



HYDERABAD (SINDH)
NATIONAL COLLEGIATE BOARD

HSNC Board's

Smt. Chandibai Himathmal Mansukhani College (Autonomous)

(Affiliated to the University of Mumbai)

University College Code : 217-JD Office : T14



Estd. 1965

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 Biotechnology SEM - I & SEM – V respectively.

It is hereby communicated that the recommendations of the syllabus made by the Ad-hoc Board of Studies in Biotechnology coordinated by the Dean, Faculty of Applied Sciences in the meeting of Academic Council held on 23rd May, 2025 vide item No. 2.3, 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 Applied 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

Bachelor of Science
(Biotechnology)
(Self-Financing Course)

Semester – I

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

PREAMBLE

Biotechnology is a multidisciplinary subject that deals with the application of biological processes for solving problems and designing eco-friendly products and processes. At Undergraduate level, learners are offered various subjects that would strengthen their fundamentals in basic sciences as well as explore the applications of Biotechnology. Subjects such as Microbiology, Biochemistry, analytical science and computer language form an integral part of the syllabus. Biotechnology plays a key role in industries such as refining, environmental remediation, agriculture and food production, healthcare, pharmacy, animal husbandry, textiles, and nutrition. Learners after completing their Biotechnology course will be primed in the basics and applications of Biotechnology and can find suitable employment in the research and development laboratories, pharmaceutical, food and beverages industry etc. The syllabus herein discusses the courses offered at the undergraduate level, highlighting the respective course as well as program outcomes.

The Undergraduate program in Biotechnology has been designed on learning outcome-based curriculum framework. The course covers the areas of Biotechnology along with fundamental sciences with a range of core subjects in each semester. Along with providing the requisite biotechnology knowledge, the course has enough scope for inter- and multidisciplinary subjects in the form of electives. This course also caters the skill enhancement needs of the learners as well as provides opportunities for exchanges and learning from other disciplines. Every semester has a practical course for strengthening skills in designing and conducting experiments in the field of Biotechnology.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Students will acquire a good understanding of fundamental concepts in biology, including Microbiology, Biochemistry, Analytical Science and Basics of Computers relevant to Biotechnology. Students will develop skills in basic laboratory techniques, including handling equipment, performing experiments, and analyzing data.

PSO2: Students will be able to apply their knowledge to solve basic problems in Biotechnology, such as understanding the principles of biochemical reactions and the role of microorganisms.

PSO3: Students will learn about ethical, legal and social considerations in Biotechnology, such as safety protocols, environmental impact, and intellectual property.

PSO4: Students will start to develop an appreciation for research and the scientific methods, learning how to collect, interpret and conclude data by browsing through scientific journals and review articles.

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

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

Semester- I

Title: Fundamentals of Biotechnology-I

**Vertical - 1
Major Course– 2 Credits**

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

Title: Fundamentals of Biotechnology-I
Course Code: CHMBTI1

Sr. No.	Heading	Particulars
1	Description the Course:	The course aims to introduce the fundamentals of biotechnology. The learner will be able to understand the broad spectrum of biotechnology; emphasizing its relevance, applications in diverse sectors, and ethical considerations. It explores the global demand, job prospects, and connections with other disciplines. The course also focuses on biomolecules, covering carbohydrates, lipids, amino acids and proteins, providing a foundational understanding for their roles in industrial applications and health care.
2	Vertical 1	Major
3	Type Teaching Methods	Theory + Practicum Lecture/ Discussion/ Presentation/ Case Study/ Flipped classroom/ Industrial visit etc.
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: 1. To gain an understanding of Biotechnology, exploring its definition, historical context, and applications in various sectors. 2. To understand the scope and significance of Biotechnology in India and at a global level, evaluating its potential, achievements, and impact on the rising biotech market, while understanding policy initiatives and trends. 3. To develop ethical awareness by examining legal and social-ethical issues in Biotechnology 4. To grasp the definition, biological functions, and classification of biomolecules.	
8	Learning Outcomes: Student will be able to LO1: Articulate a comprehensive understanding of the diverse application of Biotechnology, including its historical context, global significance, and specific domains such as pharmaceuticals, plant and animal biotechnology. LO2: Develop the ability to assess the scope of Biotechnology in India. LO3: Relate their knowledge to identify legal and social-ethical issues in Biotechnology LO4: Classify, compare, and explain biomolecules and their role in industry and health care.	

