



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/02/2026-27

Date: 27th June, 2026

CIRCULAR

The immediate attention of all concerned is invited to this Office Circular No. CHM (A) AC 11/2026 dated 19th June, 2026 regarding Choice Based and Credit Based Syllabus (CBCS), of Smt. CHM College (Autonomous), under the guidelines of University of Mumbai, as per Academic Framework of NEP 2020, for all subjects of T.Y.B.Sc in Physics SEM-V and SEM-VI.

This is in continuation with curriculum approved by Academic Council for all the subjects of F.Y.B.Sc in Physics (SEM-I), S.Y.B.Sc in Physics (SEM-III) and F.Y.B.Sc in Physics (SEM-II) & S.Y.B.Sc in Physics (SEM – IV) vide Circular Reference Numbers CHM (A) AC/C/01/2025 dated 18th June, 2025, CHM (A) AC/C/01A/2025 dated 21st July 2025 and CHM (A) AC/C/02/2025 dated 20th November, 2025 respectively.

It is hereby communicated that the recommendations of the curriculum designed by the Ad-hoc Board of studies in Physics coordinated by the Dean, Faculty of Pure Sciences in the meeting of Academic Council held on 20th June, 2026 have been approved.

In accordance, therewith, the syllabus as per the CBCS, has been brought into force with effect from the Academic Year 2026-27 for T.Y.B.Sc in Physics, in continuation with syllabus of F.Y.B.Sc in Physics and S.Y.B.Sc in Physics of 2025-2026 (updated), and accordingly the same is attached for reference and is available on the College's website www.chmcollege.in

Ulhasnagar – 421003

27th June 2026

Dr. Manju Lalwani Pathak
Principal & Chairperson, Academic Council

Copy forwarded for information to:

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

PREAMBLE

The B.Sc. **Physics** program is three years (six semesters) program designed to provide a comprehensive understanding of both theoretical and practical aspects of Physics at undergraduate level. This program introduces students to core concepts and principles that are fundamental for further studies in physics, engineering, and related fields.

The syllabus includes a variety of subjects such as **Mathematical Physics, Classical Mechanics, Atomic and Molecular Physics, Nuclear Physics, Solid State Physics, Electrodynamics, Relativity, Electronics and Electronic Instrumentation**. These subjects aim to enhance students' understanding of physical phenomena, develop their problem-solving skills, and prepare them for higher education, research or industrial applications.

Through rigorous coursework and practical experiments, the B. Sc. Physics program is designed to shape students into competent physicists with a broad and deep understanding of physical principles, making them well-equipped for various career opportunities and advanced academic pursuits.

Faculty of Pure Sciences

Programme Outcomes

Upon completion of Bachelor of Science , learner will be able to :

- PO1: Disciplinary Knowledge:** Demonstrate comprehensive knowledge of the chosen discipline, their concepts, theories, methods, and its interdisciplinary applications
- PO2: Critical Thinking and Analytical Reasoning:** Analyse issues critically, apply logical reasoning, and develop appropriate solutions
- PO3: Problem Solving and Scientific Skills:** Apply scientific methods to investigate and solve real life problems.
- PO4: Research Competence:** Formulate research questions, design and conduct investigations, collect and interpret data, apply appropriate statistical methods and communicate research findings effectively.
- PO5: Digital literacy:** Effectively use ICT, digital resources, computational tools, bioinformatics, artificial intelligence applications, and statistical software for scientific learning, research, and decision-making.
- PO6: Communication Skills:** Communicate effectively through written reports, oral presentations, scientific publications, visual media, and interpersonal interactions with diverse audiences.
- PO7: Environmental Sustainability and Community Engagement:** Demonstrate empathy, appreciate cultural diversity, engage in community service, and promote environmental sustainability.
- PO8: Ethics and Professional Values:** Demonstrate integrity, ethical conduct, biosafety, academic honesty, respect for intellectual property, and professional responsibility in scientific practice and research.
- PO9: Leadership and Teamwork:** Work collaboratively in diverse teams, demonstrate leadership qualities, and contribute effectively to achieving common goals.
- PO10: Lifelong Education :** Engage in self-directed lifelong education for continuous personal and professional development.
- PO11: Employability and Entrepreneurship:** Apply scientific knowledge, creativity, and entrepreneurial skills for employment and entrepreneurship.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

On completion of the programme (B. Sc. Physics) the learner will be able to:

PSO1: Advanced Understanding of Core Physics Concepts: demonstrate a deep understanding of advanced topics in Physics by applying principles of Physics to solve complex physical problems and predict real-world phenomena.

PSO2: Skill in Experimental Physics and Instrumentation: perform experiments using modern laboratory instruments and computing tools to analyze experimental data with precision.

PSO3: Application of Mathematical Techniques in Physics: apply advanced mathematical techniques to solve complex problems in different domains like, Electrodynamics, Mechanics, and Atomic and Molecular Physics etc. They will also learn to apply theoretical concepts and practical skills in various fields like Electronics, Spectroscopy, Nanotechnology, Computational Physics, Astrophysics etc.

PSO4: Research Competence: analyze physical systems critically, evaluate experimental results, estimate errors, and use their knowledge to approach new challenges in research or higher studies. The learners will also acquire deeper insight into the subject by using Computational / AI tools.

PSO5: Career Readiness: be productively employed in fields like Electronics, Instrumentation, Solar Energy, Optics, Radiology, Computer Hardware, Medical Physics, Education etc.



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

Bachelor of Science
(Physics)
(Aided Course)

Semester – I

Choice Based and Credit Based syllabus
as per NEP 2020 with effect from the
Academic Year 2026-2027

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

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

Semester I

Title: Introduction to Mechanics

**Vertical - 1
Major Subject – 2 Credit**

**with effect from
Academic Year 2026-2027**

Title: Introduction to Mechanics

Course Code: CHMPHI1

Sr. No.	Heading	Particulars
1	Description the Course:	This course provides a comprehensive introduction to classical mechanics, focusing on the fundamental principles that govern motion and the behaviour of matter. Students will explore Newton's laws of motion, frictional forces, work and energy, and the dynamics of systems such as damped and driven oscillators. The course also delves into simple harmonic motion, elasticity, and fluid dynamics, providing a strong conceptual and mathematical framework for understanding the physical world. AI tools of Computational Physics like Python and Wolframalpha are introduced for solving problems in mechanics.
2	Vertical 1	Major
3	Type Teaching Methods	Theory Lecture/discussion/presentations
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives:	CO(A)1. Explain Newton's laws of motion, friction, work, energy and able to solve problems using them. CO(A)2..Learn the mechanics of multi-particle system using concepts of center of mass and conservation laws. CO(A)3.Study the mechanics of undamped and damped oscillations. CO(A)4.Study elasticity and applications of fluid mechanics CO(A)5.Demonstrate quantitative problem solving skills in all the topics covered in the syllabus using analytical methods and using AI tools.
8	Course Outcomes:	after successful completion of the course, learner will be able to CO1: explain Newton's laws of motion, friction, work, energy and able to solve problems using them. CO2: Comprehend Work and Energy equivalence and its applications through suitable numerical. CO3: discuss mechanics of multi-particle system using concepts of center of mass and conservation laws. CO4: implement concept of undamped and damped oscillations in physical problems CO5: apply the concepts of elasticity and fluid mechanics in physical problems CO6: Solve quantitative problems in mechanics using analytical methods and using AI tools.

Syllabus

UNIT I:

- **Mathematical methods in Physics (Revision):** Units , dimensions, vectors and scalars, resolution of vectors, dot product and cross product of two vectors, Differential Calculus : $\frac{dy}{dx}$ as Rate Measurer, Maxima and Minima, Integral Calculus
- **Newton's Laws of Motion:** Newton's first, second and third laws of motion, interpretation and applications, pseudo forces, inertial and non-inertial frames of reference worked out examples (with friction present).
- **Friction:** Advantages & disadvantages of friction in daily life, Friction as the component of Contact force, Kinetic Friction, Static friction, laws of friction, Understanding friction at atomic level.
- **Work and Energy:** Kinetic Energy, Work and Work-energy theorem, Potential Energy, Conservative and Non-Conservative Forces, Definition of Potential Energy and Conservation of Mechanical Energy, worked out Examples.
- **Centre of mass and Linear momentum :** Centre of Mass, Centre of Mass of Continuous Bodies, Motion of the Centre of Mass, Linear Momentum and its Conservation Principle
- **Rotational Mechanics:** Rotation of a Rigid Body about a Given Fixed Line , Kinematics, Rotational Dynamics , Torque of a Force about the Axis of Rotation, Angular Momentum, conservation of Angular Momentum , Calculation of Moment of Inertia , Two Important Theorems on Moment of Inertia
- **Applications of Computational Physics in Mechanics:** Compare computational (python programming) and analytical approaches for mechanics problem.

UNIT II:

- **Oscillations:** The Simple Harmonic Oscillator, Simple Harmonic motion, Relation between Simple Harmonic Motion and Uniform Circular Motion, Damped Harmonic Motion, Forced Oscillations and Resonance
- **Applications of Simple Harmonic oscillations:** Simple Pendulum, Torsional Pendulum and Compound pendulum (Qualitative study)
- **Elasticity:** An introduction to Elasticity, Stress, Strain, Hooke's Law and Moduli of Elasticity
- **Fluid mechanics (Qualitative study):** An introduction to Viscosity, Poiseuille's Equation, Stokes' Law, Terminal velocity, Measurement of Coefficient of Viscosity using Stoke's method, Streamline and Turbulent flow, Equation of Continuity, Bernoulli's equation, Applications of Bernoulli's equation (Ventury tube, Aspirator pump).
- **Applications of Computational Physics in Mechanics:** Plotting of graph using wolframalpha (<https://www.wolframalpha.com/>)

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Scheme of Examination and Assessment Pattern

Paper – 50 Marks

A. External Examination: Semester End External - 30 marks Time: 1hour

Format of Question Paper

Question No	Nature of Questions	Marks
Q1. (A)	Attempt any Two i) Theory ii) Theory iii) Theory iv) Theory	10
Q1. (B)	Attempt any One i) Problem ii) Problem	05
Q2. (A)	Attempt any Two i) Theory ii) Theory iii) Theory iv) Theory	10
Q2. (B)	Attempt any One i) Problem ii) Problem	05
		Total 30

B. Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Continuous Evaluation through: Quizzes, Class Tests, presentation, project, assignment etc.	15
2.	Overall participation	05
		Total 20

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REFERENCE BOOKS:

- HCV:** H.C. Verma, Concepts of Physics-Part I (Second Reprint of 2020) Bharati Bhavan Publishers and Distributers
(HCV:1.3, 1.5, 2.1,2.6 to 2.11) (HCV: 5.1 to 5.5) (HCV: 6.1 to 6.5) (HCV: 8.1, 8.2, 8.5, 8.6, 8.7) (HCV: 9.1 to 9.4) (HCV: 10.1 to 10.5, 10.8 to 10.10, 10.14,10.15) (HCV: 14.2, 14.3, 14.4, 14.5)
- RH:** Resnick and Halliday: Physics – I , 5th Edition.
RH:17.2, 17.3,17.6, 17.7, 17.8 RH:17.5
- Mark Newman, Computational Physics (revised and expanded 2013)
- [Google Colab](#)
- [Python.org](#)
- www.wolframalpha.com

Additional Reference Books

- Mechanics** – H. S. Hans and S. P. Puri, Tata McGraw Hill (2nd ED.).
- An introduction to mechanics** - Daniel Kleppner and Robert Kolenkow

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

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

Semester- I

Title: Physics Major Practical

**Vertical - 1
Physics Major Practical – 2 Credit**

**with effect from
Academic Year 2026-2027**

Title: Physics Major Practical

Course Code: CHMPHI2

Sr. No.	Heading	Particulars
1	Description the Course:	This practical session is designed to provide students with the opportunity to actively engage in hands-on experiments while learning essential scientific skills. The session includes the following key components. Students gain practical experience by working directly with the apparatus, helping them develop proficiency in handling equipment and executing experiments. Students apply the theoretical concepts learned in the classroom to real-world scenarios, reinforcing their understanding through practical application. Students are trained to identify errors in their experimental setups and results, as well as to estimate and quantify the impact of these errors on the final outcomes. Students also learn how to use different tools for graph plotting and simulations for better understanding of an experiment. The session fosters hands-on environment where students can freely explore, experiment, and learn from mistakes, enhancing their confidence in performing experiments and applying concepts. Practical sessions are essential for bridging the gap between theory and real-world scenario, ensuring that students develop a comprehensive understanding of the subject matter and are well-equipped to tackle real-world challenges.
2	Vertical 1	Major
3	Type Teaching Methods	Practical
4	Credit	2 Credits
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1. learn the skills while performing experiments. CO(A)2. know how to use the apparatus without fear & hesitation. CO(A)3. learn the concepts of physics theory concepts and their practical application. CO(A)4. learn the errors and their estimation. CO(A)5. Learn different tools of computational physics for graph plotting and simulations.	

