



Smt. Chandibai Himathmal Mansukhani College

(Autonomous)

(Affiliated to the University of Mumbai)

University College Code : 217-JD Office : T14



Principal : Dr. Manju Lalwani Pathak

Ref No: CHM (A) AC/C/01/2025

Date: 18th June 2025

CIRCULAR

The immediate attention of all concerned is invited to this office Circular No. CHM (A) AC 05/2025 dated 19th May, 2025 regarding the Choice Based and Credit Based Syllabus (CBCS) for all subjects of F.Y.B.Sc. & T.Y.B.Sc. in Chemistry SEM - I & SEM - V respectively.

It is hereby communicated that the recommendations of the syllabus made by the Ad-hoc Board of Studies in Chemistry coordinated by the Dean, Faculty of Pure Sciences in the meeting of Academic Council held on 23rd May, 2025 vide item No. 5.2, have been accepted and subsequently passed.

In accordance, therewith, the syllabus as per the CBCS has been brought into force with effect from the academic year 2025 – 2026 and accordingly the same is attached for reference and is available on the College's website www.chmcollege.in

Ulhasnagar - 421 003

18th June, 2025

Dr. Manju Lalwani Pathak

Principal & Chairperson, Academic Council

Copy forwarded for information to:-

- 1) The Dean, Faculty of Pure Sciences
- 2) The Chairperson, Ad-hoc Board of Studies.
- 3) The Controller of Examination.
- 4) The Registrar



HSNC Board's
Smt. Chandibai Himathmal Mansukhani College, Ulhasnagar
(Autonomous)
Affiliated to the University of Mumbai

Bachelors of Science
(Chemistry)
(Aided Course)

Semester – I

Choice Based and Credit Based syllabus
as per NEP 2020 with effect from the
Academic Year 2025-2026

PREAMBLE

Present program is designed to provide a basic understanding of Chemistry keeping in view the student centric learning pedagogy, which is entirely outcome-oriented and emphasizing on skill enhancement. Curriculum of B.Sc. (Chemistry) is framed to equip students with a basic theoretical foundation, Practicum skills, and critical thinking abilities necessary to address the challenges and opportunities in the diverse fields of the subject. There is continuous evaluation of students based on quizzes, class tests and assignments. Emphasis is given to conceptual understanding of theoretical concepts followed by inclusion of the same in Practicum. In line with recent trends in the education section, this syllabus fosters implementation of modern pedagogical tools such as hybrid learning, e- learning platforms to understand basic concepts. The aims and objectives of the B.Sc. (Chemistry) course are designed to provide students with a foundational understanding of the principles and applications of chemistry. These aims and objectives align with broader educational goals, focusing on academic, Practicum, and professional development. The course certainly helps to apply acquired skills to entry-level positions in industries requiring a foundation in chemistry. Present approach is intended to follow flexibility and innovation in design of the program. The framework is intended to allow flexibility and innovation in program design, syllabi development, teaching-learning process and quality assessment of students' learning levels mix of academic knowledge, Practicum skills, and industry exposure.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Fundamental understanding: Students can have better command of fundamental principles, laws, concepts, and formulae in chemistry.

PSO2: Problem-solving: Students are able to apply their knowledge to systematically approach the problems in various areas of chemistry, including those encountered in industry and everyday life.

PSO3: Laboratory skills: Students will gain hands-on experience in laboratory techniques, including handling instruments and chemicals, as well as designing, implementing, and analyzing experiments.

PSO4: Research orientation: Students will develop an aptitude and understanding of research methodologies and be able to contribute to research projects.

**Smt. Chandibai Himathmal Mansukhani College
(Autonomous)**

**First Year B. Sc.
(Chemistry)**

Semester- I

**Title: Basics in Physical, Inorganic and
Organic Chemistry**

**Vertical – 1
(MAJOR)**

**with effect from
Academic Year 2025-2026**

Title: Basics in Physical, Inorganic and Organic Chemistry
[Course Code: CHMCHI1]

Sr. No.	Heading	Particulars
1	Description of the Course	This course introduces students to the fundamental principles of chemistry and their Practicum applications in in the field of chemistry. It begins with developing and understanding of the concepts in all disciplines of chemistry. The course enhances knowledge of basic analytical tools. The course helps to solve the problem and also think methodically, independently and draw a logical conclusion. Students can employ critical thinking and the scientific knowledge to design, carryout, record and analyze the results of chemical reactions. The course can help to create an awareness of the impact of chemistry on the environment, society, and development outside the scientific community.
2	Vertical	1
3	Type Teaching Methodology	Theory Classroom Discussion / Demonstration / Presentation / Real time Problem Solving
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: 1. To understand the basic concept of viscosity, preparation of solutions, kinetics, rate laws and determination of orders of reactions. 2. To understand basic concepts of electrochemistry, thermodynamics and surface tension 3. To comprehend the history of atomic structure, periodicity and properties of elements. 4. To distinguish the qualitative methods for identification of inorganic compounds; types of chemical bonds in molecule/ compounds and theories. 5. To develop critical thinking about different types of organic compounds and about stereochemical approach of organic compounds	
8	Learning Outcomes: Upon completion of the course, student will be able to LO1 learn concepts related to state of matter and different methods of concentration expressions and rate laws. LO2 acquire the knowledge related to electrochemistry, thermodynamics and surface tension. LO3 classify the elements on the basis of theory learnt and will understand the historical.	