Syllabus

UNIT I: What is Biotechnology

- **Introduction to Biotechnology:** Definition; History & Introduction to Biotechnology
Scope and Significance of Biotechnology in modern world
- **World of Biotechnology:** Pharmaceutical Biotechnology, Plant Biotechnology, Industrial Biotechnology, Marine Biotechnology, Animal Biotechnology, Environmental Biotechnology.
- **Scope of Biotechnology in India:** Needs for future development, Global scenario, Potential and achievements of Biotechnology. Bio-business in India, booming biotech market, success story of biotech market, policy initiatives and global trends; Biotechnology research in India
- **Legal & Social-ethical issues**

UNIT II: Biomolecules

- **Carbohydrates:** Introduction, definition, general formula & Properties. Classification of carbohydrates, Concept of glycosidic bond, Industrial applications of carbohydrates: Fermentation, Pharmaceutical and Food industry
- **Lipids:** Introduction and definition and Biological functions of fats and Lipids. Introduction and definition of Fatty acids. Classification of Fatty acids
- **Amino acids:** General introduction, classification and structures, properties (physical & chemical), peptide bond, three-dimensional structure of proteins.

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Scheme of Examination and Assessment Pattern

Paper – 50 Marks

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

Format of Question Paper

Question No	Based	Options	Marks
Q1	Unit 1	<i>Any 2 out of 4</i>	10
Q2	Unit 2	<i>Any 2 out of 4</i>	10
Q3	Unit 1 & 2	<i>Any 2 out of 4</i>	10
			Total 30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Class Tests/ Poster Preparation/ Models/ Quizzes/ Presentation/ Project/ Role play/ Creative writing (Any Three)	20
		Total 20

REFERENCES:

1. Dubey, R. C. (1993). A textbook of Biotechnology. S. Chand Publishing.
2. Dubey, R. C. (2014). Advanced biotechnology. S. Chand Publishing.
3. Singh, B. D., & Singh, B. D. (2007). Biotechnology expanding horizons. Kalyani publishers
4. Satyanarayana U. and Chakrapani U. (2007). Biochemistry. 3rd Edition, Books and Allied (P) Ltd.
5. Fundamentals of Biochemistry Textbook by Charlotte W. Pratt and Donald Voet
6. <https://www.frontiersin.org/journals/genetics/articles/10.3389/fgene.2022.1052371/full>
7. <https://www.studyiq.com/articles/ethical-issues-of-biotechnology/>
8. https://r.search.yahoo.com/_ylt=Awr1QZPUQzhoFAIA34S7HAX.;_ylu=Y29sbwNzZzMtEcG9zAzEEdnRpZAMEc2VjA3Ny/RV=2/RE=1749727445/RO=10/RU=https%3a%2f%2fbmi.dbtindia.gov.in%2f/RK=2/RS=yBk9lO3KNux0p7400caasE_wj2A-
9. [https://med.libretexts.org/Courses/Metropolitan_State_University_of_Denver/Introduction to Nutrition \(Diker\)/05%3ALipids/5.3%3A Functions of Lipids](https://med.libretexts.org/Courses/Metropolitan_State_University_of_Denver/Introduction_to_Nutrition_(Diker)/05%3ALipids/5.3%3A_Functions_of_Lipids)
10. <https://www.interestjournals.org/articles/biomolecules-the-elements-that-make-up-life.pdf>
11. <https://www.rroij.com/open-access/introduction-to-biomolecules.pdf>
12. Cox, M. M., & Nelson, D. L. (2008). Lehninger principles of biochemistry (Vol. 5). New York: W H Freeman.
13. Conn, E., & Stumpf, P. (2009). Outlines of biochemistry. John Wiley & Sons.

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

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

Semester- I

Title: Microbial Biotechnology

**Vertical - 1
Major Course – 2 Credits**

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

Title: Microbial Biotechnology
Course Code: CHMBTI2

Sr. No.	Heading	Particulars
1	Description the Course:	This Course provides a foundational understanding of the microbial world, spanning history, microscopy, and cultivation, with a focus on sterilization techniques and bioprocess technology. Relevant across biology, chemistry, and engineering disciplines, these units meet industry demands in pharmaceuticals, biotechnology, and healthcare, offering diverse job prospects in research, development, and production. The practical application of theoretical concepts ensures learners are well-prepared for dynamic roles in advancing microbial science and bioprocessing.
2	Vertical 1	Major
3	Type Teaching Methods	Theory + Practicum Lecture/ Discussion/ Presentation/ Case Study/ Flipped classroom/ Industrial visit etc.
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: 1. To develop a comprehensive understanding of microbial science by exploring the history, classification, and cultivation techniques, emphasizing the role of microorganisms in everyday life. 2. To acquire understanding of microscopy principles, including optics, staining techniques, and the application of microscopes, laying the groundwork for practical applications in research and laboratory settings. 3. To understand the principles and techniques of sterilization and disinfection, with a focus on dry heat, steam, radiation, chemical agents, and their applications in diverse settings. 4. To introduce the concept of Bioprocess technology, encompassing bioreactor design, microbial fermentations, and the industrial production of chemicals, antibiotics, enzymes, and beverages.	
8	Learning Outcomes: Student will be able to LO1: Comprehend the microbial world's historical context, classification, and cultivation techniques, thus creating a foundational knowledge base for future scientific endeavors. LO2: Apply principles of optics and microscopy effectively; discriminate and distinguish between different types of staining techniques and its practical applications; enhancing	