8	<p>Course Outcome: after successful completion of the course, learner will be able to</p> <p>CO1 practice the skills to perform experiments.</p> <p>CO2 use the apparatus without fear & hesitation.</p> <p>CO3 correlate the physics theory concepts to practical application.</p> <p>CO4 apply the concept of errors for their estimation after performing the experiment.</p> <p>CO5: plot a graph using tools of computational physics and work with simulations of experiments.</p>	
9	<h2>Syllabus</h2>	
	Sr. No	Name of experiment
1		Torsional Oscillation: To determine modulus of rigidity η of a material of wire by Torsional oscillations
2		Zener diode characteristics: forward biased and reverse biased
3		Young's Modulus of a bar by method of vibrations
4		Spectrometer: To determine of angle of Prism
5		Frequency of AC Mains: To determine frequency of AC mains (Sonometer wire)
6		To study Thermistor characteristics: Resistance Vs Temperature
7		To determine capacitance in AC circuits using R and C
8		To determine Inductance in AC circuits using L and R
9		LDR Characteristics: To study the dependence of LDR resistance on intensity of light
10		Transistor characteristics: CE mode
11		NAND and NOR as universal gates
	Skill Experiment	
1		Use of Vernier Callipers, Micrometer Screw Gauge and Travelling Microscope
2		Graph plotting with different tools of computational physics (using word, excel, PhET calculus grapher) (Plot BE/A verses A graph for 30 atoms, Plot Packing Fraction graph for 30 atoms)
3		Spectrometer: Schuster's Method
4		To determine the Resistance & Capacitance using Colour code/Number & verify using Multimeter (Analog/Digital).
5		PhET Simulations : Circuit construction kit
6		Absolute and relative error calculation

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Scheme of Examination and Assessment Pattern**Paper – 50 Marks****A. Semester End Practical Examination - 30 marks Time: 2hours**

	Assessment / evaluation	Marks
	One Experiment	20
1.	Viva-voce	05
2.	Journal	05
	Total	30

B. Internal Examination: - 20 marks

	Assessment / evaluation	Marks
1.	One skill experiment/ test based on skill experiments	10
2.	Skill experiment write up	05
3.	Overall performance	05
	Total	20

Note:

- All the measurements and readings should be written with proper units in SI system only.
- After completing all the required number of experiments in the semester and recording them in journal, student will have to get their journal certified and produce the certified journal at the time of practical examination.
- While evaluating practical, weightage should be given to circuit/ray diagram, observations, tabular representation, experimental skills and procedure, graph, calculation and result.
- Skill of doing the experiment and understanding physics concepts should be more important than the accuracy of final result.
- For practical examinations, the learner will be examined in one experiment
- Each experiment will be of two lecture hours' duration.
- Minimum 8 experiments must be reported in journal
- 4 skill experiments are required to be completed compulsorily. Students are required to report all these experiments in the journal. Evaluation in viva voce will be based on regular experiments and skill experiments.

A learner will be allowed to appear for the semester and practical examination only if he submits a certified journal of Physics or a certificate that the learner has completed the practical course of Physics Semester I as per the minimum requirements

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REFERENCE BOOKS:

- Advanced course in Practical Physics D. Chattopadhyaya, P. C. Rakshit & B Saha. (6th Edition) Book and Allied Pvt. Ltd.
- B. Sc. PRACTICAL Physics – Harnam Singh S. Chand & Co. Ld. 2001
- B.Sc. Practical Physics – C. L Arora (1st Edition) -2001 S. Chand and Co Ltd.
- <https://phet.colorado.edu>

Additional Reference Books

- A test book of advanced practical PHYSICS _ SAMIR Kumar Ghosh, New Central Book Agency (3rd edition)
- Practical Physics CL Squires (3rd Edition) Cambridge University
- University Practical Physics – DC Tayal. Himalaya Publication
- Advanced Practical Physics – Worsnop & Flint.

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

First Year B. Sc.

Semester 1

Title: - Open Elective

Vertical - 3

Open Elective – 2 Credit

**with effect from
Academic Year 2026-2027**



HSNC Board's

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Estd. Year
1965

Faculty of Interdisciplinary

Vertical 3: List of Open Elective Skill Based Courses for First Year: Semester - I

Sr. No.	Nomenclature of the Paper
1	Basic Computer Skills for Digital Age
2	Visual Design and Digital Tools : A Foundation For Animation
3	Basic Tools of AI for Economics and Education
4	Communicative English
5	Urbanization and Real Estate: Concepts and Contemporary Scenarios
6	Business of Travel and Tours
7	Managing Family Wealth Through Family Office
8	Web Designing Essentials: HTMLI and CSS Styling Techniques
9	Basics of Nutrition
10	Lessons of Reel Making
11	Performing Arts
12	Data Analysis with Excel
13	Political Communication and Media Skills
14	Stress Management-I
15	Social Media and Communication
16	Mushroom Cultivation: Training and Trading
17	Yoga and Fitness
18	Basic Perfumeries Course (Level-I)
19	Soft Skills for Corporate Readiness
20	Beautician : Strategic Business Planning
21	Current Trends of Fashion Design: Financial Perspective
22	Basics of Accounting-I
23	Digital Marketing
24	Online Trading in Stock Market
25	Event Management Course in Sindhi



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

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

Semester- I

Title: - Laboratory Equipment Maintenance

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

**with effect from
Academic Year 2026-2027**

Title: - Laboratory Equipment Maintenance

Course Code: CHMPHI4

Sr. No.	Heading	Particulars
1	Description the Course:	This hands-on course is designed to provide students with foundational knowledge and practical skills in electronics and laboratory techniques. Students will learn to identify, understand, and measure various electronic components, including passive components like resistors, capacitors, and inductors. The course covers essential of soldering, de-soldering and mounting practices, for building and modifying basic circuits on printed circuit boards (PCBs). Additionally, students will explore AC and DC power supplies, gaining an understanding of their application in circuit design and testing. Practical sessions will also focus on the maintenance and safe handling of essential laboratory equipment. By the end of the course, students will have developed critical skills in circuit assembly, testing, and troubleshooting, laying the foundation for more advanced studies in electronics.
2	Vertical 4	VSC
3	Type Teaching Methods	Theory and Practical Lecture/discussion/presentations/Experiments
4	Credit	2 Credits
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives:	CO(A)1. Learn to identify and understand electronic components. CO(A)2. Identify, measure and testing of various types passive components CO(A)3. Learn Soldering and de-soldering of components on PCB and mounting of basic circuits on PCB using digital tools. CO(A)4. Learn about of A.C & D.C. power supply CO(A)5. Learn Maintenance of basic laboratory equipments.

8	<p>Course Outcome: after successful completion of the course, learner will be able to</p> <p>CO1: Identify different electronic components and faults in it. CO2: Solder and de-solder electronic components in a given circuit. CO3: Arrange basic building blocks of power supplies. CO4: Handle and maintain laboratory electronic equipment. CO5: Make layouts of circuits using digital tools</p>
9	<p style="text-align: center;">Syllabus</p> <p>Unit-I</p> <ul style="list-style-type: none"> ● Testing of Passive Electronic Components using Digital Multimeter (DMM) ● Introduction to Active and Passive components ● Passive components resistors and its types ● capacitors and its types ● inductors ● failures in fixed resistors ● testing of resistors ● variable resistors ● variable resistor as potentiometer ● measuring resistors using colour codes. <p>Active Components:</p> <ul style="list-style-type: none"> ● Diode and its types ● bipolar junction transistors ● integrated circuit <p>Unit-II</p> <ul style="list-style-type: none"> ● Testing of semiconductor devices, soldering and troubleshooting ● Testing of Semiconductor devices & understanding types of failures ● Basics of soldering: soldering alloy, soldering iron ● Soldering & de-soldering ● Dry soldering and good contact. ● Types of Laboratory Power supplies and its maintenance.

List of Experiments

- To identify different types of Wires, power cables, probes, fuses used in the laboratory and check their continuity using DMM
- Identification of various types of passive components - resistors, capacitors and inductors used in laboratories.
- Measurement of resistors using colour codes & DMM.
- Identification of various types of semiconductor devices: different types of diodes, bipolar junction transistors.
- Soldering and de-soldering of electronic components in a given circuit
- Mounting simple circuit on PCB.
- Study of a.c & d.c power supplies used in laboratory.
- Digital Tools: PhET Simulations, TinyCAD, Tinkercad Circuits, Every circuit.

Note:

1. After completing all the required number of experiments in the semester and recording them in journal, student will have to get their journal certified and produce the certified journal at the time of practical examination.
2. Skill of doing the experiment and understanding physics concepts should be more important than the accuracy of final result.
3. For practical examinations, the learner will be examined in one experiment
4. Each experiment will be of two lecture hours' duration.
5. Minimum 8 experiments must be reported in journal

A learner will be allowed to appear for the semester and practical examination only if he submits a certified journal or a certificate that the learner has completed the VSC course of Physics Semester I as per the minimum requirements

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Scheme of Examination and Assessment Pattern

Paper – 50 Marks

A. External Examination: Semester End External - 30 marks Time: 1hour

Format of Question Paper

Question No	Nature of Questions	Marks
Q1.	Q:1 Attempt any Three (5 marks each) i) Theory ii) Theory iii) Theory iv) Theory v) Theory	15
Q2.	Q:1 Attempt any Three (5 marks each) i) Theory ii) Theory iii) Theory iv) Theory v) Theory	15
		Total 30

B. Internal Examination: - 20 marks Duration: 2hours

	Assessment / evaluation	Marks
1.	One Experiment	15
2.	Viva-voce	02
3.	Journal	03
	Total	20

11

REFERENCE BOOKS:

- Text book of Electrical Technology, by B.L. Theraja and A.K. Theraja
- Modern Electronic Equipment: Troubleshooting, Repair and Maintenance by Khandpur, TMH 2006
- Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting by R. G. Gupta Tata McGraw Hill Edition 2001
- Student Reference Manual for Electronic Instrumentation Laboratories by Stanley Wolf, and Richard F. M. Smith, Prentice Hall of India Pvt. Ltd. New Delhi
- Consumer Electronics by S. P. Bali, Pearson

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

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

Semester- I

**Title: - Basic Instrumentation Skills and Basic
Mathematical Skills for Physics**

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

**with effect from
Academic Year 2026-2027**

Title: - Basic Instrumentation Skills and Basic Mathematical Skills for Physics
Course Code: CHMPHI5

Sr. No.	Heading	Particulars
1	Description the Course:	This course provides a comprehensive introduction to the use of various laboratory instruments and measurement techniques commonly used in scientific and engineering practices. Students will develop a deep understanding of concepts such as accuracy, precision, resolution, range, and error analysis, which are essential for interpreting and validating experimental data. Practical experience in building simple electrical circuits on breadboards and Printed Circuit Boards (PCBs) (delete). Proficiency in using a scientific calculator for formula based mathematical calculations, including trigonometric, logarithmic functions. Development of key mathematical concepts that describe physical laws, with an emphasis on applying these principles to solve real-world problems. Basics of Python programming to solve simple physics problems.
2	Vertical 4	SEC
3	Type Teaching Methods	Practical Lecture/discussion/presentations/Experiments
4	Credit	2 Credits
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives:	<p>CO(A)1. Generate awareness among students about handling different laboratory instruments scientifically.</p> <p>CO(A)2. Develop concepts of accuracy, precision, resolution, range and errors/uncertainty in measurement.</p> <p>CO(A)3. Understand Breadboard to construct simple circuits</p> <p>CO(A)4. Learn systematic use of scientific calculator.</p> <p>CO(A)5. Illustrate necessary mathematical concepts to develop corresponding skills</p> <p>CO(A)6. Develop the problem solving skill using python programming.</p>

8	<p>Course Outcome: after successful completion of the course, learner will be able to</p> <p>CO 1: Accomplish desired skills to handle different laboratory instruments scientifically. CO 2: Acquire knowledge about precision and accuracy in measurements CO 3: Develop basic electronic circuit using different techniques. CO 4: Develop confidence to use scientific calculator systematically. CO 5: Apply mathematical tools to understand theoretical concepts of physics. CO 6: write a python program to solve real world problems in physics.</p>
9	<p style="text-align: center;">Syllabus</p> <p>Unit 1: Basic Instrumentation skills</p> <ul style="list-style-type: none"> ● Study and determination of Focal length of a convex lens. ● Use of Voltmeter, Ammeter & Digital Multi-meter. ● Use of CRO: Measurement of voltage (AC, DC), Frequency. ● Logic gate IC Testing. ● Introduction to Breadboard. ● Building Electronic Circuits using Breadboard <p>Unit 2: Basic Mathematical Skills</p> <ul style="list-style-type: none"> ● Use of scientific Calculator ● Basic trigonometry and its applications in physics ● Concept of logarithm and its application to Physics ● Concept of derivatives and its application to Physics ● Concept of integration and its application to Physics ● Concept of differential equations (1st order) and its application to Physics ● Graph plotting - plotting of graphs and finding slope and intercept, semi log graph paper, excel, wolframalpha. ● Basic Python programming <p>Note:</p> <ol style="list-style-type: none"> 1. After completing all the required number of experiments in the semester and recording them in journal, student will have to get their journal certified and produce the certified journal at the time of practical examination. 2. Skill of doing the experiment and understanding physics concepts should be more important than the accuracy of final result. 3. For practical examinations, the learner will be examined in one experiment 4. Each experiment will be of two lecture hours' duration.

5. Minimum 8 experiments must be reported in journal

A learner will be allowed to appear for the semester and practical examination only if he submits a certified journal or a certificate that the learner has completed the VSC course of Physics Semester I as per the minimum requirements

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Scheme of Examination and Assessment Pattern

Paper – 50 Marks

A. External Examination: Semester End External - 30 marks Time: 2hours

	Assessment / evaluation	Marks
1.	One Experiment	20
2.	Viva-voce	05
3.	Journal	05
	Total	30

B. Internal Examination: - 20 marks

	Assessment / evaluation	Marks
1.	Assignment or Test on experiments	10
2.	Viva-voce	05
3.	Over all performance	05
	Total	20

11

REFERENCE BOOKS:

1. Text book of Electrical Technology, by B.L. Theraja and A.K. Theraja
2. Modern Electronic Equipment: Troubleshooting, Repair and Maintenance by Khandpur, a. TMH 2006
3. Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting by R. G. Gupta Tata McGraw Hill Edition 2001
4. Student Reference Manual for Electronic Instrumentation Laboratories by Stanley Wolf, and Richard F. M. Smith, Prentice Hall of India Pvt. Ltd. New Delhi
5. Consumer Electronics by S. P. Bali, Pearson
6. Mark Newman, Computational Physics (revised and expanded 2013)
7. Python.org

**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 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 & Teaching Methods	Theory + Practicum Lectures/Discussions/Presentations/Case Studies, etc.
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1: To sensitize the students about context in which they are embedded i.e. Indian culture and civilization including its Knowledge System and Tradition. CO(A)2: To help student to understand the knowledge, art and creative practices, skills and values in ancient Indian system. CO(A)3: To help to study the enriched scientific Indian heritage. CO(A)4: To introduce the contribution from Ancient Indian system & tradition to modern science & Technology.	
8	Course Outcomes: Student will be able to CO1: Understand and appreciate the rich Indian Knowledge Tradition. CO2: Understand the contribution of Indians in various fields. CO3: Experience increase subject-awareness and self-esteem. CO4: 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 Ambernath, 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

10**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 all questions.