	perspective of atomic structure LO4 identify different methods of qualitative analysis and various theories of chemical bonds. LO5 identify the organic compounds on the basis of nomenclature and stereochemistry.
9	Syllabus UNIT I: Physical Chemistry • Liquid State: Introduction, coefficient of viscosity, relative viscosity, specific viscosity, reduced viscosity, determination of viscosity by Ostwald viscometer. • Chemical Calculations: Mole concept, molar mass & Percentage composition, Methods of expressing concentration of solutions: Normality, Molarity, Molality, Mole fraction ppm, ppb. Preparation of solutions (Dilution). (Numerical problems expected wherever necessary) • Chemical Kinetics: Rate of reaction, rate constant, measurement of reaction rates, order and molecularity of reaction, Integrated rate equation of first order and Second order reactions (with equal initial concentration of reactants) .Determination of order of reaction by a) Integration method b) Graphical method c) Ostwald's isolation method d) Half time method (Numerical problems expected wherever necessary). UNIT II: Inorganic Chemistry • Atomic Structure: Historical perspectives of the atomic structure; J.J. Thomson Model, Rutherford's Atomic Model- alpha particle scattering experiment, Bohr's theory, Aufbau principle, Hund's rule of maximum multiplicity and Pauli exclusion principle, Applications of Atomic Structure in Modern Science • Periodic Table and Periodicity: Classification for elements as main group, transition and inner transition elements. Atomic and ionic size, electron gain enthalpy, ionization enthalpy, effective nuclear charge (Slater's rule), electronegativity, Pauling and Mulliken methods. (Numerical problems expected, wherever applicable.) UNIT III: Organic Chemistry • Classification and Nomenclature of Organic Compounds: Nomenclature of mono and bi-functional aliphatic compounds on the basis of priority order of the following classes of Basic Principles of compounds: haloalkanes, alcohols, ethers, aldehydes, ketones, carboxylic acids. • Stereochemistry: Flying Wedge projection, Fischer Projection, Newman and Sawhorse Projection formulae (erythro, threo isomers of tartaric acid and 2,3 - dichlorobutane) and their interconversions; R/S nomenclature, E/Z notations with C.I.P rules. Conformational analysis of n-butane; Relative stability with energy profile diagrams, Introduction to Optical activity. Basic concepts of Chirality (dissymmetry), enantiomers, diastereomers and meso isomers (with examples like Lactic acid (1C), glyceraldehyde(1C), Tartaric acid (2C))

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

A. External Theory Examination: Semester End Total Marks - 30 Time- 1.0 hour
Format of Question Paper

Question No	Nature of Questions	Marks
Q1	A)Objective questions 4 out of 6	4
	B)Subjective questions 2 out of 3	6
Q2	A)Objective questions 4 out of 6	4
	B)Subjective questions 2 out of 3	6
Q3	A)Objective questions 4 out of 6	4
	B)Subjective questions 2 out of 3	6
		Total 30

Note:

- Each questions will carry 10 marks.
- All questions shall be compulsory with internal choice within the questions.
- Use of simple calculator is allowed in the examination.

B. Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Viva/ Real time Assignments/ Objective Question Tests	15
2.	Active participation	05
		Total 20

11

REFERENCES:

- Instrumental Analysis by Douglas A. Skoog, F. James Holler, Stanley R. Crouch (2006)
- Fundamental of Analytical Chemistry by Douglas A. Skoog, West, F. James Hollers'. Crouch (2009)
- Modern Analytical Chemistry by David Harvey, McGraw-Hill Higher Education (1999)
- S.M. Khopkar, "Basic Concepts of Analytical Chemistry", IInd Edition New Age International Publisher (2004)
- Principles of Instrumental Analysis, D. A. Skoog, F. James Holler, Stanley R. Crouch (2007)
- Vogel's Textbook of Quantitative Chemical Analysis, 5th edition (1989)
- Instrumental method of analysis, B.K. Sharma, Goel publishing house. Miscellaneous methods (2005)

**Smt. Chandibai Himathmal Mansukhani College
(Autonomous)**

**First Year B. Sc.
(Chemistry)**

Semester- I

**Title: Practicals in Basics in Physical, Inorganic
and Organic Chemistry**

**Vertical – 1
(MAJOR)**

**with effect from
Academic Year 2025-2026**

Title: Practicals in Basics in Physical, Inorganic and Organic Chemistry
[Course Code: CHMCHI2]

Sr. No.	Heading	Particulars
1	Description of the Course	This course introduces students to the fundamental principles of chemistry and their Practicum applications in in the field of chemistry. It begins with developing and understanding of major concepts in all disciplines of chemistry. The course enhances knowledge of basic analytical tools. The course helps to solve the problem and also think methodically, independently and draw a logical conclusion. Students can employ critical thinking and the scientific knowledge to design, carryout, record and analyze the results of chemical reactions. The course can help to create an awareness of the impact of chemistry on the environment, society, and development outside the scientific community.
2	Vertical	1
3	Type Teaching Methodology	Practicum Experimental \ Demonstration \ Handling of instruments
4	Credit	2 Credits
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives: 1. The First Year B.Sc. Chemistry Practicum syllabus aims to equip students with fundamental laboratory skills and knowledge in chemistry. 2. The course objectives focus on building a strong foundation for advanced studies and Practicum applications in chemistry. 3. To enable students to develop critical thinking, efficient experimental skills in all chemistry disciplines, scientific temper and research-based skills. 4. To provide knowledge of basic branches of chemistry and leverage it to develop interest in contemporary chemistry aspects	