	skills crucial for research and laboratory work. LO3: Understand principles of sterilization and disinfection techniques; explain principles of dry heat, steam, radiation, and chemical agents, and appreciate and identify their applications across various fields LO4: Understand the basics of bioprocess technology, including the design of bioreactors and the industrial production of chemicals, antibiotics, enzymes, and beverages, preparing students for roles in bioprocessing industries.
9	Syllabus UNIT I: Introduction to Microbial World • History: Discovery of Microorganisms, Role of microorganisms in everyday life, Groups of Microorganisms. • Microscopy: General principles of optics; various parts and their functions - objectives – numerical aperture, resolving power, depth of focus, working distance, aberrations; oculars; condensers. Applications of microscopes. Dark Field Microscope; Phase Contrast Microscope, Fluorescent Microscope, • Stains and Staining Solutions- Definition of Dye and Chromogen; acidic and basic dyes; functions and types of chromophore and auxochrome groups. Theories to explain staining. Definition and function of stain; mordant, intensifiers and fixative. • Natural and Synthetic Dyes. • Simple Staining, Differential Staining – Gram staining and Acid Fast Staining with specific examples, Compound staining (Romanowsky) UNIT II: Sterilisation Techniques & Bioprocess Technology • Sterilisation Techniques Introduction: Definition and concept of Sterilization, Disinfection, Disinfectant, Antiseptic, Sanitizers, Antibiotics, MIC, MLC, Cidal & Static agents. • Types and Applications: Dry Heat, Moist heat (boiling, Pasteurization, Inspissation, Steam under pressure), Gases, Dyes, Radiation and Filtration. • Chemical Agents and their Mode of Action: Aldehydes, Halogens, Quaternary Ammonium Compounds, Phenol and Phenolic Compounds, Heavy Metals, Alcohol, Dyes, and Detergents, chemotherapeutic agents with examples • Disinfectant: Ideal Disinfectant. Examples of Disinfectants and Evaluation of disinfectant (Phenol coefficient test) • Cultivation: Nutritional categories of microorganisms, Design and Types of Culture Media, Concept of Pure culture, Methods of isolation, growth kinetics. • Bioprocess Technology: Definition, Inoculum development, Design of Bioreactor, Concept of fermentation media (role, ingredients), Applications of Bioprocess Technology • Microbial Fermentations: Overview of Industrial Production of Chemicals using suitable examples: Antibiotics, Enzymes and Beverages

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

Question No	Based	Options	Marks
Q1	Unit 1	Any 2 out of 4	10
Q2	Unit 2	Any 2 out of 4	10
Q3	Unit 1 & 2	Any 2 out of 4	10
			Total 30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Class Tests/ Poster Preparation/ Models/ Quizzes/ Presentation/ Project/ Role play/ Creative writing (Any Three)	20
		Total 20

11

REFERENCES:

1. Pelczar, Microbiology. (1993). India: McGraw-Hill Education.
2. Ananthanarayan, R., Paniker, C. J. (2006). Ananthanarayan and Paniker's Textbook of Microbiology. India: Orient Longman.
3. Salle, A. J., & Salle, A. J. (1954). Fundamental principles of bacteriology McGraw- Hill.
4. Industrial Microbiology- A. H. Patel
5. A Handbook of Elementary Microbiology- H A Modi
6. Prescott, L. M. (2002). Microbiology 5th Edition.
7. Frobisher M. Fundamentals of Microbiology (9th Ed)
8. Industrial Microbiology- L. E. Casida- John Wiley & Sons
9. https://www.researchgate.net/publication/320945390_Introduction_to_Microscopy
10. Advances in Chemical and Biological Methods to Identify Microorganisms—From Past to Present Ricardo Franco-Duarte 1,2,† , Lucia Cernáková 3,† , Snehal Kadam 4 , Karishma S. Kaushik 4 , Bahare Salehi et al, Microorganisms 2019, 7, 130; doi:10.3390/microorganisms7050130
<https://pmc.ncbi.nlm.nih.gov/articles/PMC6560418/>

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

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

Semester- I

**Title:
Practicals of Fundamentals of Biotechnology
+
Microbial Biotechnology**

**Vertical - 1
Major Course – 2 Credits**

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

Title:
Practicals of Fundamentals of Biotechnology + Microbial Biotechnology
Course Code: CHMBTI3