Question No	Nature of Questions	Marks
Q1	Attempt any two out of five	06
Q2	Attempt any three out of five	12
Q3	Attempt any three out of fifteen	12
TOTAL		30


Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Class test during lectures (MCQ / Short notes / Match the pairs / Puzzles)	10
2.	Participation in Workshop / Conference / Seminar / Case Study / Field Visit / Certificate Course / Project presentation / Viva	10
TOTAL		20

11**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 Banrasidas, 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. Nitin Arekar)



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

First Year B.Sc.

Semester- I

Vertical – 5

**Ability Enhancement Course (English)
2 Credits**

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

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

Sr. No.	Heading	Particulars
1	Description the Course:	<p>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.</p> <p>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.</p>
2	Vertical 4	Ability Enhancement Course
3	Type Teaching Methods:	Theory+ Practicum (Lecture/ Discussion/ Presentation/ Reading sessions/ Worksheets/ etc.)
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	<p>Course Objectives:</p> <p>CO(A)1: To introduce learners to the fundamentals of effective communication and its components.</p> <p>CO(A)2: To enhance learners’ reading comprehension through exposure to multiple genres and contexts.</p> <p>CO(A)3: To develop grammatical accuracy and lexical resourcefulness for academic and professional communication.</p> <p>CO(A)4: To strengthen verbal and non-verbal presentation skills and promote interactive speaking abilities.</p>	

	CO(A)5: To build competence in real-world writing tasks such as email drafting, bio-data preparation, and descriptive writing.
8	Course Outcomes: Student will be able to CO-1: Understand and apply key principles of effective communication in varied contexts. CO-2: Comprehend and analyze written texts using appropriate reading strategies. CO-3: Recognize and correct common grammatical and lexical errors. CO-4: Engage in clear, confident, and context-appropriate spoken interactions. CO-5: Produce structured, coherent, and grammatically correct written content for academic and workplace use.

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
Sample readings will include excerpts from news articles, reports, editorials, and educational essays (200–250 words).

C) Grammar and Vocabulary

- Subject-Verb Agreement
- Sentence Structures
- Punctuation and Capitalization
- Commonly Confused Words
- Editing and Proofreading Practice

A remedial and functional approach will be followed with contextual exercises.

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 (Attempt any 3 out of 5) - Unit 1 OR Essay-Type Question (Attempt any 1 out of 2)- Unit 1	15
Q. 2	Short Notes (Attempt any 3 out of 5) - Unit 2 OR Essay-Type Question (Attempt any 1 out of 2)- Unit 2	15
	Total	30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Students are required to draft a job application letter along with a resume using the following AI assistance: Canva Resume Builder, Resume.oj, Zety, Novopresume, Rezi etc OR Draft an SoP with the help of the following AI assistance: Quillbot, Yocket, Writesonic, Jasper AI	15
2.		05
	Total	20


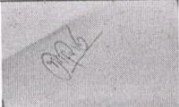
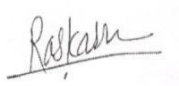
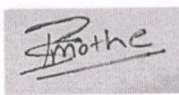
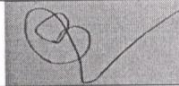
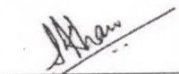
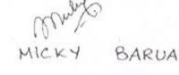

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REFERENCES:

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.

Syllabus Committee:

Sr. No	Name of the Faculty	Designation and College	Signature
1.	Prof. (Dr.) Kailas Aute	Professor & Head, Dept. of English, Smt. CHM College	
2.	Prof. (Dr.) B. R. Hiramani,	(VC Nominee, University of Mumbai) Pancham Khemraj College, Sawantwadi	
3.	Prof. (Dr.) Vikas Raskar	(Subject Expert outside University) Hutatma Rajguru Mahavidyalay, Rajguru Nagar, Khed, (Affiliated to Savitribai Phule University)	
4.	Prof. (Dr.) Prashant Mothe	(Subject Expert outside University) Aadarsh Mahavidyalay, Umerga, Dharashiv, (Affiliated to Dr. Baba Saheb Ambedkar Marathwada University)	
5.	Mr. Ananda Pandhare	Asst. Professor, Dept. of English, Smt. CHM College	
6.	Ms. Sana Khan	Asst. Professor, Dept. of English, Smt. CHM College	
7.	Dr. Micky Barua	Faculty Vidyalkar Institute of technology, Alumni Member	 MICKY BARUA
8.	Ms. Sofy Verghese	Accenture, Industry Representative	

Name & Signature of the Ad-hoc BoS Chairperson: Prof. (Dr). Kailas Aute



Name & Signature of the Dean: Prof. (Dr). Nitin Arekar





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

**Bachelor of Commerce/
Arts/Science/ SFC
(Sindhi)**
(AEC – Ability Enhancement Course)
(Aided Course)

Semester – I

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

PREAMBLE

The Bachelor of Commerce (B.Com.) in Sindhi is a comprehensive program designed to develop Sindhi language. Language is the soul of Literature. Sindhi is medium of Communication, Education and Cultural exchange. Curriculum is designed specially in digital age.

Language enriches literature. This curriculum is prepared according to Social, Cultural and Academic needs. The B.Com. Sindhi subject offers students a unique opportunity to explore and widened Sindhi Culture through a wide range of literary programs. The curriculum not only emphasizes literary appreciation and analysis but also fosters ethical awareness, intercultural sensitivity and social responsibility.

The program is committed to developing critical thinking, ethical reasoning and inclusive perspectives. It encourages students to reflect and engage with communication in Sindhi, expertise in Business and Employment Creative work, meditation and listening, use of visual tails, expertise of asking questions, knowledge of different languages through communication.

Language allows us to share our ideas, thoughts, feelings and emotions with others through communication. There is a special contribution of the ideal citizen in nation building. It plays crucial role in creating civilized society.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO-1 Students will understand the communication skills and role of language in communication.

PSO-2 Students will be able to talk effectively in Sindhi language with friends, relatives and Business customers.

PSO-3 Students will understand aspects of language.

PSO-4 Students will be able to understand the Importance of communication, and they will communicate in different ways i.e. verbal, non-verbal, written and Digital methods.

Smt
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: CHMSINIAEC

Sr. No.	Heading	Particulars
1	Description the Course:	Communication is the core component of 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. Innovative approaches like critical thinking, creative mind, and use of technology will lead to communicating and participating with 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
7	Course Objectives: After successful completion of this course: CO(A) 1: The learner will get understanding of communication skills. CO(A) 2: The learner will understand how to accurate the pronunciation of special words in Sindhi CO(A) 3: The learner will improve the conversation skill in Sindhi. CO(A) 4: The learner will become best communicator in Sindhi language	
8	Course Outcomes: Student will be able to CO1: Know the basic special features of Sindhi language. CO2: Understand communication skills. CO3: Knowing the conversation with businessmen and customers CO4: Know the etiquettes with parents, relatives, friends and others in effective way	

Syllabus

UNIT I: Fundamental of Sindhi Communication

- Introduction of Communication skills 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

Syllabus

यूनित १: सिंधी राबते जो बुनियाद

- संचारी भाषा: वाक्फियत
- भाषा जी अहमियत
- भाषा जा बुनियादी पहलू
१) किस्म, २) भाषा जो किरदार, ३) भाषा मे तबदीलियूं, ४) भाषा जा अहिसासाती पहलू ५) बोली ऐ नई पीड़ी
६) बोली ऐ जदीद टेकनालाजी
- नई तैलीमी नीति ऐं बोलियुन जी अहमियत
- असां जी सिंधी बोली

यूनित २: अमली राबतो (असराइतो गालाइण जो तरीको)

- राबते जी अहमियत
- राबते जा किस्म
१) जिबानी राबतो, २) गैर जिबानी राबतो, ३) लिख्त राबतो ४) डिजीटल राबतो राबते मां फायदा
- राबते में रंडकुं
- बेहतर राबते जा तरीका
- ग्राहकन सां सिंधी बोलीअ मे गुफ्तगू
- कारोबार में सिंधी गालाइण

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
Q1.A)	Objective Type Questions (Unit- I)	05
Q1.B)	Attempt ANY 2 out of 4- (5 marks each) (Unit-I)	10
Q2.A)	Objective Type Questions (Unit- II)	05
Q2.B)	Attempt ANY 2 out of 4- (5 marks each) (Unit-II)	10
Total		30
Internal Examination: Continuous Evolution - 20 marks		Total 30

	Assessment / evaluation	Marks
1.	Written assignment on any one of the following topics 1) Draft a Notice and Report writing in Sindhi 2) Simulate dialogues such as interview, daily conversation and public speaking in Sindhi (Students are required to use AI assistance in the preparation of their drafts. Eg: Microsoft Copilot, Google Gemini, Google voice Typing tool)	15
2.	Class Attendance and Participation	05
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	
2.	Mrs. Komal Totani	Assistant Teacher, Smt. CHM College	

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

Name & Signature of the Dean: (Dr. Nitin Arekar)_____

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

First Year

Semester- I

Title: Cocurricular Course I

**Vertical - 6
Cocurricular Course - 2 Credits**

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

Title: Cocurricular Course - I

Course Code: CHMCCI6

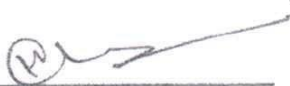
Sr. No.	Heading	Particulars
1	Description the Course:	<p>This student-friendly Co-Curricular Course is uniquely designed to promote holistic development through active participation in various college-based activities. Unlike traditional theory-based subjects, this course emphasizes hands-on involvement 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.</p> <p>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.</p> <p>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.</p>
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:	<ol style="list-style-type: none"> 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:	<p>By the end of the course, students will be able to:</p> <p>LO1: Participate meaningfully in diverse co-curricular activities and reflect on their learning experiences.</p> <p>LO2: Demonstrate improved communication, leadership, and teamwork skills.</p> <p>LO3: Exhibit increased awareness of social responsibility and civic engagement.</p> <p>LO4: Build confidence through creative, cultural, and intellectual expressions.</p> <p>LO5: Maintain a portfolio or activity log to track participation and personal development.</p>

9	Syllabus																											
	Unit I - Suggested Areas of Participation in the activities: <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • Workshops/Seminars: Report Writing, Personality Development, Soft Skills, Leadership Talks. • Speak, Show, Shine: Presentation / Poster Presentation / Viva and Learning Experience Mode of Evaluation: <ul style="list-style-type: none"> • 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. 																											
10	Scheme of Examination and Assessment Pattern Based on 3 approved Activities Semester End External - 30 marks <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Activity No</th> <th style="width: 65%;">Nature of Activities</th> <th style="width: 20%;">Marks</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1.</td> <td>Title of Approved Activity - 1</td> <td style="text-align: center;">10</td> </tr> <tr> <td style="text-align: center;">2.</td> <td>Title of Approved Activity - 2</td> <td style="text-align: center;">10</td> </tr> <tr> <td style="text-align: center;">3.</td> <td>Title of Approved Activity - 3</td> <td style="text-align: center;">10</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total</td> <td style="text-align: center;">30</td> </tr> </tbody> </table> Internal Examination: Continuous Evaluation – 20 marks <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;"></th> <th style="width: 70%;">Assessment / Evaluation</th> <th style="width: 20%;">Marks</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1.</td> <td>Reflective journal</td> <td style="text-align: center;">10</td> </tr> <tr> <td style="text-align: center;">2.</td> <td>Presentation/ poster presentation/viva</td> <td style="text-align: center;">10</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total</td> <td style="text-align: center;">20</td> </tr> </tbody> </table>	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		Assessment / Evaluation	Marks	1.	Reflective journal	10	2.	Presentation/ poster presentation/viva	10	Total		20
Activity No	Nature of Activities	Marks																										
1.	Title of Approved Activity - 1	10																										
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3.	Title of Approved Activity - 3	10																										
Total		30																										
	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





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

Bachelor of Science
(Physics)
(Aided Course)

Semester – II

Choice Based and Credit Based syllabus
as per NEP 2020 with effect from the
Academic Year 2026-2027

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

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

Semester II

Title: Optics

**Vertical - 1
Major Subject – 2 Credit**

**with effect from
Academic Year 2026-2027**

Title: Optics

Course Code: CHMPH11

Sr. No.	Heading	Particulars
1	Description of the Course:	This course provides an introduction to optics, focusing on the study of lenses and optical phenomena like diffraction and polarization. PhET, Ray Optics Simulation, GeoGebra and similar AI / computational tools are used for visualization of ray optics, diffraction and polarization phenomena.
2	Vertical 1	Major
3	Type Teaching Methods	Theory Lecture/discussion/presentations
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives:	<p>CO(A)1. Explain the nomenclature used in lenses, lens equations for single convex lenses, Types of magnification, equivalent focal length of two thin lenses, concept of cardinal points.</p> <p>CO(A)2. Explain qualitatively Spherical aberration & reduction, chromatic aberration & reduction.</p> <p>CO(A)3. Study of Fresnel and Fraunhofer type of diffraction and Fraunhofer diffraction pattern due to a single slit and double slit,</p> <p>CO(A)4. Describe Polarization and types of Polarization, Double refraction</p> <p>CO(A)5. The students learn to visualize the concepts using simulations and computational tools and apply their knowledge to solve problems that are covered in the syllabus .</p>
8	Course Outcomes:	<p>after successful completion of the course, learner will be able to</p> <p>CO1: explain the nomenclature used in lenses, lens equations for single convex lenses, types of magnification, equivalent focal length of two thin lenses, concept of cardinal points.</p> <p>CO2: comprehend qualitatively Spherical aberration & reduction, chromatic aberration & reduction.</p> <p>CO3: differentiate between Fresnel and Fraunhofer type of diffraction and Fraunhofer diffraction pattern due to a single slit and double slit,</p> <p>CO4: discuss types of Polarization, Double refraction</p> <p>CO5: visualize the concepts using simulations and computational tools and solve problems related to the topics that are covered in the syllabus.</p>