8	Learning Outcomes: Upon completion of the course, student will be able to LO1 prepare solutions of different concentrations and standardize the given solutions. LO2 determine rate constant of a reaction and understand effect of time on rate of reaction. LO3 perform quantitative commercial analysis of compounds by volumetric titration method. LO4 calculate the percent purity of samples by gravimetric method. LO5 purify various organic compounds by recrystallization technique and calibrate thermometer and determine physical constants; M.P. and B.P.												
9	Syllabus Physical Chemistry • To prepare 0.1 N succinic acid and standardize the NaOH solution of different concentrations. • To standardize Sodium thiosulphate solution. • To determine the rate constant for the hydrolysis of ester using HCl as catalyst. • Introduction to instruments: pH meter, Potentiometer, Colorimeter and Conduct meter (Demonstration only) Inorganic Chemistry • To determine the strength of commercial acid sample (HCl) by volumetric analysis. • To estimate the content of Na₂CO₃ and NaHCO₃ in the given sample using double indicator by volumetric analysis. • To determine the percent purity of sample of BaSO₄ containing NH₄Cl gravimetrically. Organic Chemistry • Purification of organic compounds by recrystallization selecting suitable solvent (minimum 2 Organic compounds to be given, Students are expected to report a) Solvent for recrystallization b) Percentage Yield and the melting points of the purified compound.) • Basic principles involved in characterization of Organic compound (minimum 4 Solid Organic compounds, Students should perform Preliminary Tests, Solubility Test, obtain melting point and recrystallize the compound with given solvent)												
10	Scheme of Practicum Examination and Assessment Pattern Total – 50 Marks A. Practicum Examination: Total Marks - 50 marks Time: 3.5 hours <table><tr><th></th><th>Assessment / evaluation</th><th>Marks</th></tr><tr><td>1.</td><td>Viva/Assignments/Objective Question Tests (15Marks), Overall Performance (5Marks)</td><td>20</td></tr><tr><td>2.</td><td>One experiment (25 marks for Experiment and 5 Marks for Journal)</td><td>30</td></tr><tr><td></td><td style="text-align: right;">Total</td><td>50</td></tr></table>		Assessment / evaluation	Marks	1.	Viva/Assignments/Objective Question Tests (15Marks), Overall Performance (5Marks)	20	2.	One experiment (25 marks for Experiment and 5 Marks for Journal)	30		Total	50
	Assessment / evaluation	Marks											
1.	Viva/Assignments/Objective Question Tests (15Marks), Overall Performance (5Marks)	20											
2.	One experiment (25 marks for Experiment and 5 Marks for Journal)	30											
	Total	50											

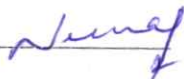
REFERENCES:

1. Instrumental Analysis by Douglas A. Skoog, F. James Holler, Stanley R. Crouch (2006)
2. Fundamental of Analytical Chemistry by Douglas A. Skoog, West, F. James Hollers'. Crouch (2009)
3. Modern Analytical Chemistry by David Harvey, McGraw-Hill Higher Education (1999)
4. S.M. Khopkar, "Basic Concepts of Analytical Chemistry", IInd Edition New Age International Publisher (2004)
5. Principles of Instrumental Analysis, D. A. Skoog, F. James Holler, Stanley R. Crouch (2007)
6. Vogel's Textbook of Quantitative Chemical Analysis, 5th edition (1989)
7. Instrumental method of analysis, B.K. Sharma, Goel publishing house. Miscellaneous methods (2005)

Department of Chemistry

Sr No	Name of the Faculty	Designation and College	Signature
1.	Dr. Yogini Bambardekar	Head, Associate Professor Smt.CHM College, Ulhasnagar Bambardekar.yogini@gmail.com	
2.	Dr. Sarika Chhabria Talreja	Associate Professor Smt.CHM College, Ulhasnagar sarikachhabriatalreja@gmail.com	
3.	Dr. Nagesh Sutar	Associate Professor Smt.CHM College, Ulhasnagar Nageshr.sutar@gmail.com	
4.	Dr. Neena Anand	Associate Professor Smt.CHM College, Ulhasnagar dr.neenanand@gmail.com	
5.	Dr. Sandeep Kotwal	Associate Professor Smt.CHM College, Ulhasnagar sandeepbkotwal@gmail.com	
6.	Dr. Prashant Thorat	Assistant Professor Smt.CHM College, Ulhasnagar drthoratprashant@gmail.com	
7.	Dr. Gayatree Shinde	Assistant Professor Smt.CHM College, Ulhasnagar Gayatree.g@gmail.com	
8.	Dr. Prajakta More	Assistant Professor Smt.CHM College, Ulhasnagar prajaktasandeep@gmail.com	
9.	Dr. Nilanjana Kar	Assistant Professor Smt.CHM College, Ulhasnagar Nilkar.nilanjanakar@gmail.com	
10.	Mr. Dnyaneshwar Gholap	Assistant Professor Smt.CHM College, Ulhasnagar gholapdnyaneshwar.chmc.chem@gmail.com	

Name & Signature of the Adhoc BoS Chairperson: Dr. Yogini Bambardekar 

Name & Signature of the Dean: Dr. Neena Anand 

HEAD
CHEMISTRY DEPARTMENT
SMT. C.H.M. COLLEGE
ULHASNAGAR-421 003



**Smt. Chandibai Himathmal Mansukhani College
(Autonomous)**

**First Year B. Sc.
(Chemistry)**

Semester- I

**Vertical – 2
(MINOR)
Not Applicable**

**with effect from
Academic Year 2025-2026**

**Smt. Chandibai Himathmal Mansukhani College
(Autonomous)**

**First Year B. Sc.
(Chemistry)**

Semester- I

**Vertical – 3
(OPEN ELECTIVE)**

**with effect from
Academic Year 2025-2026**

OPEN ELECTIVES (OE)

For First Year B.Sc.

(Physics, Chemistry, Mathematics, Botany, Zoology, Microbiology)

Students are required to select any one OE subject from the list below

Sr. No.	Subject Name
1.	Communicative English
2.	Performing Arts
3.	Journalism in Hindi
4.	Event Management Course in Sindhi
5.	Basic Tools of AI for Economics and Education
6.	Political Communication and Media Skills
7.	Stress Management - I
8.	Social Media and Communication
9.	Urbanization and Real Estate: Concepts and Contemporary Scenarios
10.	Business of Travel and Tours
11.	Lessons of Reel Making
12.	Basic Accounting
13.	Soft Skills for Corporate Readiness
14.	Business Statistics and SPSS
15.	Beautician : Strategic Business Planning
16.	Current Trends of Fashion Design: Financial Perspective
17.	Digital Marketing
18.	Managing Family Wealth through Family Office
19.	Online Trading in Stock Market



**Smt. Chandibai Himathmal Mansukhani College
(Autonomous)**

**First Year B. Sc.
(Chemistry)**

Semester- I

Title:

