



**THIRD-YEAR OF BACHELOR OF SCIENCE
CHEMISTRY (MAJOR)
REVISED SYLLABUS ACCORDING TO CBCS
NEP2020**

**COURSE TITLE: CHEMISTRY-III
SEMESTER-VI
W.E.F. 2025-2026**

**RECOMMENDED BY THE BOARD OF STUDIES IN CHEMISTRY
AND
APPROVED BY THE ACADEMIC COUNCIL
Devrukh Shikshan Prasarak Mandal's
Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and
Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh.
Tal. Sangameshwar, Dist. Ratnagiri-415804, Maharashtra, India**

Academic Council Item No: 02/2025

Name of the Implementing Institute	:	Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh. Tal. Sangameshwar, Dist. Ratnagiri-415804,
Name of the Parent University	:	University of Mumbai
Name of the Programme	:	Bachelor of Science
Name of the Department	:	Chemistry
Name of the Class	:	Third Year
Semester	:	Six (VI)
No. of Credits	:	02
Title of the Course	:	Chemistry-III
Course Code	:	S312CHT
Name of the Vertical in adherence to NEP 2020	:	Major
Eligibility for Admission	:	Any student admitted to Third Year of B.Sc. Degree Programme in adherence to Rules and Regulations of the University of Mumbai and Government of Maharashtra
Passing Marks	:	40%
Mode of Assessment	:	Formative and Summative
Level	:	5.5
Pattern of Marks Distribution for SEE and CIA	:	40:60%
Status	:	NEP-CBCS
To be implemented from Academic Year	:	2025-2026
Ordinances /Regulations (if any)	:	

Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce and Vid. Dadasaheb Pitre Science College, Devrukh (An Autonomous College Affiliated with University of Mumbai)

Syllabus for Third Year of Bachelor of Science in Chemistry

(With effect from the academic year 2025-2026)

SEMESTER-VI

Paper No.– III

Course Title: Chemistry-III

No. of Credits - 02

Type of Vertical: Major

COURSE CODE: S312CHT

Learning Outcomes Based on BLOOM's Taxonomy:

After Completing the Programme, Student will be able to,

Bloom Level	CO No.	Course Outcome
Remember	CO1	write the mechanisms of rearrangement reactions with examples and stereochemistry
Understand	CO2	understand the concept of Molecular chirality
Apply	CO3	predict the structure of simple organic compounds using individual or combined use of UV-Vis, IR, Mass and NMR spectroscopic technique

Syllabus for Third Year of Bachelor of Science in Chemistry

(With effect from the academic year 2025-2026)

SEMESTER-VI

Paper No.– III

Course Title: Chemistry-III

No. of Credits - 02

Type of Vertical: Major

COURSE CODE: S312CHT

COURSE CONTENT			
Module No.	Content	Credits	No. of Hours
1	1.1 Stereochemistry and Biomolecules (4L) 1.1.1 Stereoselectivity and stereospecificity: Idea of enantioselectivity (ee) and diastereoselectivity (de), Topicity: enantiotopic and diastereotopic atoms, groups and faces. 1.1.2 Stereochemistry of a) Addition reactions to olefins: a) bromination (electrophilic anti addition) b) syn hydroxylation with KMnO_4 1.2 Amino acids & Peptides (4L) 1.2.1 α-Amino acids: General Structure, configuration, and classification based on structure and nutrition. 1.2.2 Properties: pH dependency of ionic structure, isoelectric point and zwitter ion. 1.2.3 Polypeptides: nature of polypeptides, Nomenclature and representation of polypeptides (di-and tri-peptides) with examples 1.2.4 Merrifield solid phase polypeptide synthesis 1.2 Molecular Rearrangements (4L) Mechanism of the following rearrangements with examples and stereochemistry wherever applicable. 1.2.1 Migration to the electron deficient carbon: Pinacol-pinacolone rearrangement. 1.2.2 Migration to the electron deficient nitrogen: Beckmann rearrangement. 1.2.3 Name reactions: Michael addition 1.3 Carbohydrates (4L) 1.3.1 Introduction: classification, reducing and non-reducing sugars, DL notation, Structures of monosaccharides: Fischer projection (4-6 carbon monosaccharides) and Haworth formula (furanose and pyranose forms of pentoses and hexoses) 1.3.2 Reactions of D-glucose and D-fructose: (a) Osazone formation (b) reduction: H_2/Ni, NaBH_4 (c) oxidation: bromine water, HNO_3, HIO_4 (d) acetylation (e) methylation:(d) and (e) with cyclic pyranose forms	01	15

2	2.1 Spectroscopy (15L) 2.1.1 IR Spectroscopy: Basic theory, nature of IR spectrum, selection rule, fingerprint region. 2.1.2 PMR Spectroscopy: Basic theory of PMR, nature of PMR spectrum, chemical shift (δ unit), standard for PMR, solvents used. Factors affecting chemical shift: (1) inductive effect (2) anisotropic effect (with reference to C=C, C$\equiv$C, C=O and benzene ring). Spin- spin coupling and coupling constant, application of deuterium exchange technique, application of PMR in structure determination. 2.1.3 Spectral characteristics of following classes of organic compounds, including benzene and monosubstituted benzenes, with respect to IR and PMR: (1) alkanes (2) alkenes (3) alkynes (4) haloalkanes (5) alcohols (6) carbonyl compounds (7) ethers (8) amines (broad regions characteristic of different groups are expected). Problems of structure elucidation of simple organic compounds using individual or combined use of UV-Vis, IR, Mass and NMR spectroscopic technique are expected. (Index of hydrogen deficiency should be the first step in solving the problems).	01	15
	Total	02	30

Access to the Course

The course is available for all the students admitted for Third Year Bachelor of Science.

Methods of Assessment

The assessment pattern would be 40:60, 60% for Semester End Examination (SEE) and 40% for Continuous Internal Assessment (CIA). The structure of the SEE and CIA would be as recommended by the Board of Studies and approved by the Board of Examination and the Academic Council of the college.

References:

1. Organic Chemistry, Francis A Carey, Pearson Education, 6th Ed., Special Indian Ed. 2008.
2. Organic Chemistry, R.T. Morrison and R.N. Boyd, 6th Edition, Pearson Edition.
3. Organic Chemistry, T.W.G. Solomon and C.B. Fryhle, 8th Edition, John Wiley & Sons, 2004.
4. Organic Chemistry Baula Y. Bruice, Pearson Edition, 2008.
5. Organic Chemistry, J.G. Smith, 2nd Edition Special Indian Edition, Tata. McGraw Hill.
6. Stereochemistry, P.S. Kalsi, New Age International Ltd. 4th Edition, 2006
7. Organic Spectroscopy by Jag Mohan
8. Organic Spectroscopy by P.S. Kalsi, New Age International Ltd.

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