Syllabus

UNIT I:

- **Lenses and Lens Maker's Equation:** Introduction to lenses, Terminology and sign conventions, Introduction to Thin lenses and Lens equation for single convex lens, Lens maker's equation: Positions of the Principal Foci and Newton's Lens equation.
- **Magnification by a lens and power of lens:** Lateral, Longitudinal and Angular magnification, Deviation by a thin lens and its power, Equivalent focal length of two thin lenses, Focal length of the equivalent lens & power of two thin lenses, Concept of cardinal points and their significance
- **Introduction to Aberration in lenses:** Spherical aberration & reduction, chromatic aberration & reduction (Qualitative).
- **Suitable numericals with appropriate difficulty level.**
- **Use of phET simulations to study bending of light.**

UNIT II:

- **Fresnel diffraction:** Introduction, Huygens-Fresnel's theory, Fresnel's assumptions, Distinction between interference and diffraction, Fresnel and Fraunhofer types of diffraction,
- **Fraunhofer diffraction:** Introduction, Fraunhofer diffraction at a single slit, intensity distribution in diffraction pattern due to a single slit, Fraunhofer diffraction at double slit (Qualitative), Distinction between single slit and double slit diffraction patterns.
- **Polarization:** Introduction, Polarization, Types of Polarization, Polarization by selective absorption, Polarizer and analyzer, Malus' law, Double refraction in calcite crystal
- Use of **GeoGebra** and similar computational tools for visualization of diffraction and polarization phenomena

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Scheme of Examination and Assessment Pattern

Paper – 50 Marks

A. External Examination: Semester End External - 30 marks Time: 1hour

Format of Question Paper

Question No	Nature of Questions	Marks
Q1. (A)	Attempt any Two i) Theory ii) Theory iii) Theory iv) Theory	10
Q1. (B)	Attempt any One i) Theory /Problem ii) Theory /Problem	05
Q2. (A)	Attempt any Two i) Theory ii) Theory iii) Theory iv) Theory	10
Q2. (B)	Attempt any One i) Theory /Problem ii) Theory /Problem	05
		Total 30

B. Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Continuous Evaluation through: Quizzes, Class Tests, presentation, project, assignment etc.	15
2.	Overall participation	05
		Total 20

11

REFERENCE BOOKS:

- A Textbook of Optics** - Dr. N. Subrahmanyam, Brijlal, and Dr. M. N. Avadhanulu, 25th Revised Edition (2012) S. Chand.
(4.1, 4.2, 4.3, 4.7, 4.8, 4.9, 4.10, 4.10.1, 4.11, 4.12, 4.12.1, 4.12.2, 4.12.3, 4.15, 4.16, 4.17, 4.17.1, 4.17.2, 4.17.3, 4.17.4, 5.2, 9.2, 9.5, 9.5.1, 9.10, 17.1, 17.2, 17.3, 17.6, 17.7, 18.1, 18.2, 18.2.1, 18.4, 18.4.2, , 20.1, 20.2, 20.5, 20.5.1, 20.5.2, 20.5.3, 20.6, 20.6.4, 20.6.5, 0.8, 20.9, 20.11, 20.11.2)
- <https://www.phet.colorado.edu/>
- <https://www.geogebra.org/>

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

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

Semester II

Title : Physics Major Practical

**Vertical - 1
Physics Major Practical – 2 Credit**

**with effect from
Academic Year 2026-2027**

Title: Physics Major Practical

Course Code: CHMPHII2

Sr. No.	Heading	Particulars
1	Description of the Course:	This practical session is designed to provide students with the opportunity to actively engage in hands-on experiments while learning essential scientific skills. The session includes the following key components. Students gain practical experience by working directly with the apparatus, helping them develop proficiency in handling equipment and executing experiments. Students apply the theoretical concepts learned in the classroom to real-world scenarios, reinforcing their understanding through practical application. Students are trained to identify errors in their experimental setups and results, as well as to estimate and quantify the impact of these errors on the final outcomes. The session fosters hands-on environment where students can freely explore, experiment, and learn from mistakes, enhancing their confidence in performing experiments and applying concepts. Practical sessions are essential for bridging the gap between theory and real-world scenario, ensuring that students develop a comprehensive understanding of the subject matter and are well-equipped to tackle real-world challenges. Wolfram alpha and Excel are used for plotting of graphs. Also Optics simulations using PhET, Ray Optics Simulation (phydemo.app) and similar AI/ computational tools are used for visualization of ray optics and diffraction of light.
2	Vertical 1	Major
3	Type Teaching Methods	Practical
4	Credit	2 Credits
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1. learn the skills while performing experiments. CO(A)2. know how to use the apparatus without fear & hesitation. CO(A)3. learn the concepts of physics theory concepts and their practical application. CO(A)4. learn the errors and their estimation. CO(A)5. learn different tools of computational physics for graph plotting and simulations.	

8	<p>Course Outcome: after successful completion of the course, learner will be able to</p> <p>CO1 practice the skills to perform experiments. CO2 use the apparatus without fear & hesitation. CO3 correlate the physics theory concepts to practical application. CO4 apply the concept of errors for their estimation after performing the experiment. CO5:plot a graph using tools of computational physics and work with simulations of optics experiments.</p>																																				
9	<table border="1"> <thead> <tr> <th colspan="2" data-bbox="282 485 1528 569" style="text-align: center;">Syllabus</th> </tr> <tr> <th data-bbox="282 569 383 642" style="text-align: center;">Sr. No</th> <th data-bbox="383 569 1528 642" style="text-align: center;">Name of experiment</th> </tr> </thead> <tbody> <tr> <td data-bbox="282 642 383 680">1</td> <td data-bbox="383 642 1528 680">Determination of wavelength of monochromatic source using grating</td> </tr> <tr> <td data-bbox="282 680 383 718">2</td> <td data-bbox="383 680 1528 718">Spectrometer: To determine refractive index of prism material</td> </tr> <tr> <td data-bbox="282 718 383 791">3</td> <td data-bbox="383 718 1528 791">Combination of Lenses: To determine equivalent focal length of a lens system by magnification method</td> </tr> <tr> <td data-bbox="282 791 383 865">4</td> <td data-bbox="383 791 1528 865">Newton's Rings: To determine radius of curvature of a given convex lens using Newton's rings.</td> </tr> <tr> <td data-bbox="282 865 383 903">5</td> <td data-bbox="383 865 1528 903">Determination of diameter of thin wire using Wedge Shaped Film</td> </tr> <tr> <td data-bbox="282 903 383 940">6</td> <td data-bbox="383 903 1528 940">Study of Logic gates</td> </tr> <tr> <td data-bbox="282 940 383 978">7</td> <td data-bbox="383 940 1528 978">To verify De Morgan's Theorems</td> </tr> <tr> <td data-bbox="282 978 383 1016">8</td> <td data-bbox="383 978 1528 1016">To study load regulation of a Bridge Rectifier</td> </tr> <tr> <td data-bbox="282 1016 383 1054">9</td> <td data-bbox="383 1016 1528 1054">To study Zener Diode as Regulator</td> </tr> <tr> <td data-bbox="282 1054 383 1092">10</td> <td data-bbox="383 1054 1528 1092">To study half adder and full adder and verify their truth table</td> </tr> <tr> <td colspan="2" data-bbox="282 1092 1528 1129" style="text-align: center;">Demonstration Experiment</td> </tr> <tr> <td data-bbox="282 1129 383 1167">1</td> <td data-bbox="383 1129 1528 1167">Radius of ball bearings (single pan balance)</td> </tr> <tr> <td data-bbox="282 1167 383 1205">2</td> <td data-bbox="383 1167 1528 1205">Use of Oscilloscope (measurement of ac and dc voltage, ac frequency and time period)</td> </tr> <tr> <td data-bbox="282 1205 383 1243">3</td> <td data-bbox="383 1205 1528 1243">Use of PC for graph plotting using excel, wolfram alpha</td> </tr> <tr> <td data-bbox="282 1243 383 1281">4</td> <td data-bbox="383 1243 1528 1281">Testing of components (Diode , Transistor)</td> </tr> <tr> <td data-bbox="282 1281 383 1318">5</td> <td data-bbox="383 1281 1528 1318">Optics simulations using phET, Ray Optics Simulation (phydemo.app)</td> </tr> </tbody> </table>	Syllabus		Sr. No	Name of experiment	1	Determination of wavelength of monochromatic source using grating	2	Spectrometer: To determine refractive index of prism material	3	Combination of Lenses: To determine equivalent focal length of a lens system by magnification method	4	Newton's Rings: To determine radius of curvature of a given convex lens using Newton's rings.	5	Determination of diameter of thin wire using Wedge Shaped Film	6	Study of Logic gates	7	To verify De Morgan's Theorems	8	To study load regulation of a Bridge Rectifier	9	To study Zener Diode as Regulator	10	To study half adder and full adder and verify their truth table	Demonstration Experiment		1	Radius of ball bearings (single pan balance)	2	Use of Oscilloscope (measurement of ac and dc voltage, ac frequency and time period)	3	Use of PC for graph plotting using excel, wolfram alpha	4	Testing of components (Diode , Transistor)	5	Optics simulations using phET, Ray Optics Simulation (phydemo.app)
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Scheme of Examination and Assessment Pattern

Paper – 50 Marks

A. Semester End Practical Examination - 30 marks Time: 2hours

	Assessment / evaluation	Marks
1.	One Experiment	20
2.	Viva-voce	05
3.	Journal	05
	Total	30

B. Internal Examination: - 20 marks

	Assessment / evaluation	Marks
1.	Test based on demonstration experiment	10
2.	Demonstration experiment write up	05
3.	Overall performance	05
	Total	20

Note:

1. All the measurements and readings should be written with proper units in SI system only.
2. After completing all the required number of experiments in the semester and recording them in journal, student will have to get their journal certified and produce the certified journal at the time of practical examination.
3. While evaluating practical, weightage should be given to circuit/ray diagram, observations, tabular representation, experimental skills and procedure, graph, calculation and result.
4. Skill of doing the experiment and understanding physics concepts should be more important than the accuracy of final result.
 - For practical examinations, the learner will be examined in one experiment
 - Each experiment will be of two lecture hours duration.
 - In all minimum 8 experiments and 4 demonstration experiments are required to be completed compulsorily. Students are required to report all these experiments in the journal. Evaluation in viva voce will be based on regular experiments and demonstration/ skill experiments.

A learner will be allowed to appear for the semester and practical examination only if he submits a certified journal of Physics or a certificate that the learner has completed the practical course of Physics Semester II as per the minimum requirements.

REFERENCE BOOKS:

1. Advanced course in Practical Physics D. Chattopadhyaya, P. C. Rakshit & B Saha. (6th Edition) Book and Allied Pvt. Ltd.
2. B. Sc. PRACTICAL Physics – Harnam Singh S. Chand & Co. Ld. 2001
3. B.Sc. Practical Physics – C. L Arora (1st Edition) -2001 S. Chand and Co Ltd.

Additional Reference Books

1. A test book of advanced practical PHYSICS _ SAMIR Kumar Ghosh, New Central Book Agency (3rd edition)
2. Practical Physics CL Squires (3rd Edition) Cambridge University
3. University Practical Physics – DC Tayal. Himalaya Publication
4. Advanced Practical Physics – Worsnop & Flint.

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

First Year B. Sc.

Semester 2

Title: - Open Elective

Vertical - 3

Open Elective – 2 Credit

**with effect from
Academic Year 2026-2027**



HSNC Board's

Smt. Chandibai Himathmal Mansukhani College

(Autonomous)

(Affiliated to the University of Mumbai)

University College Code: 217 | JD Office: T14



Faculty of Interdisciplinary

Vertical 3: List of Open Elective Skill Based Courses for First Year: Semester – II

Sr. No.	Nomenclature of the Paper
1	Cyber and Digital Safety
2	Audio -Video Editing Foundation for Graphics Design and Basics of Animation II
3	Basic Tools of AI for Economics and Education - II
4	English for Professional and Corporate World
5	Urbanisation and Real Estate
6	Business of Travel and Tours-II
7	Managing Family Wealth through Family Office
8	Interactive Web Design using Java Script
9	Basics of Nutrition II
10	Reels Production and Creator Branding
11	Performing Art
12	Data Analysis with Advanced Excel
13	Advanced Political Communication and Media Skills
14	Stress Management
15	Social Media and Society Identity, Power and Digital Citizenship
16	Mushroom Cultivation Training and Trading Level
17	Yoga and Fitness II
18	Basic Perfumery Course (Level-II)
19	Soft Skills II-Personal and Interpersonal Effectiveness
20	Beautician - Strategic Business Planning-II
21	Current Trends of Fashion Designing- Financial Perspective Level-II
22	Basic Accounting-II
23	Digital Marketing II
24	Online Trading and Stock Market-II
25	Event Management Course in Sindhi



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

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

Semester II

Title: - PCB Making

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

**with effect from
Academic Year 2026-2027**

Title: - PCB Making
Course Code: CHMPHII4

Sr. No.	Heading	Particulars
1	Description of the Course:	This hands-on course is designed to provide students with foundational knowledge and practical skills in electronics. The course covers the essentials of soldering, de-soldering and mounting practices, for building and modifying basic circuits on printed circuit boards (PCBs). By the end of the course, students will have developed critical skills in circuit assembly, testing, and troubleshooting, laying the foundation for more advanced studies in electronics.
2	Vertical 4	VSC
3	Type Teaching Methods	Practical
4	Credit	2 Credits
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives CO(A)1. To Develop skills in soldering through-hole and surface-mount components. CO(A)2. To Gain experience in building rectifiers, filters, bridges, and timer circuits. CO(A)3. To Understand single, double, and multi-layer PCB design and layout. CO(A)4. To Learn to verify circuit performance and correct faults. CO(A)5. To Apply digital simulation tools to design, analyze, and validate electronic circuits before fabrication.	
8	Course Outcomes After successful completion of the course, learner will be able to CO1 Assemble and test rectifier circuits with filters & regulators. CO2 Construct and analyze second-order active filters. CO3 Apply bridge principles for temperature sensing. CO4 Perform schematic entry, footprint creation, placement & routing. CO5 Use Multisim and TinyCAD for schematic capture, footprint visualization, and basic circuit testing.	