VSC- Calibration of Glassware and instruments

Vertical - 4

**with effect from
Academic Year 2025-2026**

Title: Calibration of Glassware and Instruments
[Course Code: CHMCHI4]

Sr. No.	Heading	Particulars
1	Description of the Course	The aim of Vocational Skill Courses (VSC) designed to provide experiential learning for students, which help to develop their technical skill through hands-on training and also developing abilities of critical thinking, Analytical skill, collaboration, teamwork, problem-solving and communication which mold their careers.
2	Vertical	4
3	Type Teaching Methodology	Theory & Practicum Classroom Discussion / Presentation / Real time Problem Solving Demonstration / Experimental / Handling of instruments
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: 1. To introduce glassware and instruments used in a Chemistry laboratory. 2. To understand the importance of calibration of glassware and instruments in tune with concepts of precision and accuracy. 3. To develop awareness about safety measures for handling chemicals. 4. To Identify and comprehend the major components present in food samples. 5. To gain knowledge about various analytical techniques employed in commercial food analysis.	
8	Learning Outcomes: Upon completion of the course, student will be able LO1 calibrate glassware and instruments. LO2 understand the concept of minimizing errors. LO3 handle various chemicals with the necessary care. LO4 identify the various components present in food samples. LO5 apply analytical techniques for analysis of food samples.	
9	Syllabus Theory: • Tools of Analytical Chemistry: Introduction to common laboratory glasswares and instruments used in Practicum course, SOPs for instruments used in Practicum course, Importance of calibration with reference to accuracy, precision and minimization of errors • Introduction to Analytical Chemistry and Calibration of Laboratory Instruments: Introduction, types of chemical analysis, general analytical method, primary standard and secondary standard substances, Calibration of Laboratory Glasswares Burettes, Pipettes, Volumetric Flask, thermometer etc. Calibration of laboratory instruments: pH meter, conductometer, potentiometer and colorimeter. • Chemicals and Laboratory Safety: Introduction to pictogram of chemical used. (Acids, Bases, Solvents and Salts), Material Safety Data Sheets with reference hazardous chemicals like $K_2Cr_2O_7$, Benzene, cadmium nitrate, β-naphthol, CCl_4 and mercury, Precautions in handling of hazardous substances like conc. acids, ammonia, organic	

	solvents like ether and alcohol. Practicum: • Calibration of Laboratory Glasswares: Calibration of Burette, Calibration of Pipette, Calibration of Standard Measuring Flask, Calibration of Thermometer(Demonstration) • Calibration of Laboratory Instruments: Calibration of pH meter, Calibration of Conductometer, Calibration of Colorimeter, Calibration of Potentiometer(Demonstration)																												
10	Scheme of Examination and Assessment Pattern Paper – 50 Marks A. External Examination: Semester End - 30 Marks Time: 3.5 hours <table border="1"><thead><tr><th>Question</th><th>Option</th><th>Marks</th><th>Questions Based on</th></tr></thead><tbody><tr><td>Q.1</td><td>Based on Theory Attempt any two out of three questions (5 marks each)</td><td>10</td><td>Unit I (Theory Component)</td></tr><tr><td>Q.2</td><td>One Experiment (15 marks for Experiment and 5 Marks for Journal = 20 Marks)</td><td>20</td><td>Unit II (Practicum Component)</td></tr><tr><td></td><td>Total</td><td>30</td><td>---</td></tr></tbody></table> Note: The examination shall be of 1 hour for theory and 2.5 hours for practicum. B. Internal Examination: Continuous Evaluation - 20 marks <table border="1"><thead><tr><th></th><th>Assessment / evaluation</th><th>Marks</th></tr></thead><tbody><tr><td>1.</td><td>Viva/ Real time Assignments/ Objective Question Tests</td><td>15</td></tr><tr><td>2.</td><td>Active participation</td><td>05</td></tr><tr><td></td><td>Total</td><td>20</td></tr></tbody></table>	Question	Option	Marks	Questions Based on	Q.1	Based on Theory Attempt any two out of three questions (5 marks each)	10	Unit I (Theory Component)	Q.2	One Experiment (15 marks for Experiment and 5 Marks for Journal = 20 Marks)	20	Unit II (Practicum Component)		Total	30	---		Assessment / evaluation	Marks	1.	Viva/ Real time Assignments/ Objective Question Tests	15	2.	Active participation	05		Total	20
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**Smt. Chandibai Himathmal Mansukhani College
(Autonomous)**

**First Year B. Sc.
(Chemistry)**

Semester- I

Title:

SEC- Basic statistical tools in Chemistry

Vertical - 4

**with effect from
Academic Year 2025-2026**

Title: Basic Statistical Tools in Chemistry
[Course Code: CHMCHI5]

Sr. No.	Heading	Particulars
1	Description the Course	The aim of Skill Enhancement Courses (SECs) is to introduce the students with opportunities to develop Required skills in Chemistry
2	Vertical	4
3	Type Teaching Methodology	Theory & Practicum Classroom Discussion / Presentation / Real time Problem Solving Demonstration / Experimental / Handling of instruments
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: 1. To understand the significance of data and its types 2. To learn methods to assess precision and accuracy using statistical measures 3. To gain proficiency in analyzing data dispersion using statistics	
8	Learning Outcomes: Upon completion of the course, student will be able to LO1 critically evaluate and categorize different types of datasets and distinguish between them LO2 utilize the various measures of precision and accuracy to analyze and interpret data LO3 assess data dispersion and variability through the application of statistical measures	
9	Syllabus Theory: • Introduction, Types and Variables of Data: Introduction and importance, Meaning and Types-Primary data and secondary data, Discrete data and continuous data, Variables and their types • Precision and Accuracy: Concept of Precision: Mean, median, mode, range, absolute deviation, average deviation, relative average deviation, standard deviation, variance, Concept of Accuracy: Absolute and relative error, Measures of Dispersion: Percentiles, Mean deviation, Standard deviation (S.D.) Practicum: • Determination of mean, median and mode of titre values of acid base titration (Minimum number titre values = 10) • Determination of standard deviation and variance of titre values of any complexometric titration (Minimum number titre values = 10) • Determination of acetic acid in vinegar by potentiometry and calculate absolute and relative error • Determination of Absolute deviation, average deviation and relative average deviation from the given data of any experiments of Chemistry. • Determination of absolute and relative error in standardization of $\text{Na}_2\text{S}_2\text{O}_3$ by using $\text{K}_2\text{Cr}_2\text{O}_7$. (The readings of all students of the batch shall be used for calculation and also expert reading shall be provided)	