Sr. No.	Heading	Particulars
1	Description the Course:	This course aims to give hands-on training to gain laboratory skills and techniques in basic biotechnology through experiments, case studies, demonstrations, and virtual visits, thus linking theory with practical insights. Acquire essential skills in microscopy, staining, sterilization, isolation, and identification, meeting industry demands for qualified professionals. Enhance employability with hands-on experience in diverse biotech applications, positioning for a dynamic and evolving industry.
2	Vertical 1	Major
3	Type	Practical
4	Credit	2 Credits
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives: 1. To gain hands-on experience in microscopy, staining, and sterilization for effective handling of biotechnological processes and to experientially learn to analyze biomolecules. 2. To learn several basic laboratory techniques to handle microorganisms under sterile conditions, isolate, culture & identify using colony characteristics & Bergey's manual, for their diverse roles in the biotech industry. 3. To learn to prepare fermented products, up skilling their entrepreneurial skills. 4. To learn to browse and curate scientific review articles and choose an appropriate review article for a presentation, up skilling their scientific aptitude, scientific reading and presentation skills.	
8	Learning Outcomes: Student will be able to LO1: Independently perform essential lab techniques, including microscopy, staining sterilization, culture of microorganisms; and identify various biomolecules by performing suitable tests. LO2: Isolate, culture & identify microorganisms with the help of colony characteristics an Bergey's manual for diverse roles in the Biotech industry. LO3: Prepare a fermented product, thus laying the foundation for future biotech start-ups. LO4: Apply biotechnological concepts to understand, analyze and critically evaluate various advances in biotechnology, by browsing through scientific journals and review articles as	

	well as create a power point presentation on a review article of their choice and present it to their peers and instructors.
9	Practical Syllabus UNIT: • Study of Microscope – Compound Microscope (Including Handling and storage) • Observation of microorganisms using bright field microscope - Protozoa, Molds and Yeasts, Algae – from natural habitat/permanent slides. • Monochrome staining using any suitable material. (Bacteria/Plant/Animal tissue) Differential staining – Gram’s staining, Acid fast staining, Romanowsky stains • Fungal staining – wet mount (Lactophenol cotton blue/Methylene Blue) • Preparation of media- Nutrient broth and Agar, MacConkey Agar, Sabouraud's Agar • Sterilization of Laboratory Glassware and Media using Autoclave and Hot air oven. • Aseptic transfer techniques (media & culture). • Isolation techniques: T-streak, polygon method • Colony Characteristics of Microorganisms. • Use of Bergey’s manual to help identify any one isolate. (Demo) • Isolation of Yeasts on Sabouraud’s agar. • Study of morphology and colony characteristics of yeasts. • Enumeration of microorganisms by Serial Dilution-Pour plate, Spread plate method • Growth Curve of E.coli • Preparation of fermented product. (Demonstration or group activity can be used for internal evaluation) • Qualitative estimation of carbohydrates • Qualitative estimation of Lipids • Qualitative estimation of Amino Acids/ Proteins. • Analyse a case-study and write a report on any one recent application of Biotechnology (Not older than past 5 years) (Assignment) • Presentation of a scientific review article (not older than 5 years) from a peer reviewed journal. • Field visit to National/ International research institutes for research in biotechnology (Assignment) • Exploring web resources of National/ International research institutes for research in biotechnology (Assignment)

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Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 3.5 hours

Format of Question Paper

Question No	Nature of Questions	Marks
Q1	Practical	25
Q2	Journal	05
		Total 30
OR		
Q1	Practical	15
Q2	Practical	10
Q3	Journal	05
		Total 30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Viva /skill assessment/ Spots/ Identification/ objective question test/ MCQ	15
2.	Overall performance	05
	Total	20

Note:

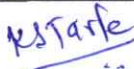
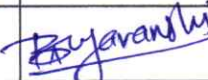
1. **Certified Journal is compulsory** for appearing at the time of practical exam, failing which they will not be allowed to appear for examination.
2. Students are required to perform at least 75% of practicals, for the journal to be certified. The journal serves as record of the student's practical work is an essential component of evaluation process.

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REFERENCES:

1. Basic Practical Microbiology - A Manual by Microbiology Society ([23cbf9c5-f8c8-4f91-b092a4ad819e6357.pdf](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6961714/))
2. Practical Microbiology: based on the Hungarian practical notes entitled "Mikrobiológiai Laboratórium Gyakorlatok" by Erika M. Tóth, Andrea K. Borsodi, Tamás Felföldi, Balázs Vajna, Rita Sipos and Károly Márialigeti
3. Practical handbook of microbiology, 2nd Edition Eds. Emanuel Goldman, Lorrence H. Green, CRC Press, Taylor & Francis Group 2012
4. Practical Microbiology by R.C. Dubey and D.K. Maheshwari S. Chand Pub 2002
5. An Introduction to Practical Biochemistry.3rd Edition, (2001), David Plummer, Tata McGraw Hill Edu.Pvt.Ltd. New Delhi, India
6. Bacterial culture through selective and non-selective conditions: the evolution of culture media in clinical microbiology, M. Bonnet¹, J. C. Lagier^{1,2}, D. Raoult^{1,2} and S. Khelaifia^{1,2} New Microbe and New Infect 2020; 34: 100622 © 2019 The Authors. Published by Elsevier Ltd <https://pmc.ncbi.nlm.nih.gov/articles/PMC6961714/>

