



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

**COURSE TITLE: PHYSICAL, INORGANIC & ORGANIC CHEMISTRY-II
SEMESTER-I
W.E.F. 2023-2024**

**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: 03 dated 08 July 2023

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	:	First Year
Semester	:	First
No. of Credits	:	02
Title of the Course	:	Physical, Inorganic & Organic Chemistry-II
Course Code	:	S102CHT
Name of the Vertical in adherence to NEP 2020	:	Major and Minor
Eligibility for Admission	:	Any 12 th Science Pass learner seeking admission to 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	:	UG
Pattern of Marks Distribution for SEE and CIA	:	60:40
Status	:	NEP-CBCS
To be implemented from Academic Year	:	2023-2024
Ordinances /Regulations (if any)		

Syllabus for First Year of Bachelor of Science in Chemistry

(With effect from the academic year 2023-2024)

SEMESTER-I

Paper No.– 2

Course Title: Physical, Inorganic & Organic Chemistry-II

No. of Credits - 02

Type of Vertical: Major and Minor

COURSE CODE: S102CHT

Learning Outcomes Based on BLOOM's Taxonomy:

After completing the course, the learner will be able to...

Course Learning Outcome No.	Blooms Taxonomy	Course Learning Outcome
CLO-01	Understand	explain order, rate, types of the order of reaction, trends in properties of main group elements, concepts of surface tension and viscosity.
CLO-02	Apply	draw Fischer, Newman and Sawhorse Projection formulae.
CLO-03	Analyse	distinguish between diastereomers, meso structures, racemic mixture and resolution as well as environmental aspects of oxides and oxyacids

Syllabus for First Year of Bachelor of Science in Chemistry

(With effect from the academic year 2023-2024)

SEMESTER-I

Paper No.– 2

Course Title: Physical, Inorganic & Organic Chemistry-II

No. of Credits - 02

Type of Vertical: Major and Minor

COURSE CODE: S102CHT

COURSE CONTENT			
Module No.	Content	Credits	No. of Hours
1	<p>Unit I</p> <p>1.1 Chemical Kinetics:</p> <p>Rate of reaction, rate constant, measurement of reaction rates, order and molecularity of reaction, integrated rate equation of first and second order reactions (with equal initial concentration of reactants) (Numerical Problems expected) Determination of order of reaction by (a) Integration method (b) Graphical method (c)Ostwald's isolation method (d) Half time method (Numerical Problems expected)</p> <p>1.2 Liquid State:</p> <p>Surface tension: Introduction, methods of determination of surface tension by drop number method (Numerical Problems expected) Viscosity: Introduction, coefficient of viscosity, relative viscosity, specific viscosity, reduced viscosity, determination of viscosity by Ostwald viscometer (Numerical Problems expected) Refractive index: Introduction, molar refraction and polarizability, determination of refractive index by Abbe's refractometer (Numerical Problems expected)</p>	02	10
2	<p>Unit-II</p> <p>Comparative chemistry of Main Group Elements:</p> <p>Metallic and non-metallic nature, oxidation states, electronegativity, anomalous behavior of second period elements, allotropy, catenation, diagonal relationship. Comparative chemistry of carbides, nitrides, oxides and hydroxides of group I and group II elements. Some important compounds- NaHCO₃, Na₂CO₃, NaCl, NaOH, CaO, CaCO₃; oxides of carbon, oxides and oxyacids of Sulphur and nitrogen with respect to environmental aspects.</p>		10

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3	<p>Unit III</p> <p>Stereochemistry I:</p> <ul style="list-style-type: none"> • Two-dimensional molecule in three-dimension formula: Fischer Projection, Newman and Sawhorse Projection formulae (of erythro, threo isomers of tartaric acid and 2,3-dichlorobutane, cyclic compounds) and their interconversions; Geometrical isomerism in alkene and cycloalkanes: cis–trans and syn-anti isomerism E/Z notations with C.I.P rules. Optical Isomerism: Optical Activity, Specific Rotation, Chirality/Asymmetry, Enantiomers, Molecules with two similar and dissimilar chiral-centers. • Diastereoisomers, meso structures, racemic mixture and resolution (methods of resolution not expected). Relative and absolute configuration: D/L and R/S designations. Conformation analysis of alkanes (ethane, propane and n-butane); Relative stability with energy diagrams. 	10	
Total		02	30

Access to the Course

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

Methods of Assessment

The assessment pattern would be 60:40, 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:

Unit I:

1. Atkins P.W. and Paula J.de, Atkin's Physical Chemistry, 10th Ed., Oxford University Press (2014).
2. Ball D.W., Physical Chemistry, Thomson Press, India (2007).
3. Castellan G.W., Physical Chemistry, 4th Ed., Narosa (2004).
4. Mortimer R.G., Physical Chemistry, 3rd Ed., Elsevier: NOIDA, UP (2009).
5. Engel T. and Reid P., Physical Chemistry, 3rd Ed., Pearson (2013).
6. Peter A. and Paula J. de., Physical Chemistry, 10th Ed., Oxford University Press (2014).
7. McQuarrie D.A. and Simon J.D., Molecular Thermodynamics, Viva Books Pvt. Ltd., New Delhi (2004).
8. Levine I.N., Physical Chemistry, 6th Ed., Tata Mc Graw Hill (2010).
9. Metz C.R., 2000 Solved Problems in Chemistry, Schaum Series (2006).
10. Mortimer R.G., Physical Chemistry, 3rd Ed., Elsevier: NOIDA, UP (2009).
11. Banwell C.N., Fundamentals of Molecular Spectroscopy, 4th Ed., Tata McGraw Hill (1994).
12. K.L. Kapoor, A Textbook of Physical Chemistry, Macmillan (2000).
13. A. Bhal, B.S. Bahl, G.D.Tuli- Essential of physical Chemistry

Unit II:

1. Lee, J.D. Concise Inorganic Chemistry ELBS, 1991.
2. Douglas, B.E. and McDaniel, D.H. Concepts & Models of Inorganic Chemistry Oxford, 1970
3. Atkins, P.W. & Paula, J. Physical Chemistry, 10th Ed., Oxford University Press, 2014.
4. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications, 1962.
5. Rodger, G.E. Inorganic and Solid State Chemistry, Cengage Learning India Edition, 2002.
6. Textbook of Inorganic Chemistry- O.P.Tandon, GRS.

Unit III:

1. Morrison, R. T. and Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt Ltd. (Pearson Education). 2012
2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt Ltd. (Pearson Education).
3. Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt Ltd. (Pearson Education).

4. Eliel, E. L. and Wilen, S. H. Stereochemistry of Organic Compounds, Wiley: London, 1994.
5. Kalsi, P. S. Stereochemistry Conformation and Mechanism, New Age International, 2005.
6. McMurry, J.E. Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning India Edition, 2013.
7. Paula Y Bruice, Organic Chemistry, pearson education, Asia.
8. Graham Solomon, Fryhle, Snyder, Organic Chemistry, wiley publication.
9. Bahl and Bahl, advanced organic chemistry by S. Chand publication.
10. Guidebook to the mechanism in organic chemistry by P. Sykes.