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

A. External Examination: Semester End - 30 Marks Time: 3.5 hours

Question	Option	Marks	Questions Based on
Q.1	Based on Theory Attempt any two out of three questions (5 marks each)	10	Unit I (Theory Component)
Q.2	One Experiment (15 marks for Experiment and 5 Marks for Journal = 20 Marks)	20	Unit II (Practicum Component)
	Total	30	---

Note: The examination shall be of **1 hour for theory and 2.5 hours for practicum.**

B. Internal Examination: Continuous Evaluation - 20 marks

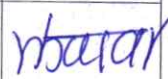
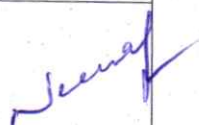
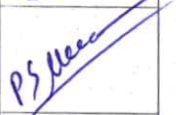
	Assessment / evaluation	Marks
1.	Quizzes, Class Tests, Presentations, Projects, Role Plays, Creative Writing, Assignments etc.	15
2.	Active participation	05
	Total	20

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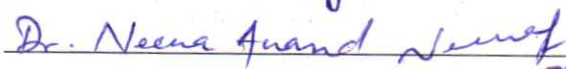
REFERENCES:

1. Analytical Chemistry by Cary D. Christian, John Wiley and sons
2. Basic concepts of Analytical Chemistry by S.M. Khopkar, NewAge International Publishers
3. Vogel's Textbook of Quantitative Chemical Analysis by J. Menham, R.C. Denney, J.D. Barnes and
4. M.J.K. Thomas, 6th Edn, Low Price Edition, Pearson Education Ltd, New Delhi (2000)

Department of Chemistry

Sr No	Name of the Faculty	Designation and College	Signature
1.	Dr. Yogini Bambardekar	Head, Associate Professor Smt.CHM College, Ulhasnagar Bambardekar.yogini@gmail.com	
2.	Dr. Sarika Chhabria Talreja	Associate Professor Smt.CHM College, Ulhasnagar sarikachhabriatalreja@gmail.com	
3.	Dr. Nagesh Sutar	Associate Professor Smt.CHM College, Ulhasnagar Nageshr.sutar@gmail.com	
4.	Dr. Neena Anand	Associate Professor Smt.CHM College, Ulhasnagar dr.neenanand@gmail.com	
5.	Dr. Sandeep Kotwal	Associate Professor Smt.CHM College, Ulhasnagar sandeepkotwal@gmail.com	
6.	Dr. Prashant Thorat	Assistant Professor Smt.CHM College, Ulhasnagar drthoratprashant@gmail.com	
7.	Dr. Gayatree Shinde	Assistant Professor Smt.CHM College, Ulhasnagar Gayatree.g@gmail.com	
8.	Dr. Prajakta More	Assistant Professor Smt.CHM College, Ulhasnagar prajaktasandeep@gmail.com	
9.	Dr. Nilanjana Kar	Assistant Professor Smt.CHM College, Ulhasnagar Nilkar.nilanjanakar@gmail.com	
10.	Mr. Dnyaneshwar Gholap	Assistant Professor Smt.CHM College, Ulhasnagar gholapdnyaneshwar.chmc.chem@gmail.com	

Name & Signature of the Adhoc BoS Chairperson:  Dr. Yogini Bambardekar

Name & Signature of the Dean:  Dr. Neena Anand

HEAD
CHEMISTRY DEPARTMENT
SMT. C.H.M. COLLEGE
ULHASNAGAR-421 005



**Smt. Chandibai Himathmal Mansukhani College
(Autonomous)**

**First Year B. Sc.
English
(AEC- Ability Enhancement Course)
Semester- I**

**Title: Introduction to Communication Skills in
English**

**Vertical - 5
AEC - 2 Credits**

**with effect from
Academic Year 2025-2026**

Title: Introduction to Communication Skills in English
Course Code: CHMSCIAECI

Sr. No.	Heading	Particulars
1	Description of the Course:	Effective communication is the cornerstone of academic and professional success. This course introduces learners to foundational skills in English communication, with a focus on both oral and written competencies essential in academic, social, and workplace contexts. It aims to equip learners with the ability to read critically, write precisely, speak confidently, and listen actively. Emphasis is placed on building clarity, coherence, and conciseness in communication, along with an understanding of audience, purpose, and tone. The course integrates grammar reinforcement, vocabulary building, reading comprehension, and practice-oriented modules such as email etiquette, group discussion, and formal writing. Through dynamic classroom interactions and practical assessments, learners will gain confidence in using English effectively and purposefully.
2	Vertical 5	AEC- Ability Enhancement Course
3	Type	Theory+ Tutorial (Teaching Methods: Lecture/ Discussion/ Presentation/ Reading sessions/ Worksheets/ Listening to audio clips etc.)
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: 1. To introduce students to the fundamentals of effective communication and its components. 2. To enhance students' reading comprehension through exposure to multiple genres and contexts. 3. To develop grammatical accuracy and lexical resourcefulness for academic and professional communication. 4. To strengthen verbal and non-verbal presentation skills and promote interactive speaking abilities. 5. To build competence in real-world writing tasks such as email drafting, bio-data preparation, and descriptive writing.	