Syllabus

Sr. No	Name of experiment
GROUP A	
1	Soldering electronic components and testing
2	Circuit assembly on general purpose board of bridge rectifier with capacitor filter and regulator
3	Circuit assembly on general purpose board of Second order active Filter
4	Circuit assembly on general purpose board of Wheatstone bridge for temperature measurement
5	Circuit assembly on general purpose board of 555 based LED flasher
6	Testing of Circuit assembled on general purpose board
7	Soldering of surface mount devices
8	Schematic circuit entry software
GROUP B	
9	Single side PCB
10	Double side PCB
11	Multi-layer PCB
12	Schematic / Components design review.
13	Determine what footprints are required to be built, and build them incorporating.
14	Component placement.
15	Power and Ground Plane assignment.
16	Critical net routing
17	Idea of Digital tools : TinyCad, Multisim, simulators Etc

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

A. Semester End Practical Examination - 30 marks Time: 2hours

	Assessment / evaluation	Marks
1.	One Experiment (either from group A or group B)	20
2.	Viva-voce	05
3.	Journal	05
Total 30		

B. Internal Examination: - 20 marks

	Assessment / evaluation	Marks
1.	One short experiment	10
2.	Test	05
3.	Overall performance	05
Total 20		

	<p>Note:</p> <ul style="list-style-type: none"> ● After completing all the required number of experiments in the semester and recording them in journal, student will have to get their journal certified and produce the certified journal at the time of practical examination. ● Skill of doing the experiment and understanding physics concepts is important. ● For practical examinations, the learner will be examined in one experiment ● Each experiment will be of two lecture hours' duration. ● A Minimum 6 from each group and in all minimum 12 experiments must be reported in journal <p>A learner will be allowed to appear for the semester end practical examination only if he submits a certified journal.</p>
11	<p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. Electronic Product Design Vol. I Basic for PCB Design – by Er. Mehta S.D. 2. Printed circuit boards: Design fabrication , Assembly and testing – R S Khandpur. 3. PCB Design and Layout Fundamentals – by Roger Hu 4. PCB Design and Technology – by Walter C Bosehart

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

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

Semester II

Title: - ICT tools for Physics

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

**with effect from
Academic Year 2026-2027**

Title: - ICT tools for Physics

Course Code: CHMPHI5

Sr. No.	Heading	Particulars
1	Description of the Course:	This course provides a comprehensive introduction to the use of Microsoft Office programs – MS Word, MS Excel and MS Powerpoint. By the end of the course, students will have developed skills to create documents, spreadsheets and effective presentations.
2	Vertical 4	SEC
3	Type Teaching Methods	Practical Lecture/discussion/presentations/Experiments
4	Credit	2 Credits
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives:	<ol style="list-style-type: none">1. To know how to use the most common Microsoft Office programs.2. To be able to create documents for printing and sharing.3. To be able to create and share presentations.4. To be able to manage and store data in a spreadsheet.5. To be able to use AI tools to make presentations and analyse data.
8	Course Outcome:	After successful completion of the course, learner will be able to CO 1: Create a word document, save the word document and print the word document. CO 2: Demonstrate various insert features of a word document. CO 3: Create, edit, save, format and print presentations. CO 4: Create, open, view, edit, save and print a workbook. Learn to use functions, formulas, charts and graphs CO 5: .Use AI tools to make presentations and analyse data.

Syllabus

Sr. No	Name of experiment
GROUP A	
1	Introduction to MS Word, starting word, creating a Document, Saving and Printing a document, Move and Copy Text, Cut and Paste, Finding Text, Replace Command, Checking Spelling and Grammar
2	Inserting Picture, Formatting Text, fonts, Using Bullets and Numbering in Paragraphs, Inserting equations and symbols
3	Page Setup, Inserting Page Breaks, Using Headers and Footers in the Document, inserting page numbering, Print Preview, Print Options
4	Creating Tables, Formatting a Table
5	Using Mail Merge.
6	Introduction to power point presentation, creating a blank presentation, adding new slides, saving a presentation, printing options
7	Designing a presentation
8	Animation and transition, Slide show
9	Designing a presentation using AI tool-(Canva, Presenti.ai)
GROUP B	
10	Creating spreadsheet and adding information to it, different data types
11	Moving data values, editing data values, inserting/ deleting rows and columns
12	Data editing: find & replace, spell check,
13	Data formatting techniques
14	Working with different mathematical, text, date and time formulae
15	Page layout options, adding header, footer and page numbering
16	Working with sort and filter functions
17	Working with multiple spreadsheets.
18	Use of AI tool Wolfram alpha (to plot graphs) and formula-bot

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

A. External Examination: Semester End External - 30 marks Time: 2hours

	Assessment / evaluation	Marks
1.	One Experiment (either from group A or group B)	20
2.	Viva-voce	05
3.	Journal	05
	Total	30

B. Internal Examination: - 20 marks

	Assessment / evaluation	Marks
1.	Assignment or Test on experiment	10
2.	Viva-voce	05
3.	Overall performance	05
	Total	20

Note:

- After completing all the required number of experiments in the semester and recording them in journal, student will have to get their journal certified and produce the certified journal at the time of practical examination.
- Skill of doing the experiment is important.
- For practical examinations, the learner will be examined in one experiment
- Each experiment will be of two lecture hours' duration.
- A Minimum 6 from each group and in all minimum 12 experiments must be reported in journal

A learner will be allowed to appear for the semester end practical examination only if he submits a certified journal.

11

REFERENCE BOOKS:

1. Text book of Electrical Technology, by B.L. Theraja and A.K. Theraja
2. Modern Electronic Equipment: Troubleshooting, Repair and Maintenance by Khandpur, a. TMH 2006
3. Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting by R. G. Gupta Tata McGraw Hill Edition 2001
4. Student Reference Manual for Electronic Instrumentation Laboratories by Stanley Wolf, and Richard F. M. Smith, Prentice Hall of India Pvt. Ltd. New Delhi
5. Consumer Electronics by S. P. Bali, Pearson



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

**Bachelor of Commerce/
Arts/Science/ SFC
(Sindhi)**
(AEC – Ability Enhancement Course)
(Aided Course)

Semester – II

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

PREAMBLE

The Bachelor of Commerce (B.Com.) in Sindhi is a comprehensive program designed to develop Sindhi language. Language is the soul of Literature. Sindhi is medium of Communication, Education and Cultural exchange. Curriculum is designed specially in digital age.

Language enriches literature. This curriculum is prepared according to Social, Cultural and Academic needs. The B.Com. Sindhi subject offers students a unique opportunity to explore and widened Sindhi Culture through a wide range of literary programs. The curriculum not only emphasizes literary appreciation and analysis but also fosters ethical awareness, intercultural sensitivity and social responsibility.

The program is committed to developing critical thinking, ethical reasoning and inclusive perspectives. It encourages students to reflect and engage with communication in Sindhi, expertise in Business and Employment Creative work, meditation and listening, use of visual tails, expertise of asking questions, knowledge of different languages through communication.

Language allows us to share our ideas, thoughts, feelings and emotions with others through communication. There is a special contribution of the ideal citizen in nation building. It plays crucial role in creating civilized society.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO-1 Students will understand the communication skills and role of language in communication.

PSO-2 Students will be able to talk effectively in Sindhi language with friends, relatives and Business customers.

PSO-3 Students will understand aspects of language.

PSO-4 Students will be able to understand the Importance of communication, and they will communicate in different ways i.e. verbal, non-verbal, written and Digital methods.

Smt
Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year

Semester- II

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: CHMSINIIAEC

Sr. No.	Heading	Particulars
1	Description the Course:	<p>Communication is the core component of 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. Innovative approaches like critical thinking, creative mind, and use of technology will lead to communicating and participating with different groups. The vocabulary section would be given prominence.</p> <p>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.</p>
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
7	<p>Course Objectives: After successful completion of this course: CO(A) 1: The learner will get understanding of communication skills. CO(A) 2: The learner will understand how to accurate the pronunciation of special words in Sindhi CO(A) 3: The learner will improve the conversation skill in Sindhi. CO(A) 4: The learner will become best communicator in Sindhi language</p>	
8	<p>Course Outcomes: Student will be able to CO1: Know the basic special features of Sindhi language. CO2: Understand communication skills. CO3: Knowing the conversation with businessmen and customers CO4: Know the etiquettes with parents, relatives, friends and others in effective way</p>	

Communication Skills in Sindhi**UNIT I: Everyday & Professional Communication in Sindhi**

- Daily Life Conversation Skills: Greetings and introductions, asking for information, making requests/giving instructions, small talk in simple Sindhi
- Workplace & Business Communication: Customer interaction, Office enquiries, permissions, complaints, Bank/shop/travel conversation, Basic telephone conversation, Short Event Reports

UNIT II: Digital & Modern Communication in Sindhi

- Email & Message Writing: Professional emails, WhatsApp/SMS etiquette, Announcements, reminders
- Product and Promotive Communication: Short ads, Taglines & slogans, Simple product description, Pitch Presentation, Interview / Communication for Market

Syllabus

Communication Skills in Sindhi

यूनिट १: रोज़मरह जी जिंदगी में गुफ्तगू (सिंधीअ में):

- वाकुफ़ियत डियण ऐ ज़ाण हासुल करण, वैंती मोकिलण, अर्ज करण, हिदायतूं डियण, सौली सिंधीअ में ग़ालाईण.
- कम करण वारी जग़ह ते राबतो ऐ कारोबारी राबतो: ग्राहकनि सा गुफ्तगू, ऑफिस में पूछताछ, परमीशन, शिकायत पत्र, बैंक जे करमचारियुनि सा गुफ्तगू, ग्राहकनि सा ग़ालिहाइणि, बेसिक टेलीफोनिक संवादु, नंडे जशन जी रिपोर्ट.

यूनिट २: डिजिटल ऐ आधुनिक संवादु (सिंधी में):

- ईमेल ऐ मैसेज लिखण, पेशेवर ईमेल, वाट्सप ऐ समसे (Message) जा शिष्टाचार (Etiquettes), घोषणा याद डियारण वारो नोट (Reminders),
- उत्पाद ऐ प्रचार प्रसार संवादु, नंडो विज्ञापन (Small Ads), टैगलाइन ऐ स्लोगन सौलो उत्पाद वर्णन.
- पिच प्रिन्टेशन, इंटरव्यू, मार्केट रिसर्च जे लाइ संवादु.

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
	Q1.A)	Objective Type Questions (Unit- I)	05
	Q1. B)	Attempt ANY 2 out of 4- (5 marks each) (Unit-I)	10
	Q2.A)	Objective Type Questions (Unit- II)	05
	Q2. B)	Attempt ANY 2 out of 4- (5 marks each) (Unit-II)	10
	Total		30
Internal Examination: Continuous Evolution - 20 marks			
		Total 30	
	Assessment / evaluation	Marks	
1.	Written assignment on any one of the following topics 1) Draft a formal letter and formal E_mail in Sindhi 2) Write a conversation between Customer and Shopkeeper, Nurse and patient. (Students are required to use AI assistance in the preparation of their drafts. Eg: Notion AI, Powtoon, Elicit)	15	
2.	Class Attendance and Participation	05	
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		

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

Name & Signature of the Dean: (Dr. Nitin Arekar) _____

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

First Year B.Sc.

Semester- II

Vertical – 5

**Ability Enhancement Course (English)
2 Credits**

**with effect from
Academic Year 2026-2027**

Title: Advanced English for Workplace and Academic Communication
Course Code: CHMBSCAECII

Sr. No.	Heading	Particulars
1	Description of the Course:	<p>In an increasingly competitive academic and professional landscape, learners require advanced communication skills that enable clarity, precision, critical thinking, and professionalism. This course focuses on practical, real-world communication abilities needed for college-level academic work, job applications, workplace collaboration, and digital interactions.</p> <p>Through hands-on tasks, real-world assignments, and communication practice, learners become adept in using English confidently and appropriately in diverse settings.</p>
2	Vertical 5	AEC: Advanced English for Workplace and Academic Communication
3	Type Teaching Methods:	Theory+ Practicum (Lecture/ Discussion/ Presentation/ Reading sessions/ Worksheets/ etc.)
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	<p>Course Objectives:</p> <ol style="list-style-type: none"> 1. To develop advanced communication skills required for academic and professional success. 2. To train learners in report writing, summary writing, and formal documentation. 3. To enhance proficiency in digital and virtual communication platforms. 4. To strengthen presentation, interview, and workplace communication skills. 5. To build confidence in expressing ideas clearly to varied audiences. 	
8	<p>Learning Outcomes: After completing this course, learners will be able to:</p> <p>LO-1: Demonstrate clarity, precision, and professionalism in communication.</p> <p>LO-2: Interpret and summarize written texts, visuals, and data accurately.</p> <p>LO-3: Prepare well-structured reports, emails, and professional documents.</p>	

- LO-4:** Use digital tools and virtual communication etiquette effectively.
- LO-5:** Communicate confidently in interviews, presentations, and teamwork situations

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Syllabus

UNIT I: Communication for Academic & Professional Settings (15 Hours)

A. Communication in Academic & Workplace Contexts

1. Features of formal communication
2. Audience-centered communication
3. Ethics in communication: integrity, attribution, clarity
4. Explaining concepts in simple and clear language
5. Interpreting graphs, charts, tables, and infographics
6. Summarizing data concisely

B. Grammar & Style for Professional Writing

1. Tone: formal, neutral, objective
2. Avoiding redundancy and ambiguity
3. Active vs. passive structures
4. Editing, revising, and proofreading techniques

UNIT II: Practical Documentation & Employability Skills (15 Hours)

1. Report writing (academic/field-based/observational)
2. Project summary reports
3. Preparing short presentations
4. Creating informational posters or digital slides
5. Writing a formal complaint or request email
6. Creating a short informational or awareness write-up

