 4: Students will acquire knowledge of kinetic and thermodynamic controlled reactions.

POs/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
COs												
CO1	3	3	3	3	3	3	3	3	3	3	3	2
CO2	3	3	2	2	3	3	3	2	3	3	1	2
CO3	3	3	2	1	3	3	3	1	3	3	1	2
CO4	3	2	2	2	3	3	3	2	3	3	3	2

Correlations between contributions of Cos for fulfillment of Pos are defined using numbers: 0-No correlation; 1-Small correlation; 2-Large correlation; 3-full correlation

### Paper No. OCH -XIV: STEREOCHEMISTRY

- CO1: The study of stereochemical aspects of organic molecules gives very important tool in assigning the properties of bioactive molecules.
- CO2: Students will have sound knowledge about conformations of acyclic and cyclic compounds.
- CO3: Students will have sound expertise in designing of new bioactive molecules with specific stereochemical properties.
- CO4: Students will have an idea of applications of chiral reagents in asymmetric synthesis.

POs/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
COs												
CO1	3	3	3	3	3	3	2	3	3	3	3	2
CO2	3	3	3	2	3	3	2	2	3	2	2	2
CO3	3	3	3	3	3	3	3	1	3	3	1	2
CO4	3	2	2	3	3	3	3	2	3	2	3	2

Correlations between contributions of Cos for fulfillment of Pos are defined using numbers: 0-No correlation; 1-Small correlation; 2-Large correlation; 3-full correlation

## Paper XV: Chemistry of Natural Product

- CO1: Gain knowledge about classification of natural products and their stereochemistry.
- CO2: Illustrate the principles of biosynthesis, green synthesis, stereoselective transformations and its physiological role in human body.
- CO3: Understand structure and synthesis of various hormones.
- CO4: Able to understand vitamin deficiency and importance of different vitamins in human health.

POs/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
COs												
CO1	3	3	2	2	3	3	3	3	3	3	2	3
CO2	3	3	2	2	3	3	3	2	3	2	1	3
CO3	3	3	2	2	3	3	3	2	3	3	1	3
CO4	3	3	2	2	3	3	1	2	3	2	3	1

Correlations between contributions of Cos for fulfillment of Pos are defined using numbers: 0-No correlation; 1-Small correlation; 2-Large correlation; 3-full correlation

## Paper No. OCH -XVIA: APPLIED ORGANIC CHEMISTRY

- CO1: This knowledge helps to get placement to the students in agrochemicals, cosmetic, pharmaceuticals, dyes, polymers industries
- CO2: Students will have knowledge of cosmetics, perfumes and food flavours in day to day life.
- CO3: Knowledge of unit processing will be useful for automation industries.
- CO4: Students will get an idea of synthesis of pesticides and their applications in agriculture.



POs/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
COs												
CO1	3	3	3	3	3	3	3	3	3	3	2	3
CO2	3	3	3	3	3	3	3	3	3	2	2	3
CO3	3	3	3	3	3	3	3	2	3	3	3	3
CO4	3	3	2	2	3	3	2	2	3	2	3	2

Correlations between contributions of Cos for fulfillment of Pos are defined using numbers: 0-No correlation; 1-Small correlation; 2-Large correlation; 3-full correlation

## Paper No. OCH -XVIB BIOORGANIC CHEMISTRY

- CO1: Students will understand the concept building blocks of biomacromolecules.
- CO2: Students will have an idea regarding classification, structure and functions of different bioorganic molecules.
- CO3: Students will get idea regarding structure and functions of plant and animal cells.
- CO4: Students will understand the physiological role of RNA, DNA and enzymes.

POs/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
COs												
CO1	3	3	3	2	3	3	3	3	3	3	2	3
CO2	3	3	3	3	3	3	3	3	3	2	2	3
CO3	3	3	3	3	3	3	3	3	3	3	2	3
CO4	3	3	3	3	3	3	3	3	3	2	2	3

Correlations between contributions of Cos for fulfillment of Pos are defined using numbers: 0-No correlation; 1-Small correlation; 2-Large correlation; 3-full correlation

## M.Sc.II Organic Chemistry Sem-IV, Practical –V and VI

- CO1: To demonstrate professional and ethical attitude with enormous responsibility to servethe society

CO2: Students will have knowledge of safety signs on container of chemicals, safety in handling of chemicals, MSDS sheets.

CO3: Students will have ability to synthesize commercial products.

CO4: Based on the experience of project work, students will have ability to start their R & D laboratory.

Os/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
COs												
CO1	3	3	3	3	3	3	2	3	3	3	3	3
CO2	3	3	3	3	3	2	1	3	3	3	3	3
CO3	3	3	3	3	3	2	2	3	3	3	3	3
CO4	3	3	3	3	3	3	1	3	3	3	3	3

Correlations between contributions of Cos for fulfillment of Pos are defined using numbers: 0-No correlation; 1-Small correlation; 2-Large correlation; 3-full correlation