8	Learning Outcomes: Students will be able to LO-1: Understand and apply key principles of effective communication in varied contexts. LO-2: Comprehend and analyze written texts using appropriate reading strategies. LO-3: Recognize and correct common grammatical and lexical errors. LO-4: Engage in clear, confident, and context-appropriate spoken interactions. LO-5: Produce structured, coherent, and grammatically correct written content for academic and workplace use.
9	Syllabus UNIT I: Foundations of English Communication A) Core Concepts of Communication • Principles of Effective Communication: The 7 Cs • Verbal and Non-verbal Communication with Examples • Cross-cultural Communication in the Globalized World • Technology in Communication: Email, Messaging, Video Conferencing • Listening for Detail and Intent: Barriers to Listening and Strategies B) Reading Comprehension • Understanding the Main Idea and Supporting Details • Interpreting Tone, Purpose, and Bias • Using Context Clues for Vocabulary Building • Reading Visual Texts: Graphs, Charts, and Infographics <i>Sample readings will include excerpts from news articles, reports, editorials, and educational essays (200–250 words).</i> C) Grammar and Vocabulary • Subject-Verb Agreement • Sentence Structures • Punctuation and Capitalization • Commonly Confused Words • Editing and Proofreading Practice <i>A remedial and functional approach will be followed with contextual exercises.</i> UNIT II: Applied Communication Skills A) Speaking and Listening Skills • Introducing Oneself in Academic/Professional Settings • Participating in Group Discussions and Expressing Opinions • Delivering a Short Speech (2–3 minutes) on Familiar Topics • Understanding and Responding to Instructions • Listening Comprehension Practice through Audio/Video Clips

	B) Functional Writing Skills • Formal Email Writing with Subject and Tone Sensitivity • Descriptive Paragraph Writing (People, Places, Processes) • Bio-data and Resume Writing • Drafting Job Applications (Solicited and Unsolicited) • Writing a Statement of Purpose																																				
10	Scheme of Examination and Assessment Pattern Paper – 50 Marks External Examination: Semester End External - 30 marks Time: 1:00 hour Format of Question Paper <table><tr><th>Question No</th><th>Nature of Questions</th><th>Marks</th></tr><tr><td>Q. 1</td><td>Short Notes (2 out of 4) Unit – I (A) – Principles and Types of Communication</td><td>10</td></tr><tr><td>Q. 2 (A)</td><td>Reading Comprehension – Unseen Passage (200–250 words) Unit –I (B)</td><td>06</td></tr><tr><td>Q. 2 (B)</td><td>Grammar – Error Correction, Transformation of Sentences (Unit- I - C)</td><td>04</td></tr><tr><td>Q. 3</td><td>Formal Writing Task (1 out of 2 choices) – Email, Resume, SoP, etc. (Unit – II -B)</td><td>10</td></tr><tr><td></td><td style="text-align: right;">Total</td><td>30</td></tr></table> Internal Examination: Continuous Evaluation - 20 marks <table><tr><th></th><th>Assessment / evaluation</th><th>Marks</th></tr><tr><td>1.</td><td>Activity-Based Assessment – Presentation or Conversation Skills: Individual or group task based on Unit 2(A). Scheduled and assessed during regular class hours.</td><td>05</td></tr><tr><td>2.</td><td>Participation in One Additional Classroom Activity: Activity may include listening to audio clips, reading aloud, group discussion, summarizing, or vocabulary building.</td><td>05</td></tr><tr><td>3.</td><td>Attendance and Overall Engagement: Attendance as per institutional norms, along with active participation in class discussions and tasks.</td><td>05</td></tr><tr><td>4.</td><td>Short Writing Task (Descriptive Paragraph, Email, or SOP extract): Based on Unit 2(B); to be completed as a classroom assignment or home submission</td><td>05</td></tr><tr><td></td><td style="text-align: right;">Total</td><td>20</td></tr></table>	Question No	Nature of Questions	Marks	Q. 1	Short Notes (2 out of 4) Unit – I (A) – Principles and Types of Communication	10	Q. 2 (A)	Reading Comprehension – Unseen Passage (200–250 words) Unit –I (B)	06	Q. 2 (B)	Grammar – Error Correction, Transformation of Sentences (Unit- I - C)	04	Q. 3	Formal Writing Task (1 out of 2 choices) – Email, Resume, SoP, etc. (Unit – II -B)	10		Total	30		Assessment / evaluation	Marks	1.	Activity-Based Assessment – Presentation or Conversation Skills: Individual or group task based on Unit 2(A). Scheduled and assessed during regular class hours.	05	2.	Participation in One Additional Classroom Activity: Activity may include listening to audio clips, reading aloud, group discussion, summarizing, or vocabulary building.	05	3.	Attendance and Overall Engagement: Attendance as per institutional norms, along with active participation in class discussions and tasks.	05	4.	Short Writing Task (Descriptive Paragraph, Email, or SOP extract): Based on Unit 2(B); to be completed as a classroom assignment or home submission	05		Total	20
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11	REFERENCES: 1. Adler, Ronald B., et al. <i>Understanding Human Communication</i>. 15th ed., Oxford UP, 2021. 2. Bailey, Stephen. <i>Academic Writing: A Handbook for International Students</i>. 5th ed., Routledge, 2018.																																				

