

|                       |  |
|-----------------------|--|
| <b>INSTITUTE</b>      | <b>FACULTY OF SCIENCE</b>              |
| <b>PROGRAM</b>        | <b>BACHELOR OF SCIENCE (CHEMISTRY)</b> |
| <b>SEMESTER</b>       | <b>6</b>                               |
| <b>COURSE TITLE</b>   | <b>ADVANCED ORGANIC CHEMISTRY</b>      |
| <b>COURSE CODE</b>    | <b>02CY0352</b>                        |
| <b>COURSE CREDITS</b> | <b>6</b>                               |

**Objective:**

- 1 To study reactive intermediates, name reactions and rearrangements.
- 2 To make students capable of understanding reagents and its applications.
- 3 To study the introduction, classification and nomenclature of carbohydrates.

**Course Outcomes:** After completion of this course, student will be able to:

- 1 Understand the concepts of reactive intermediates, name reactions and rearrangements.
- 2 Be aware of the basics of reagents and its applications .
- 3 Obtain the information regarding carbohydrates and its chemistry.
- 4 Obtain the information regarding carbohydrates configuration and synthesis.

**Pre-requisite of course:** To understand advanced concepts in organic chemistry

**Teaching and Examination Scheme**

| <b>Theory Hours</b> | <b>Tutorial Hours</b> | <b>Practical Hours</b> | <b>ESE</b> | <b>IA</b> | <b>CSE</b> | <b>Viva</b> | <b>Term Work</b> |
|---------------------|-----------------------|------------------------|------------|-----------|------------|-------------|------------------|
| 5                   | 0                     | 2                      | 50         | 30        | 20         | 25          | 25               |

| <b>Contents : Unit</b> | <b>Topics</b>   | <b>Contact Hours</b> |
|------------------------|---|----------------------|
| 1                      | <b>Reactive Intermediates, Name Reactions and Rearrangements</b><br>Homo and heterolytic fission, carbocations, carbanions, free radicals, Introduction to carbenes, nitrenes, benzynes, ylides and enamines. Ullmann reaction, Meerwein-pondorffvarley reaction, Knorr-pyrole reaction, skraup synthesis, Hantzsch-pyridine synthesis, Neber rearrangement, Stevens rearrangement, pinacol-pinacolone rearrangement. |                      |
| 2                      | <b>Reagents and its applications</b><br>Aluminium isopropoxide, N-bromosuccinimide, Diazomethane, Lithium aluminium hydride, Manganese dioxide, Wittig reagent, Selenium dioxide.   |                      |

| <b>Contents :<br/>Unit</b> | <b>Topics</b>  | <b>Contact<br/>Hours</b> |
|----------------------------|--|--------------------------|
| 3                          | <b>Carbohydrates</b><br>Introduction, classification and nomenclature, general reactions of monosaccharides (with reference to glucose and fructose), conversion of aldose to corresponding ketose, conversion of aldose to next higher ketose (Wolfson method), conversion of aldose to ketose having two more carbon atoms (Sowden method), conversion of ketose to corresponding aldose. Step-up reactions: Kiliani reaction and Swodennitromethane reaction, Step-down reactions: Ruff method, configuration of monosaccharides, ring structure of aldoses, determination of ring size of glucose by methylation method and periodic oxidation method, mutarotation of D(+) glucose. |                          |
| <b>Total Hours</b>         |  |                          |

#### Suggested List of Experiments:

| <b>Contents :<br/>Unit</b> | <b>Topics</b>  | <b>Contact<br/>Hours</b> |
|----------------------------|--|--------------------------|
| 1                          | <b>Experiments</b><br>Experiment - 1, Experiment - 2, Experiment - 3, Experiment - 4, Experiment - 5, Experiment - 6, Experiment - 7, Experiment - 8 |                          |
| <b>Total Hours</b>         |  |                          |

#### Textbook :

- Essentials of Carbohydrate Chemistry, John F. Robyt, Springer New York, 2012
- Organic Chemistry Reactions & Reagents, O.P. Agrawal, Krishna Prakashan, 2019

#### References:

- Organic Reactions And Their Mechanisms, Organic Reactions And Their Mechanisms, P.S. Kalsi, New Age International, 2009
- Organic Chemistry, Organic Chemistry, Morrison Boyd, Pearson, 1991
- Organic Chemistry, Organic Chemistry, S M Mukherji, S P Singh, R P Kapoor, R Dass, New Age International Publishers, 2012

#### Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

| Distribution of Theory for course delivery and evaluation |                   |              |                |                 |                                  |
|---|-------------------|--------------|----------------|-----------------|----------------------------------|
| <b>Remember /<br/>Knowledge</b>                           | <b>Understand</b> | <b>Apply</b> | <b>Analyze</b> | <b>Evaluate</b> | <b>Higher order<br/>Thinking</b> |
| 10.00   | 20.00             | 25.00        | 25.00          | 10.00           | 10.00                            |

**Instructional Method:**

- 1 The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory
- 5 Use of hazardous/toxic chemicals should be avoided as far as possible in laboratory.
- 6 All students in the laboratory must wear safety goggles and lab coats during lab session.

**Supplementary Resources:**

- 1 <http://nptel.ac.in/course.php?disciplineId=104>
- 2 <http://ocw.mit.edu/courses/chemistry/>
- 3 <http://vlab.amrita.edu/index.php?sub=2>
- 4 [http://www.vlab.co.in/ba\\_labs\\_all.php?id=9](http://www.vlab.co.in/ba_labs_all.php?id=9)
- 5 <https://www.youtube.com/user/TMPChem>
- 6 <https://www.youtube.com/playlist?list=PL166048DD75B05C0D>
- 7 <https://www.youtube.com/channel/UCqk-dmk3AOFtikaFDpsZorg>