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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

All questions are compulsory:

Question No	Nature of Questions	Marks
Q. 1	Short Notes (Attempt any 3 out of 5) - Unit 1 OR Attempt Essay Type question. (1 out of 2) - Unit 1	15
Q. 2	Short Notes (Attempt any 3 out of 5) - Unit 2 OR	15

	Attempt Essay Type question. (1 out of 2) - Unit 2	
	Total	30

Internal Examination: Continuous Evaluation - 20 marks




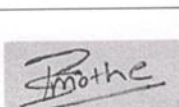
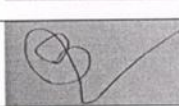

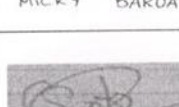
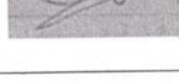
	Assessment / evaluation	Marks
1.	Assignments on any one of the following topics: Academic/Scientific Report/ Informational Poster / Digital Infographic (Students are required to use AI assistance in the preparation of their drafts. Eg: Notion AI, Otter.ai, Grammarly, Google Gemini, Canva, Piktochart, etc)	15
2.	Class Attendance and Participation	05
	Total	20

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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. Cargill, Margaret, and Patrick O'Connor. *Writing Scientific Research Articles*. Wiley-Blackwell, 2013.
4. Eastwood, John. *Oxford Guide to English Grammar*. Oxford UP, 2005.
5. Gerson, Sharon J., and Steven M. Gerson. *Technical Communication: Process and Product*. 9th ed., Pearson, 2021.
6. Hewings, Martin. *Advanced Grammar in Use*. Cambridge UP, 2013.
7. Kumar, Sanjay, and Pushp Lata. *Communication Skills*. 2nd ed., Oxford UP, 2018.
8. McCarthy, Michael, and Felicity O'Dell. *Academic Vocabulary in Use*. Cambridge UP, 2008.
9. Nordquist, Richard. *The Essentials of English Grammar*. McGraw-Hill Education, 2016.
10. Seely, John. *The Oxford Guide to Writing and Speaking*. Oxford UP, 2005.
11. Zinsser, William. *On Writing Well: The Classic Guide to Writing Nonfiction*. Harper Perennial, 2016.

Syllabus Committee:

Sr. No	Name of the Faculty	Designation and College	Signature
1.	Prof. (Dr.) Kailas Aute	Professor & Head, Dept. of English, Smt. CHM College	
2.	Prof. (Dr.) B. R. Hiramani,	(VC Nominee, University of Mumbai) Pancham Khemraj College, Sawantwadi	
3.	Prof. (Dr.) Vikas Raskar	(Subject Expert outside University) Hutatma Rajguru Mahavidyalay, Rajguru Nagar, Khed, (Affiliated to Savitribai Phule University)	
4.	Prof. (Dr.) Prashant Mothe	(Subject Expert outside University) Aadarsh Mahavidyalay, Umerga, Dharashiv, (Affiliated to Dr. Baba Saheb Ambedkar Marathwada University)	
5.	Mr. Ananda Pandhare	Asst. Professor, Dept. of English, Smt. CHM College	
6.	Ms. Sana Khan	Asst. Professor, Dept. of English, Smt. CHM College	
7.	Dr. Micky Barua	Faculty Vidyalankar Institute of technology, Alumni Member	 MICKY BARUA
8.	Ms. Sofy Verghese	Accenture, Industry Representative	

Name & Signature of the Ad-hoc BoS Chairperson: Prof. (Dr.) Kailas Aute :



Name & Signature of the Dean: Prof. (Dr.) Nitin Arekar



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

First Year

Semester- II

Title: Cocurricular Course I

**Vertical - 6
Cocurricular Course - 2 Credits**

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

Title: Cocurricular Course - I

Course Code: CHMCCI6

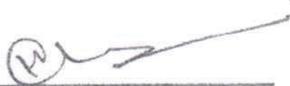
Sr. No.	Heading	Particulars
1	Description the Course:	<p>This student-friendly Co-Curricular Course is uniquely designed to promote holistic development through active participation in various college-based activities. Unlike traditional theory-based subjects, this course emphasizes hands-on involvement 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.</p> <p>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.</p> <p>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.</p>
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:	<ol style="list-style-type: none"> 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:	<p>By the end of the course, students will be able to:</p> <p>LO1: Participate meaningfully in diverse co-curricular activities and reflect on their learning experiences.</p> <p>LO2: Demonstrate improved communication, leadership, and teamwork skills.</p> <p>LO3: Exhibit increased awareness of social responsibility and civic engagement.</p> <p>LO4: Build confidence through creative, cultural, and intellectual expressions.</p> <p>LO5: Maintain a portfolio or activity log to track participation and personal development.</p>

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	Unit I - Suggested Areas of Participation in the activities: <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • Workshops/Seminars: Report Writing, Personality Development, Soft Skills, Leadership Talks. • Speak, Show, Shine: Presentation / Poster Presentation / Viva and Learning Experience Mode of Evaluation: <ul style="list-style-type: none"> • 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. 																											
10	Scheme of Examination and Assessment Pattern Based on 3 approved Activities Semester End External - 30 marks <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Activity No</th> <th style="width: 65%;">Nature of Activities</th> <th style="width: 20%;">Marks</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1.</td> <td>Title of Approved Activity - 1</td> <td style="text-align: center;">10</td> </tr> <tr> <td style="text-align: center;">2.</td> <td>Title of Approved Activity - 2</td> <td style="text-align: center;">10</td> </tr> <tr> <td style="text-align: center;">3.</td> <td>Title of Approved Activity - 3</td> <td style="text-align: center;">10</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total</td> <td style="text-align: center;">30</td> </tr> </tbody> </table> Internal Examination: Continuous Evaluation – 20 marks <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;"></th> <th style="width: 85%;">Assessment / Evaluation</th> <th style="width: 10%;">Marks</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1.</td> <td>Reflective journal</td> <td style="text-align: center;">10</td> </tr> <tr> <td style="text-align: center;">2.</td> <td>Presentation/ poster presentation/viva</td> <td style="text-align: center;">10</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total</td> <td style="text-align: center;">20</td> </tr> </tbody> </table>	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		Assessment / Evaluation	Marks	1.	Reflective journal	10	2.	Presentation/ poster presentation/viva	10	Total		20
Activity No	Nature of Activities	Marks																										
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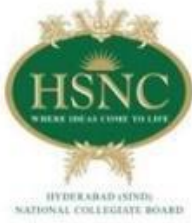
Suggested Readings:

- 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





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

Bachelor of Science
(Physics)
(Aided Course)

Semester – III

Choice Based and Credit Based syllabus
as per NEP 2020 with effect from the
Academic Year 2026-2027

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

**Second Year B. Sc.
(Physics)**

Semester- III

Title: Mathematical Methods for Physics

**Vertical - 1
Major Subject – 2 Credit**

**with effect from
Academic Year 2026-2027**

Title: Mathematical Methods for Physics

Course Code: CHMPHIII1

Sr. No.	Heading	Particulars
1	Description of the Course:	This course introduces students to the mathematical methods used in Physics. Students will learn about the different types of differential equations. Emphasis is placed on the study of problems depicting physical situations like in LC, RL and LCR circuits. The course also covers the concept of partial differential equations. It will enable the student to understand and solve important partial differential equations in Physics using wolfram alpha ai and Python
2	Vertical 1	Major
3	Type Teaching Method	Theory Lecture/ discussion/ presentation
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives:	<p>CO(A)1 To apply the knowledge of differential equations and solve problems using wolfram alpha ai and python</p> <p>CO(A)2 To learn the first order and second order homogeneous and non- homogeneous differential equations with variable coefficients and constant coefficients.</p> <p>CO(A)3 To describe variable separable method and exact differentials equation, Linear Differential equation and Second-order homogeneous differential equations with constant coefficients.</p> <p>CO(A)4 To solve important partial differential equations in physics, method of separation of variables. Partial differential equations and its type.</p> <p>CO(A)5 Understand applications of Partial Differential Equations in physics.</p>
8	Course Outcomes:	<p>Upon completion of the course, student will be able to</p> <p>CO1: Acquire fundamental knowledge of ordinary differential equations using wolfram alpha AI and Python.</p> <p>CO2: Understand first order linear and Second-order homogeneous differential equations with constant coefficients and Problems depicting physical situations like LC, RL and LCR circuits.</p> <p>CO3: Understand important Partial differential equations in and its type (Parabolic, Hyperbolic and Elliptical)</p> <p>CO4: Comprehend important applications of Partial Differential Equations.</p> <p>CO5: Understand problem solving skills in all the topics covered.</p>

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Syllabus

UNIT I: Differential equations

- First order homogeneous and non-homogeneous equations with variable coefficient
- Superposition principle
- Some partial differential equations in physics
- Method of direct integration
- Method of separation of variables
- Introducing wolfram alpha AI to solve differential equations in physics.

UNIT II: Differential equation of second order and applications to differential equation

- Second order homogeneous equations with constant coefficients
- Second order non-homogeneous equations with constant coefficients
- Electrical circuit problems, mechanical engineering problems
- Simple problems from physics(B.D. Gupta)
- Special types of differential equations arising in physics
- Solving differential equations using python programming.

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

All questions are compulsory.

Question No	Nature of Questions	Marks
Q1 (A)	Attempt any Two (5 Marks each)	10
i)	Theory	
ii)	Theory	
iii)	Theory	
iv)	Theory	
(B)	Attempt any One (5 Marks each)	05
i)	Theory/ Problem	
ii)	Problem	
Q2(A)	Attempt any Two (5 Marks each)	10
i)	Theory	
ii)	Theory	
iii)	Theory	
iv)	Theory	
(B)	Attempt any One (5 Marks each)	05
i)	Theory/ Problem	
ii)	Problem	
Total		30

Internal Examination: Continuous Evaluation – 20 marks

	Assessment / evaluation	Marks
1.	Quizzes, Class Tests, presentation, project, assignment etc.	15
2.	Overall Performance	05
	Total	20

11

REFERENCES:

1. Mathematical Physics by H.K. Dass and Dr. Rama Verma, S chand publication.
2. Introduction to Mathematical Physics by Charlie Harper, PHI Learning Publication. (**Unit-I: 5.2.1- 5.2.4, 5.3.1-5.3.4**)
3. Mathematical Physics by BD Gupta, Vikas publication house, 4th edition

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

**Second Year B. Sc.
(Physics)**

Semester- III

Title: Electrodynamics-I

**Vertical - 1
Major Subject – 2 Credit**

**With effect from
Academic Year 2026-2027**

Title: Electrodynamics-I
Course Code: CHMPHIII2

Sr. No.	Heading	Particulars
1	Description of the Course:	This course introduces students to the fundamental theorems of Gradient, Divergence and Curl and this will enable them to solve problems using them. The students will learn about the Gauss's law, Poisson's equation and Laplace's equation. The course will cover the concept of Electrostatics and Magnetostatics and will help the students to develop problem solving skills. Students will learn how to use AI tools for understanding some concepts.
2	Vertical 1	Major
3	Type Teaching Method	Theory Lecture/ discussion/ presentation
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives:	<p>CO(A)1 Explain Line, surface, volume integrals, Fundamental theorem of Gradient, Divergence and Curl and able to solve problems using them.</p> <p>CO(A)2 Learn the electric field, Gauss's law and its applications, Divergence of E and Curl of E.</p> <p>CO(A)3 Understand potential, Poisson's equation and Laplace's equation</p> <p>CO(A)4 Describe Properties of 2D and 3D Laplace equation, First & Second Uniqueness theorem, Biot-Savart law and its application.</p> <p>CO(A)5 Use of AI tools for explaining /visualizing some concepts of electromagnetism.</p>
8	Course Outcomes:	<p>Upon completion of the course, student will be able to</p> <p>CO1: Understand basic concept Fundamental theorems of Gradient, Divergence and Curl and able to solve problems using them.</p> <p>CO2: Comprehend the gauss law electric field, Divergence of E and Curl of E and able to solve problems using them.</p> <p>CO3: Understand electric potential, Poisson's equation and Laplace's equation</p> <p>CO4: Understand concept of Electrostatics and Magnetostatics and develops the problem solving skills</p> <p>CO5: Understand concepts of electromagnetism using AI tools</p>

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Syllabus

UNIT I: Electrodynamics and Vector calculus:

- Line integrals, surface integrals, volume integrals,
- Fundamental theorems of Gradient, Divergence and Curl,
- Coulomb’s law, electrostatic field,
- The principle of superposition,
- Electric Field due to point charge, continuous charge distribution,
- Field line and electric flux,
- Gauss law (integral and differential form), Applications of Gauss law,
- Divergence of E and Curl of E.
- Electric potential
- Study of Electrodynamics using PhET simulation.

UNIT II: Electromagnetism

- Comments on potential,
- Poisson’s equation and Laplace’s equation.
- Solution and properties of 1D Laplace equation with problem. Properties of 2D and 3D Laplace equation (without proof). Use of Wolfram alpha to solve Laplace equation. First & Second Uniqueness theorem,
- Biot-Savart Law, magnetic field due to a straight conductor, magnetic field along the axis of a circular current-carrying coil, magnetic field due to solenoid.

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

All questions are compulsory.

Question No	Nature of Questions	Marks
Q1 (A)	Attempt any Two (5 Marks each)	10
i)	Theory	
ii)	Theory	
iii)	Theory	
iv)	Theory	
(B)	Attempt any One (5 Marks each)	05
i)	Theory/ Problem	
ii)	Problem	
Q2(A)	Attempt any Two (5 Marks each)	10
i)	Theory	

ii)	Theory	
iii)	Theory	
iv)	Theory	
(B)	Attempt any One (5 Marks each)	05
i)	Theory/ Problem	
ii)	Problem	
		Total 30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Quizzes, Class Tests, presentation, project, assignment etc.	15
2.	Overall Performance	05
	Total	20

11

REFERENCES:

1. Introduction to Electrodynamics : David J. Griffiths (4th Ed) Prentice Hall of India
2. Introduction to Electrodynamics: A. Z. Capria and P. V. Panat. Narosa Publishing House.
3. Engineering Electrodynamics: William Hayt Jr. & John H. Buck (TMH).