3. Barrass, Robert. *Students Must Write: A Guide to Better Writing in Coursework and Examinations*. Routledge, 2005.
4. Brown, Gillian, and George Yule. *Teaching the Spoken Language: An Approach Based on the Analysis of Conversational English*. Cambridge UP, 1983.
5. Carnegie, Dale. *The Quick and Easy Way to Effective Speaking*. Pocket Books, 2006.
6. Chaney, Lillian, and Jeanette Martin. *Intercultural Business Communication*. 6th ed., Pearson, 2014.
7. Cullen, Pauline, et al. *English Grammar in Use Supplementary Exercises*. Cambridge UP, 2019.
8. Eastwood, John. *Oxford Guide to English Grammar*. Oxford UP, 2005.
9. Gerson, Sharon J., and Steven M. Gerson. *Technical Communication: Process and Product*. 9th ed., Pearson, 2021.
10. Hewings, Martin. *Advanced Grammar in Use: A Self-study Reference and Practice Book for Advanced Learners of English*. 3rd ed., Cambridge UP, 2013.
11. Jones, Leo. *Functions of English: Communication Practice in English*. Cambridge UP, 1981.
12. Kumar, Sanjay, and Pushp Lata. *Communication Skills*. 2nd ed., Oxford UP, 2018.
13. Lynch, Tony. *Listening in Language Learning*. Longman, 1988.
14. McCarthy, Michael, and Felicity O'Dell. *Academic Vocabulary in Use*. Cambridge UP, 2008.
15. Nordquist, Richard. *The Essentials of English Grammar*. McGraw-Hill Education, 2016.
16. Quirk, Randolph, et al. *A Comprehensive Grammar of the English Language*. Longman, 1985.
17. Seely, John. *The Oxford Guide to Writing and Speaking*. Oxford UP, 2005.
18. Straus, Jane, et al. *The Blue Book of Grammar and Punctuation*. 12th ed., Jossey-Bass, 2021.
19. Wallace, Catherine. *Reading*. Oxford UP, 1992.
20. Zinsser, William. *On Writing Well: The Classic Guide to Writing Nonfiction*. Harper Perennial, 2016.

Department of English:

Sr. No	Name of the Faculty	Designation and College	Signature
1.	Prof. (Dr.) Pratima Das	Head & Professor, Dept. of English, Smt. CHM College	<i>Pratima Das</i>
2.	Prof. (Dr.) Kailas Aute	Professor, Dept. of English, Smt. CHM College	<i>Kailas Aute</i>
3.	Mr. Ananda Pandhare	Asst. Professor, Dept. of English, Smt. CHM College	<i>Ananda Pandhare</i>
4.	Ms. Sana Karale	Asst. Professor, Dept. of English, Smt. CHM College	<i>Sana Karale</i>

Name & Signature of the Ad hoc BoS Chairperson: Prof. (Dr.) Pratima Das *Pratima Das*

Name & Signature of the Dean: Prof. (Dr.) Pratima Das *Pratima Das*



**Smt. Chandibai Himathmal Mansukhani College
(Autonomous)**

First Year

Semester- I

Title: Communication Skills in Sindhi

Vertical - 5

Ability Enhancement Course - 2 Credit

**with effect from
Academic Year 2025-2026**

Title: Communication Skills in Sindhi
COURSE CODE: CHMSINAECI

Sr. No.	Heading	Particulars
1	Description the Course:	Sindhi communication skills (B.Com.) Communication is the core component of the commerce and trade. In communication, language plays very significant role. If a student has mastered the skills of language, undoubtedly, he or she would be able to communicate in the best manner. In this course basic part of Sindhi language would be taught based on the NEP 2020. The innovative approach likes critical thinking, creative mind, use of technology will lead to communicating and participating with the different groups. The vocabulary section would be given prominence. The course would be in the Devanagari script so that it can attract majority of the students. Even non-Sindhi students shall have opportunity to adopt this course.
2	Vertical 1	AEC – Ability Enhancement Course
3	Type	Theory+ Practicum (Teaching Method: Lecture/ Discussion/Reading)
4	Credit	2 credits (1 credit = 15 hours for theory or 30 hours of Practical work in a semester)
5	Hours allotted	30 Hours
6	Marks allotted	50Marks (50 Marks each)
7	Course Objectives: After successful completion of this course: 1. The learner will get understanding of communication skills. 2. The learner will understand how to accurate the pronunciation of special words in Sindhi 3. The learner will improve the conversation skill in Sindhi. 4. The learner will become best communicator in Sindhi language	
8	Learning Outcomes: Student will be able to LO1: Know the basic special features of Sindhi language. LO2: Understand the skills of communication. LO3: Knowing the conversation with businessmen and customers LO4: Know the etiquettes with parents, relatives, friends and others in effective way	

Unit I – Fundamental of Sindhi Communication

- Introduction of Communication skill through Pictorial Presentation
- Importance of Language
- Basic aspects of language
 - i) Types of Language, ii) Role of Language, iii) Changes in Language
 - iv) Non-violent aspects of language v) Language & New generation
 - vi) Language & Modern Technology
- New Education Policy (NEP) & Importance of language
- Sindhi language: (Special features of spoken Sindhi language with pronunciation through audio visual presentation)

Unit II – Functional Communication

- Importance of Communication
- Types of Communication (Presentation through video clips)
 - i) Verbal, ii) Non-verbal, iii) Written iv) Digital Communication
- Characteristics of Communication
- Obstacles in Communication of Sindhi Language
- Methods of Best Communication through role plays
- Spoken Sindhi in Business
- Conversation with customers and proprietors

यूनिट – 1

- स्मचारी भाषा : वाक्फियत
- भाषा जी अहमियत
- भाषा जा बुनियादी पहलू
 - i) किस्म, ii) भाषा जो किरदार, iii) भाषा मे तबदीलियूं iv) भाषा जा अहिसासाती पहलू v) भाषा ऐं नई नसल
- नई तैलीमी नीति ऐं बोलियुन जी अहमियत
- असां जी सिंधी बोली

यूनिट – 2

- राबते जी अहमियत
- राबते जा किस्म
 - i) जिबानी राबतो, ii) गैर जिबानी राबतो, iii) लिखत राबतो iv) डिजीटल राबतो
- राबते मां फायदा
- राबते में रंडकूं
- बेहतर राबते जा तरीका
- ग्राहकन सां सिंधी बोलीअ मे गुफ्तगू

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Attempt any 4 out of 6 questions.