Department of B.Sc. (Biotechnology):

Sr No	Name of the Faculty	Designation and College	Signature
1.	Dr. Bhuvaneshwari Krishna	Assistant Professor & Head of Department, Smt. C.H.M. College.	
2.	Dr. Kishori Tarfe	Assistant Professor, Smt. C.H.M. College.	
3.	Ms. Vaishnavi Pathare	Lecturer, Smt. C.H.M. College.	
4.	Ms. Pranali Jadhav	Lecturer, Smt. C.H.M. College.	
5.	Ms. Bhairavi Suryavanshi	Lecturer, Smt. C.H.M. College.	

Name & Signature of the Ad hoc BoS Chairperson: Dr. Bhuvaneshwari Krishna 

Name & Signature of the Dean: Ms. Ritika Sachdev 



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

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

Semester- I

**Vertical - 2
Minor Course – Not Applicable**

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

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

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

Semester- I

**Vertical - 3
Open Elective – 2 + 2 Credits**

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

OPEN ELECTIVES (OE)

For First Year B.Sc.

(Computer Science, Information Technology, Biotechnology, Data Science)

Students are required to select any two 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 Life
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.
(Biotechnology)**

Semester- I

Title: Instrumentation in Biotechnology

**Vertical - 4
Vocational Skill Course (VSC) – 2 Credits**

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

Title: Instrumentation in Biotechnology
Course Code: CHMBTI5

Sr. No.	Heading	Particulars
1	Description the Course:	The course is an elementary course in instrumentation used in Biotechnology that forms the foundation of analytical techniques. The knowledge and handling of instruments is necessary in academics, research work and industry.
2	Vertical 4	VSC
3	Type	Practical
4	Credit	2 Credits
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives: 1. To enable the learners to understand the principles of laboratory instruments. 2. To provide the practical basis for instrumentation handling and operations. 3. To equip the learners with the understanding of applications of the instrumentation.	
8	Learning Outcomes: Student will be able to LO1: Understand the use and operations of basic laboratory instruments in Biotechnology LO2: Explain principle, instrumentation and applications of spectroscopic instruments. LO3: Develop skills in operating basic lab instruments.	
9	Practical Syllabus UNIT: • Operations, cleaning and of various laboratory equipment i) Autoclave ii) Hot air oven iii) Incubator iv) Shaker v) Centrifuge. • Preparation of Normal, Molar and percentage solution (%W/W, %V/V, %W/V) • Calibration and accuracy of glass pipettes /micropipettes. • Preparation of standard buffers and standardization of pH meter Measurement of pH of any two samples • Determination of Lambda max using colorimeter/spectrophotometer. • Verification of Beer Lambert's law. • Separation of plant pigments using chalk to explain chromatography principles. • Separation plant pigments by solvent extraction. • Separation of microbial pigments. • Sterile filtration of fluids using syringe filters, membrane filtration (any one)	

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Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 3.5 hour

Format of Question Paper

Question No	Nature of Questions	Marks
Q1	Practical	25
Q2	Journal	05
		Total 30
OR		
Q1	Practical	15
Q2	Practical	10
Q3	Journal	05
		Total 30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Viva /skill assessment/ Spots/ Identification/ objective question test/ MCQ	15
2.	Overall performance	05
		Total 20

Note:

- Certified Journal is compulsory** for appearing at the time of practical exam, failing which they will not be allowed to appear for examination.
- Students are required to perform at least 75% of practicals, for the journal to be certified. The journal serves as record of the student's practical work is an essential component of evaluation process.

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REFERENCES:

- Biophysical chemistry: Principles and Techniques (2016) Himalaya Publishing House College
- Physical and Analytical Chemistry,(2014)K.B.Baliga, S.A.Zaveri,Himalaya Publishing House.
- Fundamentals of Analytical Chemistry (2022)10th edition -Douglas Skoog, Donald West, Cengage Technology Edition
- Biophysical chemistry: Principles and Techniques (2016) Himalaya Publishing House
- A practical book on calibration of Analytical Instruments (2019), Dr. Suresh Jain, Dr. Vipin Saini, Dr. Naitikkumar Trivedi, Nirali Prakashan.
- Prescott, L. M. (2002). Microbiology 5th Edition.