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

**Second Year B. Sc.
(Physics)**

Semester-III

Title: Major Practical Course

**Vertical - 1
Major Subject - 2 Credit**

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

Title: Major Practical Course

Course Code: CHMPHIII3

Sr. No.	Heading	Particulars
1	Description of the Course:	This course introduces students to learn the concepts of Physics through practical and hands-on mode. The experiments are designed to improve the practical skills of the students. Emphasis is on the concept of error and their estimation.
2	Vertical 1	Major
3	Type Teaching Method	Practical
4	Credit	2 Credits
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1 To learn the skills while performing experiments CO(A)2 To know how to use the apparatus without fear & hesitation CO(A)3 To learn the concepts of physics theory concepts and their practical application CO(A)4 To learn the errors and their estimation.	
8	Course Outcomes: Upon completion of the course, student will be able to CO1 practice the skills to perform experiments. CO2 use the apparatus without fear & hesitation. CO3 correlate the physics theory concepts to practical application. CO4 apply the concept of errors for their estimation after performing the experiment.	

Syllabus

LIST OF EXPERIMENTS:

- To determine modulus of rigidity using Flat spiral spring
- Determination of Dispersive power of prism using spectrometer
- To determine Young's modulus Y using Flat spiral spring
- Determination of acceleration due to gravity 'g' using Kater's pendulum
- Log Decrement using Simple pendulum
- Determination of R.I. of liquid by laser
- LCR series resonance
- Thevenin's Theorem: To verify the theorems for DC circuits
- Norton's Theorem: To verify the theorems for DC circuits
- Design and study of Passive (RC) low pass filter
- Design and study of Passive (RC) High pass Filter
- Design and study of Passive (RC) Band pass filter

LIST OF SHORT SKILL EXPERIMENTS :

- To find least count of different types of optical instruments
- To calculate and measure values of passive components
- To find percentage tolerance of different types of passive components
- To demonstrate an experiment and explain principles of Physics using AI tool
- To prepare chart for and explain the devices /components used for experiments.
- Execute a short experiment which will showcase either innovation and / or different methods to the satisfaction of teacher in-charge of practical.
- Any other skill experiment related to syllabus

Note:

1. Minimum **TEN** experiments and minimum **four** short skill experiments should be completed and reported in the journal.
2. **Certified Journal is a must**, to be eligible to appear for the semester end practical examination.

10**Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

External Examination: Semester End External – 30 marks Time: 2:00 hour

Format of Question Paper

	Assessment / evaluation	Marks
1.	One experiment	20
2.	Certified Journal	05
3.	Viva-Voce	05
	Total	30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	One skill experiment/ test based on skill experiments	10
2.	write-up of skill experiments	05
3.	Overall performance	05
	Total	20

11**REFERENCES:**

1. Advanced course in Practical Physics D.Chattopadhyaya, PC Rakshit B Saha.(6thEdition)Book and Allied Pvt.Ltd.
2. B. Sc. PRACTICAL Physics–Harnam Singh S.Chand&Co.Ltd.2001
3. B. Sc. Practical Physics –CL Arora(1st Edition)-2001S.Chand and Co. Ltd

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

**Second Year B. Sc.
(Physics)**

Semester- III

Title: Mechanics

**Vertical - 2
Minor Subject – 2 Credit**

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

Title: Mechanics

Course Code: CHMPHIII4

Sr. No.	Heading	Particulars
1	Description of the Course:	This course introduces the fundamentals of mechanics, covering the work–energy theorem, momentum conservation, center of mass, and collisions, with brief links to quantum mechanics and thermodynamics. It also explores gravitation, variation of g , planetary motion, and oscillations, supported by digital/AI tools like Python, WolframAlpha, PhET, and Stellarium for simulation and visualization.
2	Vertical 2	Minor
3	Type Teaching Method	Theory Lecture/ discussion/ presentation
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1 Reinforce mechanics basics — Strengthen core principles of work–energy & momentum. CO(A)2 Extend particle concepts — Introduce center of mass and collisions. CO(A)3 Study gravitation — Cover G measurement, potential, and variation of g . CO(A)4 Link oscillations and motion — Relate mechanics to oscillatory and planetary systems. CO(A)5 Use digital/AI tools — Apply Python, WolframAlpha, and PhET for analysis and visualization.	
8	Course Outcomes: Upon completion of the course, student will be able to CO1: Apply conservation laws and work–energy theorem in problem solving. CO2: Analyze particle systems and collisions (elastic and inelastic). CO3: Explain gravitation, measure G , and assess variation of g . CO4: Demonstrate understanding of oscillations and planetary motion. CO5: Employ digital/AI tools to compute, simulate, and visualize mechanics concepts.	

9

Unit I: Mechanics & Quantum Mechanics.

- Work–energy theorem and conservation of momentum.
- Center of mass of a system of particles .
- Elastic and inelastic collisions.
- Introduction to Quantum Mechanics.
- Applications of computational physics in mechanics (Python/WolframAlpha reinforcement).

Unit II: Thermodynamics & Gravitation

- Introduction to Thermodynamics
- Measurement of **Gravitational Constant (G)**.
- Gravitational potential and field.
- Variation of g with latitude, altitude, and depth.
- Applications in planetary motion and oscillations (qualitative).
- Digital Tools:PhET Simulation,WolframAlpha

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

All questions are compulsory.

Question No	Nature of Questions	Marks
Q1 (A)	Attempt any Two (5 Marks each)	10
i)	Theory	
ii)	Theory	
iii)	Theory	
iv)	Theory	
(B)	Attempt any One (5 Marks each)	05
i)	Theory/ Problem	
ii)	Problem	
Q2(A)	Attempt any Two (5 Marks each)	10
i)	Theory	
ii)	Theory	
iii)	Theory	
iv)	Theory	
(B)	Attempt any One (5 Marks each)	05
i)	Theory/ Problem	
ii)	Problem	
		Total 30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Quizzes, Class Tests, presentation, project, assignment etc.	15
2.	Overall Performance	05
	Total	20

11**REFERENCES:**

1. H.C. Verma, Concepts of Physics-Part I (Second Reprint of 2020) BharatiBhavan Publishers and Distributers
2. Fundamental of Physics Halliday, Resnick and Walker and Krane 9th Edition

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

**Second Year B. Sc.
(Physics)**

Semester- III

Title: Minor Practical Course

**Vertical - 2
Minor Subject - 2 Credit**

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

Title: Minor Practical Course

Course Code: CHMPHIII5

Sr. No.	Heading	Particulars
1	Description of the Course:	This course introduces students to learn the concepts of Physics through practical and hands-on mode. The experiments are designed to improve the practical skills of the students. Emphasis is on the concept of error and their estimation.
2	Vertical 1	Minor
3	Type	Practical
4	Credit	2 Credits
5	Hours allotted	60Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1 To learn the skills while performing experiments CO(A)2 To know how to use the apparatus without fear & hesitation CO(A)3 To learn the concepts of physics theory concepts and their practical application CO(A)4 To learn the errors and their estimation.	
8	Course Outcomes: Upon completion of the course, student will be able to CO1 practice the skills to perform experiments. CO2 use the apparatus without fear & hesitation. CO3 correlate the physics theory concepts to practical application. CO4 apply the concept of errors for their estimation after performing the experiment.	

Syllabus

LIST OF EXPERIMENTS:

- Y by Bending
- Bar pendulum
- Acceleration due to gravity 'g' using Kater's pendulum
- Log Decrement using Simple pendulum
- Flat spiral spring : determination of Y
- Flat spiral spring : determination of η
- To determine the surface tension of a liquid using capillary rise method
- Passive (RC) low pass filter
- Passive (RC) High pass Filter
- Passive (RC) Band pass filter
- To determine refractive index of liquid using method of Total Internal Reflection
- Determination of Dispersive power of prism using spectrometer

LIST OF SHORT SKILL EXPERIMENTS :

- To find least count of different types of optical instruments
- To calculate and measure values of passive components
- To find percentage tolerance of different types of passive components
- To demonstrate an experiment and explain principles of Physics using an AI tool
- To prepare chart for and explain the devices /components used for experiments.
- Execute a short experiment which will showcase either innovation and / or different methods to the satisfaction of teacher in-charge of practical.
- Any other skill experiment related to syllabus

Note:

1. Minimum **TEN** experiments and minimum **four** short skill experiments should be completed and reported in the journal.
2. **Certified Journal is a must**, to be eligible to appear for the semester end practical examination.

10**Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

External Examination: Semester End External – 30 marks Time: 2:00 hour

Format of Question Paper

	Assessment / evaluation	Marks
1.	One experiment	20
2.	Certified Journal	05
3.	Viva-Voce	05
	Total	30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	One skill experiment	10
2.	Viva -voce	05
3.	Overall performance	05
	Total	20

11**REFERENCES:**

1. Advanced course in Practical Physics D.Chattopadhyaya, PC Rakshit B Saha.(6thEdition)Book and Allied Pvt.Ltd.
2. B. Sc. PRACTICAL Physics–Harnam Singh S.Chand&Co.Ltd.2001
3. B. Sc. Practical Physics –CL Arora(1st Edition)-2001S.Chand and Co. Ltd

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

**Second Year B. Sc.
(Physics)**

Semester- III

Title: Open Elective

**Vertical - 3
OE Subject – 2 Credit**

**with effect from
Academic Year 2026-2027**

Faculty of Interdisciplinary

Vertical 3: List of Open Elective Skill Based Courses for Second Year: Semester – III

Sr. No.	Nomenclature of the Paper
1	Data Analysis And Visualization Using Excel
2	2D Animation And Motion Graphics
3	Advance Tools Of AI For Economics And Education - I
4	English For Journalism And Advertising
5	Urbanization And Real Estate: Infrastructure, Technology And Urban Change
6	Tourism Marketing
7	Managing Family Wealth Through Family Office-III
8	Responsive & Modern Web Designing
9	Basics Of Nutrition -3
10	Reel Making For Media And Social Change
11	Preforming Art- Dance-3
12	Data Analysis With Excel And Power BI
13	Digital Political Strategy, AI And Public Engagement Skills
14	Psychology Of Personal Relationship-I
15	Introduction To Sociology And Digital Society
16	Mushroom Cultivation Training And Trading Level 3
17	Yogasanās: Intermediate Series
18	Perfumery Course Level 3
19	Workplace And Professional Skills
20	Beautician: Strategic Business Planning III
21	Current Trends In Fashion Designing: Financial Perspective Level 3
22	Basics Of Accounting-III
23	Digital Marketing -III
24	Advanced Trading Strategies In Stock Market



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

**Second Year B. Sc.
(Physics)**

Semester- III

**Title: Battery and Inverter testing and
maintenance**

**Vertical - 4
SEC Subject – 2 Credit**

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

Title: Battery and Inverter testing and maintenance

Course Code: CHMPHIII7

Sr. No.	Heading	Particulars
1	Description of the Course:	This course is designed for learners to get exposure with various aspects of battery and inverter, their usage through practical and hands-on mode and using AI tools
2	Vertical 4	SEC
3	Type Teaching Method	Practical
4	Credit	2 Credits
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1 To understand the various types of batteries, their construction, and materials used in their design. CO(A)2 Equip students with the knowledge of testing methods to evaluate battery performance and lifespan. CO(A)3 To Understand the fundamentals of inverters, including their design, working principles, and applications, component selection CO(A)4 To understand common inverter and UPS faults using logical fault-finding methods and testing instruments. CO(A)5 To use AI tools for better understanding of the above topics.	
8	Course Outcomes: Upon completion of the course, student will be able to CO1: Identify types of batteries and their components. CO2: Measure battery parameters and identify its condition. CO3: Identify types of Inverters and their components. CO4: To Handle testing instruments and use of fault finding methods.	

Syllabus

GROUP A: Battery Testing and Maintenance

- Voltage, Capacity and Internal Resistance Measurement of a Battery
- Verification of Ohm's Law Using a Battery and Resistors
- Series and Parallel Connection of Batteries & their effect on Voltage and Current.
- Measurement of Battery Terminal Voltage Under Load, No-Load Conditions and Testing Battery Performance under Load.
- Determining the Charging and Discharging Time of a Battery.
- Battery Self-Discharge Experiment.
- Battery Inspection and Maintenance (Visual Inspection & Heavy Load Test).
- Effect of Temperature on Battery Voltage

- using simulators for better understanding of the above topics

GROUP B : Inverter Testing and Maintenance

- Study of specifications of Inverter provided by the manufacturer
- Drawing the Block Diagram of an Inverter and Explaining Each Block
- Demonstrate and explain the working of Inverter and its different parts and its functions
- Generating an Oscillator Signal Using a 555 Timer IC (Astable mode)
- Making a Simple DC-AC Inverter Circuit
- Analysis of Inverter Output Waveform Using an Oscilloscope
- Testing Transformer Primary & Secondary Voltages and Build a Simple Bridge Rectifier & Testing DC Output

Note:

1. Minimum **TEN** experiments and minimum **four** short skill experiments should be completed and reported in the journal.
2. **Certified Journal is a must**, to be eligible to appear for the semester end practical examination.

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External – 30 marks Time: 2:00 hour

Format of Question Paper

	Assessment / evaluation	Marks
1.	One experiment from Group A or Group B	20
2.	Certified Journal	05
3.	Viva-Voce	05
	Total	30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Assignment or Test	10
2.	Viva -voce	05
3.	Overall performance	05
	Total	20

11

REFERENCES:

1. Devid Linden – Handbook of Batteries Third ed. McGraw Hill (DLB)
2. Muhammad H. Rashid-Power Electronics Circuits, Devices and Applications 4 th edition Pearson.
3. Xiaojun Tan-Battery Management System and its Application, Wiley (XTB)
4. Yan Bao-A Bi-Level Optimization Approach to Charging Load Regulation of Electric Vehicle Fast Charging Stations Based on a Battery Energy Storage System; MDPI (YBB)
5. ErsanKabalci-Multilevel Inverters: Introduction and Emergent Topologies; Academic Press (EKM)
6. Thomas F. Schuber-Fundamentals of Electronics: Book 4 Oscillators and Advanced; Springer (TFE)
7. Tetsuo Suzuki-Basic Knowledge Regarding Uninterruptible Power Supply (UPS) (TSB)
8. K.C. Selvam- Design of Function Circuits with 555 Timer Integrated Circuit 1st Edition 2023 CRC Press

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

Second Year B.Sc.