Question No	Nature of Questions	Marks
Q1.	Objective Type – Fill in the Blanks / MCQs (Unit I0	15
Q2.	Question on reading skill (Unit II)	07
Q3.	Writing short story from outlines (Unit II)	08
		Total 30

Note:

1. Equal Weightage is to be given to all the modules.
2. Use of non-programmable scientific calculator is allowed in the examination.

Internal Examination: Continuous Evolution - 20 marks

	Assessment / evaluation	Marks
1.	Speaking Activities: (Presentation) Making presentations in the classroom	10
2.	Listening Activities: (Assignment) Listening to speeches, dialogues, announcement and summarizing them	10
	Total	20

11

REFERENCE BOOKS:

1. Sanchari Basha – By Dr. Pushpa Kodwani
2. Sindhi Pahakaa – Dr. Jetly M.K.
3. Sindhi Muhavahra – By Hardwani Lachhman
4. Sindhi Adhyat mak Shabdhkesh – By Hardwani Lachhman
5. Acho Sindhi Sikhu – By Hardwani Lachhman

Syllabus Committee:

Sr No	Name of the Faculty	Designation and College	Signature
1.	Mrs. Kajal Ramchandani	H.O.D. of Jai Hind College	<i>Kajal</i>
2.	Mrs. Komal Totani	Assistant Teacher, Smt. CHM College	<i>Pratima</i>

Name & Signature of the BoS Chairperson: (Mrs. Kajal Ramchandani)

Kajal

Name & Signature of the Dean: (Dr. Pratima Das)

Pratima Das



**Smt. Chandibai Himathmal Mansukhani College
(Autonomous)**

First Year

Semester- I

**Title: Environmental Management and
Sustainable Development-I**

**Vertical - 5
VEC- 2 Credits**

**with effect from
Academic Year 2025-2026**

Title: Environmental Management and Sustainable Development-I**Course Code: CHMVECI**

Sr. No.	Heading	Particulars
1	Description of the Course:	This course introduces students to the basics of environmental management and sustainable development. It explains how ecosystems work, the importance of biodiversity, and the need to protect our natural resources. Students will learn about different environmental problems, human impact on nature, and how to manage disasters. The course also covers Indian environmental movements, ethics, and the role of public awareness. Real-life examples and case studies help students understand the connection between nature and human communities in a simple and practical way.
2	Vertical 5	VEC
3	Type & Teaching methods	Theory + Practicum Lecture/Discussion/Presentation/Case study,etc
4	Credits	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: 1. To introduce about ecosystems, biodiversity and to make aware for the need of conservation. 2. To sensitize students towards environmental concerns, issues, and impacts of human population. 3. To analyze the impact of human population growth and development activities on the environment, including issues related to displacement, disaster response, and rehabilitation. 4. To foster awareness of environmental ethics and the role of cultural and social movements in shaping sustainable environmental practices through communication, policy, and activism.	
8	Learning Outcomes: Students will be able to LO1: Explain the interrelationships within ecosystems and analyze energy flow and succession, using examples from various ecological zones. LO2: Critically evaluate biodiversity levels and conservation strategies, applying knowledge of endemic species, threats, and ecological services to real-world scenarios. LO3: Assess the socio-environmental implications of population growth, displacement, and disasters, incorporating case studies to understand sustainable development challenges.	

	LO4: Demonstrate an understanding of environmental ethics and advocacy, by interpreting the influence of cultural values, environmental movements, and communication strategies on sustainability.									
9	Syllabus UNIT I: Ecosystems, Biodiversity and Conservation • Introduction, structure, and function of ecosystems; Energy flow: food chains, food webs and ecological succession. Case studies of the following: a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) • Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns • India as a mega-biodiversity nation; Endangered and endemic species of India • Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. • Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value UNIT II: Human Communities and the Environment • Human population growth: Impacts on environment, human health and welfare. • Resettlement and rehabilitation of project affected persons; case studies. • Disaster management: floods, earthquake, cyclones and landslides. • Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan. • Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. • Environmental communication and public awareness, case studies (e.g. CNG vehicles in Delhi).									
10	Assessment Pattern Scheme of Examination and Assessment Pattern Paper – 50 Marks External Examination: Semester End External - 30 marks Time: 1:00 hours Format of Question Paper Attempt any 3 out of 4 questions. <table><tr><th>Question No.</th><th>Nature of Questions</th><th>Marks</th></tr><tr><td>Q.1</td><td>Theory based on Unit I</td><td>10</td></tr><tr><td>Q.2</td><td>Theory based on Unit I</td><td>10</td></tr></table>	Question No.	Nature of Questions	Marks	Q.1	Theory based on Unit I	10	Q.2	Theory based on Unit I	10
Question No.	Nature of Questions	Marks								
Q.1	Theory based on Unit I	10								
Q.2	Theory based on Unit I	10								

Q.3	Theory based on Unit II	10
Q.4	Theory based on Unit II	10
		Total 30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Class Test, Creative writing/visits/role play (Short notes/ MCQ's/ Match the Pairs/ Answer in one sentence/ Quiz)	10
2.	Project /Presentation / Viva/Group Discussion/Case study	10
		Total 20

11

REFERENCES :

1. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt.
2. Gadgil, M., & Guha, R. 1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
3. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
4. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.
6. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent.
7. Warren, C. E. 1971. Biology and Water Pollution Control. WB Saunders.
8. Wilson, E. O. 2006. The Creation: An appeal to save life on earth. New York: Norton.
9. Harper, Charles L. (2017) Environment and Society, Human Perspectives on Environmental Issues 6th Edition. Routledge.
10. Rajagopalan, R. (2011). Environmental Studies: From Crisis to Cure. India: Oxford University Press.
11. Harris, Frances (2012) Global Environmental Issues, 2nd Edition. Wiley- Blackwell.

Name & Signature of the Dean & Ad-hoc BoS Chairperson (Interdisciplinary):

[Signature]
Dr. Nitin Arekar



**Smt. Chandibai Himathmal Mansukhani College
(Autonomous)**

First Year B.Sc.

Semester- I

**Vertical - 6
CC – Not Applicable**