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

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

Semester- I

Title: Microbial Techniques

**Vertical - 4
Skill Enhancement Course (SEC) – 2 Credits**

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

Title: Microbial Techniques
Course Code: CHMBTI6

Sr. No.	Heading	Particulars
1	Description the Course:	This course emphasizes biosafety, enumeration, and staining techniques, with practical application of concepts that are relevant to various fields and in demand in the industry. The course enhances students' understanding and essential skills about techniques in microbiology, and prepares them for job prospects in research, teaching, and industry.
2	Vertical 4	SEC
3	Type	Practical
4	Credit	2 Credits
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives: 1. To develop essential skills in microbial techniques and lay the groundwork for more advanced studies in microbiology. 2. To demonstrate methods for isolating and quantifying microorganisms from various sources, emphasizing on aseptic techniques and proper handling. 3. To improve microscopic handling and understand different staining techniques for identifying different microorganisms. 4. To develop skills in maintaining accurate laboratory records, including microscopic observations, procedures and results.	
8	Learning Outcomes: Student will be able to LO1: Employ skills in microbial techniques for more advanced studies in microbiology. LO2: Isolate and quantify microorganisms from various sources using aseptic techniques. LO3: Perform and examine different staining techniques for identifying different Microorganisms. LO4: Maintain accurate laboratory records, including observations, procedures, and results.	
9	Practical Syllabus UNIT: • Good laboratory practices in microbiology laboratory and Biosafety measures. • Enumeration of microorganisms by Breed's count method and counting chambers. • Observation of cell motility in different microorganisms - bacteria, algae, paramecium by wet mount method/hanging drop method /swarming growth method. • Staining of spirochetes from tooth tartar. • Special staining: Endospores staining/Capsule Staining/cell wall staining • Study of the effect of different A) Physical factors like pH, temperature B) Chemical factors like sodium chloride, heavy metals (oligodynamic action) on growth of <i>E.coli</i>. • Qualitative detection of microbial enzymes like catalase, amylase, protease, lipase, dehydrogenase.	

	• Enrichment and isolation of halophilic bacteria from marine environments.(Demo) • Study of the effect of washing skin with soap and disinfectants on its micro flora. • Isolation of different fungal species from spoiled fruit/vegetable samples. • Comparative microscopic study of micro flora from different fermented foods																																							
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 border="1"><thead><tr><th>Question No</th><th>Nature of Questions</th><th>Marks</th></tr></thead><tbody><tr><td>Q1</td><td>Practical</td><td>25</td></tr><tr><td>Q2</td><td>Journal</td><td>05</td></tr><tr><td></td><td></td><td>Total 30</td></tr><tr><td colspan="3" style="text-align: center;">OR</td></tr><tr><td>Q1</td><td>Practical</td><td>15</td></tr><tr><td>Q2</td><td>Practical</td><td>10</td></tr><tr><td>Q3</td><td>Journal</td><td>05</td></tr><tr><td></td><td></td><td>Total 30</td></tr></tbody></table> 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 /skill assessment/ Spots/ Identification/ objective question test/ MCQ</td><td>15</td></tr><tr><td>2.</td><td>Overall performance</td><td>05</td></tr><tr><td></td><td></td><td>Total 20</td></tr></tbody></table> Note: 3. Certified Journal is compulsory for appearing at the time of practical exam, failing which they will not be allowed to appear for examination. 4. Students are required to perform at least 75% of practicals, for the journal to be certified. The journal serves as record of the student's practical work is an essential component of evaluation process.	Question No	Nature of Questions	Marks	Q1	Practical	25	Q2	Journal	05			Total 30	OR			Q1	Practical	15	Q2	Practical	10	Q3	Journal	05			Total 30		Assessment / evaluation	Marks	1.	Viva /skill assessment/ Spots/ Identification/ objective question test/ MCQ	15	2.	Overall performance	05			Total 20
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11	REFERENCES: 1. Textbook of Biochemistry with Clinical Correlations, 7th Edition, Thomas M. Devlin, January 2010, 2. Biosafety in Microbiological and Biomedical Laboratories-CDC 3. Laboratory Biosafety Manual Fourth edition-WHO. 4. Basic Practical Microbiology A manual, Published by the Society for General Microbiology, Marlborough House, Basingstoke Road, Spencers Wood, Reading RG7 1AG, UK 5. Forbes B. A, et al: Bailey and Scotts: Diagnostic Microbiology 12th Edition.																																							

	6. Ochei J and Kolhatkar (2000); Medical Laboratory Science, Theory and Practice, Tata McGraw-Hill Publishing Company 7. Biochemical Methods.1st , (1995), S. Sadashivam, A. Manickam, New Age International Publishers, India
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Department of B.Sc. (Biotechnology):

Sr No	Name of the Faculty	Designation and College	Signature
1.	Dr. Bhuvaneshwari Krishna	Assistant Professor & Head of Department, Smt. C.H.M. College.	<i>Bh Krishna</i>
2.	Dr. Kishori Tarfe	Assistant Professor, Smt. C.H.M. College.	<i>Ks Tarfe</i>
3.	Ms. Vaishnavi Pathare	Lecturer, Smt. C.H.M. College.	<i>V.P. Pathare</i>
4.	Ms. Pranali Jadhav	Lecturer, Smt. C.H.M. College.	<i>P. Jadhav</i>
5.	Ms. Bhairavi Suryavanshi	Lecturer, Smt. C.H.M. College.	<i>B. Suryavanshi</i>

