

As Per NEP 2020

University of Mumbai



Syllabus of Minor	
Board of Studies in Chemistry	
UG First Year Programme	
Semester	II
Title of Paper	Credits 2/4
I) Fundamentals in Physical, Inorganic and Organic Chemistry	2
From the Academic Year	2024-2025

Fundamentals in Physical, Inorganic and Organic Chemistry

Sr. No.	Heading	Particulars
1	Description the Course:	The course aims to acquaint the students to the fundamental concepts of Physical, Inorganic and Organic Chemistry and their applications
2	Vertical:	Minor
3	Type :	Theory
4	Credits :	2 Credits (1 Credit = 15 Hours for Theory)
5	Hours Allotted :	30 Hours
6	Marks Allotted:	50 Marks
7	Course Objectives (CO): CO-1 To understand the concepts of concentration units and its calculations CO-2 To reveal the concept of pH, pOH and buffer solution CO-3 To understand the basics of atomic structure CO-4 To understand the arrangement of elements in periodic table and periodicity in the properties of elements CO-5 To introduce the students with organic compounds and its IUPAC nomenclature CO-6 To acquaint with hybridization of carbon and fundamentals of organic reaction mechanism	
8	Course Outcomes (OC): Student will be able to - OC- Prepare solution of different concentration OC-2 Use the concept of pH, pH Scale and its relevance to acidity and basicity OC-3 Design the structure of atom and understand the location of subatomic particles OC-4 Express periodic changes in the properties of elements OC-5 Draw the structure and identify the name of organic compounds OC-6 Spell about the hybridization of carbon in organic compounds	

9	Modules
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Semester	Paper	Module	Description	Credits
II	Paper I: MN1: Fundamentals in Physical Inorganic and Organic Chemistry	I	Physical Chemistry 1.1 Introduction to the Concept of Concentration for Solutions: (05L) 1.2 Chemistry of Acid and Bases (05L)	02
		II	Inorganic Chemistry 2.1 Atomic Structure (05L) 2.2 Periodic Table and Periodicity (05L)	
		III	Organic Chemistry 3.1 Classification and Nomenclature of Organic Compounds (04L) 3.2 Bonding and Structure of Organic Compounds (03L) 3.3 Fundamentals of Organic Reaction Mechanism (03L)	

Module I	Physical Chemistry
1.1	Introduction to Concept of Concentration for Solutions: (5L) Concepts of Normality, Molarity, Molality, Mole Fraction, PPM, PPB (Numerical problems are expected)
1.2	Chemistry of Acid and Bases (5L) Lewis Theory of Acid Bases, Types of acid bases - Strong and weak acids and bases, Ionization of water, Concept of pH and pOH, pH scale, Buffer solutions, Henderson's Equation
Module II	Inorganic Chemistry
2.1	Atomic structure: (5L) Historical Perspectives of the Atomic Structure: J.J. Thomson Model, Rutherford's Atomic Model- alpha particle scattering experiment, Bohr's theory- Theory, its limitations and atomic spectrum of hydrogen atom.
2.2	Periodic Table and Periodicity: (5L) 2.2.1 Long form of Periodic Table; Classification for elements as main group, transition and inner transition elements. 2.2.2 Periodicity in the Following Properties Atomic and ionic size, electron gain enthalpy, ionization enthalpy, effective nuclear charge, electronegativity.
Module III	Organic Chemistry
3.1	Classification and Nomenclature of Organic Compounds (4L) Nomenclature of mono and bi- functional aliphatic compounds on the basis of priority order of the following classes of compounds- Alkanes, alkenes, alkynes
3.2	Bonding and Structure of Organic Compounds (3L) Overlap of atomic orbitals- Overlaps of atomic orbitals to form sigma and pi bonds Hybridization- sp ³ , sp ² , sp hybridization of carbon
3.3	Fundamentals of Organic Reaction Mechanism (3L)

	Basic terms and concepts- Homolytic and heterolytic fission with curly arrows with suitable examples. Electrophiles and nucleophiles Reactive intermediates in organic reaction- Carbocations, Carbanions and Free radicals
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10. Reference Books:

Physical Chemistry

- 1) Concise Graduate Chemistry – I, II, III & IV, University Text Book of Chemistry, University of Mumbai.
- 2) Atkins, P. W. & Paula, J. de Atkin's Physical Chemistry 10th Ed., Oxford University Press (2014).
- 3) Castellan, G. W. Physical Chemistry 4th Ed. Narosa (2004).
- 4) Keith J. Laidler & John H. Meiser, Physical Chemistry, 2nd Ed. (2004)
- 5) Puri B. R., Sharma L. R. & Pathania M. S. Principles of Physical Chemistry, Vishal Publishing Company, 2008

Inorganic Chemistry

1. Concise Graduate Chemistry – I, II, III & IV, University Text Book of Chemistry, University of Mumbai.
2. Lee, J.D. Concise Inorganic Chemistry ELBS, 1991.
3. Douglas, B.E. and McDaniel, D.H. Concepts & Models of Inorganic Chemistry, Oxford, 1970
4. Atkins, P.W. & Paula, J. Physical Chemistry, 10th Ed., Oxford University Press, 2014. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications, 1962.

Organic Chemistry

1. Concise Graduate Chemistry – I, II, III & IV, University Text Book of Chemistry, University of Mumbai.
2. Morrison, R. T. and Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt Ltd. (Pearson Education).2012
3. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt Ltd. (Pearson Education).
4. Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt Ltd. (Pearson Education).
5. Bahl and Bahl, Advanced Organic chemistry by S. Chand publication.2010
6. Peter Sykes. Guidebook to the mechanism in Organic chemistry ,6th edition

11	Internal Continuous Assessment: 40% (20 Marks)	External, Semester End Examination: 60% Individual Passing in Internal and External Examination (30 Marks)
12	Continuous Evaluation through: Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	As per the Format of Question Paper
13	Format of Question Paper: for the final examination	

Question Paper Pattern for 30 Marks

Semester End Theory Examination:

1. Duration - These examinations shall be of **one hour** duration.
2. Theory question paper pattern:
 - a. There shall be **03** questions each of **10 marks** on each unit
 - b. All questions shall be compulsory with internal choice within the questions

Question	Particulars	Marks	Questions Based on
Q.1	A) Objective questions 04 out of 06	04	Module I
	B) Subjective questions 02 out of 03	06	
Q.2	A) Objective questions 04 out of 06	04	Module II
	B) Subjective questions 02 out of 03	06	
Q.3	A) Objective questions 04 out of 06	04	Module III
	B) Subjective questions 02 out of 03	06	
Total		30	---

Sign of the
Dr. Sunil Patil
Co-ordinator,
Board of Studies in
Chemistry

Sign of the
Prin. (Dr.) Madhav Rajwade
Offg. Associate Dean,
Faculty of Science and
Technology

Sign of the
Prof. (Dr.) Shivram Garje
Offg. Dean,
Faculty of Science and
Technology