Name & Signature of the Ad hoc BoS Chairperson: Dr. Bhuvaneshwari Krishna *Bh Krishna*

Name & Signature of the Dean: Ms. Ritika Sachdev *Ritika Sachdev*



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

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

Semester- I

Vertical - 5

**Ability Enhancement Course (AEC) 2 Credits
Value Education Course (VEC) 2 Credits
Indian Knowledge System (IKS) 2 Credits**

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

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

**First Year B. Sc.
(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: CHMSCIAEC1**

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**

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

Internal Examination: Continuous Evaluation - 20 marks

	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

11

REFERENCES:

1. Adler, Ronald B., et al. *Understanding Human Communication*. 15th ed., Oxford UP, 2021.
2. Bailey, Stephen. *Academic Writing: A Handbook for International Students*. 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: CHMSINAEI

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 like 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 तबदीलियू 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) जिवानी राबतो, ii) गैर जिवानी राबतो, iii) लिखत राबतो iv) डिजीटल राबतो
- राबते मां फायदा
- राबते में रंडकू
- बेहतर राबते जा तरीका
- ग्राहकन सां सिंधी बोलीअ मे गुफतगू

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 I)	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

Semester- I

Title: Indian Knowledge System

**Vertical - 5
IKS Subject - 2 Credits**

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

Title: Indian Knowledge System

Course Code:CHMIKSI

Sr. No.	Heading	Particulars
1	Description of the Course:	This course introduces students to the Indian Knowledge System (IKS), emphasizing its historical depth, cultural relevance, and interdisciplinary value. Rooted in the context of Indian civilization, it explores the holistic development of knowledge from ancient to pre-modern times, including contributions in medicine, mathematics, logic, linguistics, governance, arts, and sciences. By revisiting the traditional education systems and intellectual heritage of India, the course encourages learners to connect ancient insights with contemporary disciplines. It aims to enhance awareness, foster appreciation of indigenous wisdom, and reveal the interconnectedness of various streams of knowledge, aligning with the goals of the NEP 2020.
2	Vertical 5	IKS
3	Type	Theory+ Practicum (Teaching Methods: Lecture/ Discussion/ Presentation etc.)
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: 1. To sensitize the students about context in which they are embedded i.e. Indian culture and civilization including its Knowledge System and Tradition. 2. To help student to understand the knowledge, art and creative practices, skills and values in ancient Indian system. 3. To help to study the enriched scientific Indian heritage. 4. To introduce the contribution from Ancient Indian system & tradition to modern science & Technology	
8	Learning Outcomes: Students will be able to LO1: Understand and appreciate the rich Indian Knowledge Tradition LO2: Understand the contribution of Indians in various fields LO3: Experience increase subject-awareness and self-esteem LO4: Develop a comprehensive understanding of how all knowledge is ultimately intertwined	

Syllabus

UNIT I: Introduction

- Introduction to IKS (What is knowledge System, Characteristic Features of Indian Knowledge System)
- Why IKS? (Macaulay's Education Policy and its impact, Need of revisiting Ancient Indian Traditions)
- Scope of IKS (The Universality of IKS (from Micro to Macro), development form Earliest times to 18th Century CE)
- Tradition of IKS (Ancient Indian Education System: Home, Gurukul, Pathashala, Universities and ancient educational centres)
- Relevant sites in the vicinity of the Institute (Water Management System at Kanheri, Temple Management of Ambarnath, etc.)

UNIT II:

- Medicine (Ayurveda)
- Alchemy
- Mathematics
- Logic
- Art of Governance (Arthashastra)

UNIT III: (Select Any FIVE out of the following)

- Aesthetics
- Town Planning
- Strategic Studies
- Krishi Shastra
- Vyakaran & Lexicography
- Natyashastra
- Ancient Sports
- Astronomy
- Yoga and Wellbeing
- Linguistics
- Chitrasutra
- Architecture
- Taxation
- Banking
- Trade and Commerce

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

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

Format of Question Paper

Question No	Nature of Questions	Marks
Q1	Attempt any TWO Questions out of FIVE.	06
Q2	Attempt any THREE Questions out of FIVE	12
Q3	Attempt any THREE Questions out of FIFTEEN	12
		Total 30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Class Test during the lectures (Short notes/ MCQ's/ Match the Pairs/ Answer in one sentence/ Puzzles).	10
2	Participation in Workshop/ Conference/Seminar/ Case Study/Field Visit/ Certificate Course/Project presentation /viva .	10
		Total 20

REFERENCES:

1. Concise history of science in India- D.M. Bose, S.N Sen, B.V. Subbarayappa.
2. Positive sciences of the Ancient Hindus- Brajendranatha seal, Motilal Banarasidas, Delhi 1958
3. History of Chemistry in Ancient India & Medieval India, P.Ray- Indian Chemicals Society, Calcutta 1956.
4. Charaka Samhita- a scientific synopsis, P. Ray & H.N Gupta National Institute of Sciences of India New Delhi 1965.
5. MacDonnell A.A- History of Sanskrit literature
6. Winternitz M- History of Indian Literature Vol. I, II
7. Dasgupta S.N & De S.K- History of Sanskrit literature Vol' I'
8. Ramkrishna Mission- cultural heritage of India Vol' I, II
9. Majumdar R. C & Pushalkar A.D- History & culture of the Indian people, Vol. I, II & III.
10. Keith A.B- History of Sanskrit literature'

Name & Signature of the Dean & Adhoc BoS Chairperson(Interdisciplinary):

(Dr. Nihir Arekar)



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

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

Semester- I

Vertical - 6

OJT, FP, CEP, CC, RP

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

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

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

Semester- I

Vertical - 6

COCURRICULAR COURSE (CC)-2 Credits

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

Title: Cocurricular Course - I

Course Code: CHMCCI6

Sr. No.	Heading	Particulars
1	Description the Course:	This student-friendly Co-Curricular Course is uniquely designed to promote holistic development through active participation in various college-based activities. Unlike traditional theory-based subjects, this course emphasizes hands-on involvement and experiential learning. Students are encouraged to explore their interests and talents by engaging in cultural, social, literary, sports, extension, or club-based events conducted by the college throughout the academic year. Participation will be recorded and assessed based on involvement, initiative, team spirit, creativity, and consistency. The aim is to nurture essential life skills such as leadership, communication, collaboration, and responsibility in a supportive, informal setting. This non-theory course offers students the opportunities and the freedom to learn beyond the classroom and grow into well-rounded individuals, contributing positively to campus life and society.
2	Vertical 6	Cocurricular Course (Mandatory)
3	Type Teaching Methods	Non Theory Participation, Report Writing, Presentation etc.
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: 1. To inculcate a spirit of active participation in cultural, social, environmental, and creative activities. 2. To enhance personal and interpersonal skills through real-life experiences and teamwork. 3. To foster a sense of responsibility, leadership, and community engagement among students. 4. To develop self-confidence and emotional well-being through creative expression and collaboration. 5. To integrate classroom learning with experiential learning for holistic growth.	
8	Learning Outcomes: By the end of the course, students will be able to: LO1: Participate meaningfully in diverse co-curricular activities and reflect on their learning experiences. LO2: Demonstrate improved communication, leadership, and teamwork skills. LO3: Exhibit increased awareness of social responsibility and civic engagement. LO4: Build confidence through creative, cultural, and intellectual expressions. LO5: Maintain a portfolio or activity log to track participation and personal development.	

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Syllabus

Unit I - Suggested Areas of Participation in the activities:

- Cultural Events:** Drama, dance, music, literary events, debates, etc.
- Social Outreach:** Blood donation, awareness campaigns, cleanliness drives.
- Clubs & Societies:** Photography, quiz, environment club, shram club, etc.
- Sports & Fitness:** College tournaments, yoga, marathons, fitness challenges.
- Institutional Events:** Foundation Day, Annual Day, College Festivals, Intercollegiate events.
- National Festivals:** Independence Day, Republic Day etc.

Unit II - Program Specific Topics

- Workshops/Seminars:** Report Writing, Personality Development, Soft Skills, Leadership Talks.
- Speak, Show, Shine:** Presentation / Poster Presentation / Viva and Learning Experience

Mode of Evaluation:

- Faculty Coordinator:** To guide and evaluate student progress.
- Participation Proof:** Certificates, photos, attendance records.
- Reflective Journal:** Minimum 2–3 pages summarizing experiences, learning, and growth.
- Final Viva/Presentation:** 5-minute talk on poster presentation and on overall learning.

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Scheme of Examination and Assessment Pattern
Based on 3 approved Activities
Semester End External - 30 marks

Activity No	Nature of Activities	Marks
1.	Title of Approved Activity - 1	10
2.	Title of Approved Activity - 2	10
3.	Title of Approved Activity - 3	10
	Total	30

Internal Examination: Continuous Evaluation – 20 marks

	Assessment / Evaluation	Marks
1.	Reflective journal	10
2.	Presentation/ poster presentation/viva	10
	Total	20

Suggested Readings:

- How to Win Friends and Influence People
- The 7 Habits of Highly Effective People
- Thinking, Fast and Slow
- Leaders Eat Last
- Talk Like Ted

Name & Signature of the Principal & Chairperson, Academic Council:


 Dr. Manju Lalwani Pathak