Semester- III

Vertical – 5

**Ability Enhancement Course (English)
2 Credits**

**(To be offered to Students who
opted Sindhi AEC in Sem I & II)**

**with effect from
Academic Year 2026-2027**

Title: Introduction to Communication Skills in English

Course Code: CHMBSCAECIV

Sr. No.	Heading	Particulars
1	Description the Course:	<p>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.</p> <p>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.</p>
2	Vertical 4	Ability Enhancement Course
3	Type Teaching Methods:	Theory+ Practicum (Lecture/ Discussion/ Presentation/ Reading sessions/ Worksheets/ etc.)
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: <ol style="list-style-type: none">1. To introduce learners to the fundamentals of effective communication and its components.2. To enhance learners' 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: Student 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.

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
Sample readings will include excerpts from news articles, reports, editorials, and educational essays (200–250 words).

C) Grammar and Vocabulary

- Subject-Verb Agreement
- Sentence Structures
- Punctuation and Capitalization
- Commonly Confused Words
- Editing and Proofreading Practice

A remedial and functional approach will be followed with contextual exercises.

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 (Attempt any 3 out of 5) - Unit 1 OR Essay-Type Question (Attempt any 1 out of 2)- Unit 1	15
Q. 2	Short Notes (Attempt any 3 out of 5) - Unit 2 OR Essay-Type Question (Attempt any 1 out of 2)- Unit 2	15
	Total	30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Students are required to draft a job application letter along with a resume using the following AI assistance: Canva Resume Builder, Resume.oj, Zety, Novopresume, Rezi etc OR Draft an SoP with the help of the following AI assistance: Quillbot, Yocket, Writesonic, Jasper AI	15
2.		05
	Total	20

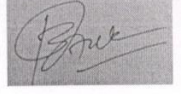
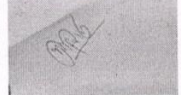
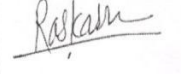
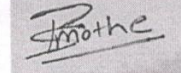
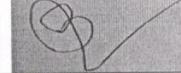
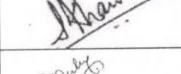
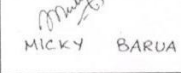

11

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- Adler, Ronald B., et al. *Understanding Human Communication*. 15th ed., Oxford UP, 2021.
- Bailey, Stephen. *Academic Writing: A Handbook for International Students*. 5th ed., Routledge, 2018.
- Barrass, Robert. *Students Must Write: A Guide to Better Writing in Coursework and Examinations*. Routledge, 2005.
- Brown, Gillian, and George Yule. *Teaching the Spoken Language: An Approach Based on the Analysis of Conversational English*. Cambridge UP, 1983.
- Carnegie, Dale. *The Quick and Easy Way to Effective Speaking*. Pocket Books, 2006.
- Chaney, Lillian, and Jeanette Martin. *Intercultural Business Communication*. 6th ed., Pearson, 2014.
- Cullen, Pauline, et al. *English Grammar in Use Supplementary Exercises*. Cambridge UP, 2019.
- 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.

Syllabus Committee:

Sr. No	Name of the Faculty	Designation and College	Signature
1.	Prof. (Dr.) Kailas Aute	Professor & Head, Dept. of English, Smt. CHM College	
2.	Prof. (Dr.) B. R. Hiramani,	(VC Nominee, University of Mumbai) Pancham Khemraj College, Sawantwadi	
3.	Prof. (Dr.) Vikas Raskar	(Subject Expert outside University) Hutatma Rajguru Mahavidyalay, Rajguru Nagar, Khed, (Affiliated to Savitribai Phule University)	
4.	Prof. (Dr.) Prashant Mothe	(Subject Expert outside University) Aadarsh Mahavidyalay, Umerga, Dharashiv, (Affiliated to Dr. Baba Saheb Ambedkar Marathwada University)	
5.	Mr. Ananda Pandhare	Asst. Professor, Dept. of English, Smt. CHM College	
6.	Ms. Sana Khan	Asst. Professor, Dept. of English, Smt. CHM College	
7.	Dr. Micky Barua	Faculty Vidyalkar Institute of technology, Alumni Member	 MICKY BARUA
8.	Ms. Sofy Verghese	Accenture, Industry Representative	

Name & Signature of the Ad-hoc BoS Chairperson: Prof. (Dr.) Kailas Aute



Name & Signature of the Dean: Prof. (Dr.) Nitin Arekar



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

**Second Year BA/BCom/BSc/SFC
(Marathi)**

Semester- III

**Vertical -5
Ability Enhancement Course (AEC) -2 Credits**

**with effect from
Academic Year 2026-2027**

Title: लेखन कौशल्ये – १ (कार्यालयीन लेखनव्यवहार आणि पत्रव्यवहार)

COURSE CODE: CHMAECMARIII

Sr. No.	Heading	Particulars
1	Description the Course:	(कार्यालयीन लेखनव्यवहार आणि पत्रव्यवहार) लेखन ओळख ते लेखन कौशल्य हा बराच मोठा प्रवास आहे. वाचन आणि लेखनाच्या सरावाने, लेखन कौशल्य विकसित करता येते. बहुतेक वेळा आपण मिळवलेले ज्ञान हे लिखित स्वरूपात मांडावे लागते. त्यासाठी आपण लेखन कौशल्याचे योग्य उपयोजन करतो. लेखने म्हणजे मजकूर तंतोतंत उतरवणे नव्हे. एखादे निवेदन, वृत्त, निबंध, पुस्तकाची टिपणे, अर्ज यांसाठी लेखन आवश्यक असते. कार्यालयीन पत्रव्यवहार, कार्यवृत्ते, नोंदी, जाहिरात, टिप्पणी ही सर्व उपयोजित लेखन कौशल्ये आहेत. कार्यालयीन पत्रव्यवहार करणे हे एक वेगळ्या प्रकारचे कौशल्य आहे. त्यातील काही उपयोजन कौशल्यांचा विचार या अभ्यासपत्रिकेत अपेक्षित आहे. कार्यालयीन लेखन व्यवहार आणि पत्रव्यवहार या अभ्यासपत्रिकेत शिकविला जाईल.
2	Vertical 5	Ability Enhancement Course
3	Type	Theory
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	50 Marks
7	Course Objectives:	CO1: कार्यालयीन लेखन व्यवहार स्वरूप समजावून सांगणे. CO2: कार्यालयीन पत्रव्यवहाराचे स्वरूप समजावून सांगणे., CO3: प्रभावी कार्यालयीन लेखनासाठी आवश्यक असणाऱ्या क्षमता आणि तंत्रांचा परिचय करून देणे,
8	Learning Outcomes:	प्रस्तुत अभ्यासक्रम शिकल्यानंतर: LO1: विद्यार्थ्यांना कार्यालयीन लेखन व्यवहाराचे स्वरूप समजेल, LO2: विद्यार्थ्यांना कार्यालयीन पत्रव्यवहाराचे स्वरूप समजेल. LO3: प्रभावी कार्यालयीन लेखनासाठी आवश्यक असणाऱ्या तंत्रांचा विद्यार्थ्यांना परिचय होईल.

Syllabus

9

UNIT I कार्यालयीन लेखनव्यवहार

१. जाहीर निवेदन आणि माहितीपत्रक
२. इतिवृत्त लेखन
३. टिप्पणी लेखन

(६० मिनिटांच्या १५ तासिका, श्रेयांकन १)

(सूचना : विद्यार्थ्यांमध्ये उपरोक्त कार्यालयीन लेखन व्यवहार व पत्रव्यवहार करण्यासाठी आवश्यक कौशल्ये व क्षमता विकसित होतील या दृष्टीने शिक्षकांनी सराव करून घ्यावा.)

UNIT II: कार्यालयीन पत्रव्यवहार

१. कार्यालयीन/प्रशासनिक पत्र
२. नोकरीसाठी अर्जलेखन
३. पत्रात्मक लेखन: नवी रूपे (शुभेच्छा, निमंत्रण)

(६० मिनिटांच्या १५ तासिका, श्रेयांकन-१)

(सूचना : विद्यार्थ्यांमध्ये उपरोक्त कार्यालयीन लेखन व्यवहार व पत्रव्यवहार करण्यासाठी आवश्यक कौशल्ये व क्षमता विकसित होतील या दृष्टीने शिक्षकांनी सराव करून घ्यावा.)

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

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

hours

Format of Question Paper

All questions are compulsory:

Q. No	Nature of Questions	Marks
Q1	Essay type question on Module 1	10
Q2	Essay type question on Module 2	10
Q6	MCQs 15 out of 20, 10 MCQs on each module	10
		Total 30

Internal Examination: Continuous Evaluation - 20 marks

	Project and presentation / Viva	Marks
1.	<ul style="list-style-type: none">AI च्या साहाय्याने जाहीर निवेदन आणि माहितीपत्रक तयार करणे. त्यामध्ये शीर्षक, उद्दिष्ट, कार्यक्रमाचे वेळापत्रक, संपर्क इत्यादींची आकर्षक मांडणी करणे.AI साधने वापरून सभेचे Audio/Video नुसार इतिवृत्त तयार करणे.	20

		<p>त्यानंतर विद्यार्थ्यांनी त्यात आवश्यक ती सुधारणा करणे.</p> <ul style="list-style-type: none"> ● AI चा वापर करून कार्यालयीन टिप्पणी तयार करणे. त्यातील भाषा, रचना, औपचारिकता इत्यादींचे परीक्षण करून सुधारित टिप्पणी तयार करणे. ● AI साधनांच्या माध्यमातून प्रशासनिक पत्रांचे विविध नमुनारूप तयार करणे. भाषेची औपचारिकता तपासणे. ● AI साधनांच्या साहाय्याने नोकरीसाठी अर्ज तयार करणे. दिलेल्या जाहिरातीवर आधारित Cover Letter तयार करणे. ● विविध प्रसंगांसाठी AI साधनांच्या आधारे निमंत्रणपत्र व शुभेच्छापत्र तयार करणे. <p>AI साधने: ChatGPT, Google Gemini, Claude, Perplexity AI, NotebookLM, Canva, CapCut, InVideo, Grammarly, QuillBot, Whisper, ElevenLabs</p>		
				Total 20
11	<p>संदर्भ ग्रंथ (Reference Books) :</p> <ol style="list-style-type: none"> १. प्रशासनिक लेखन, भाषा संचालनालय, महाराष्ट्र शासन, मुंबई, १९६६ २. भाषिक सर्जन आणि उपयोजन, राजन गवस, अरुण शिंदे, गोमटेश्वर पाटील, दर्या प्रकाशन, पुणे, २०१२ ३. परब प्रकाश, व्यावहारिक मराठी, मिथुन प्रकाशन, डोंबिवली पूर्व, मुंबई, १९८९ ४. नाईक सदानंद, राजभाषा मराठी, व्यावहारिक मराठी, प्रका-नागरी सेवा प्रबोधिनी, मुंबई, २००२ ५. तावरे स्नेहल (संपा.), व्यावहारिक मराठी, स्नेहवर्धन प्रकाशन, पुणे, चौथी आवृत्ती, २०११ ६. केतकी मोडक, संतोष शेणई, सुजाता शेणई (संपा.), उपयोजित मराठी, पद्मगंधा प्रकाशन, २०१२ ७. नसीराबादकर ल. रा., व्यावहारिक मराठी, भाषा विकास संशोधन संस्था, कोल्हापूर २०२३ 			

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Second Year B.A
(Hindi)

Semester – III

Title : हिंदी भाषा : कौशल के आधार

Vertical - 5
Ability Enhancement Course 2 Credits

with effect from
Academic Year 2025-2026

Title : हिंदी भाषा : कौशल के आधार

Course Code : CHMAECHINIII

Sr.No.	Heading	Particulars
1.	Description of the Course :	विद्यार्थियों के लिए हिंदी एक सामान्य भाषा होने के साथ विशेष भाषा तब बन जाती है जब वह हिंदी के माध्यम से अपने कौशल में अभिवृद्धि करें, हिंदी के माध्यम से रोजगार के कई अवसरों को प्राप्त करें, इस दृष्टि से पाठ्यक्रम अत्यंत लाभवर्धक और उपयोगी सिद्ध होगा, हिंदी भाषा में कौशल विकास की असीम संभावनाएं हैं और कौशल के विभिन्न आयाम जुड़े हुए हैं जो अलग – अलग दिशाओं में देखे जा सकते हैं, पाठ्यक्रम विद्यार्थियों में लेखन, वाचन कौशल की अभिवृद्धि करने के साथ रोजगारपरक अवसर प्रदान करता है।
2.	Vertical : 5	AEC
3.	Type : Teaching Method	Theory + Practicum Lecture / Discussion / Presentation / Self Study, etc.
4.	Credit :	2 Credits
5.	Hours Allotted :	30 Hours
6.	Marks Allotted :	50 Marks
7.	Course Objectives : CO(A)1 : विद्यार्थियों को लेखन, वाचन कौशल का ज्ञान देना एवं रोजगार के अवसरों से जोड़ना। CO(A)2 : विद्यार्थियों को लेखन, वाचन कौशल से परिचय करते हुए अभिव्यक्ति की शैलियों का विकास करना। CO(A)3 : विद्यार्थियों को भाषण कला के विविध रूपों को समझाना, मौलिकता में अभिवृद्धि लाना एवं विशेषज्ञता दिलाना। CO(A)4 : विद्यार्थियों को श्रवण कौशल की विशेषताओं से परिचय कराते हुए श्रवण कौशल के लाभों से अवगत कराना।	

8.	<p>Course Outcomes :</p> <p>CO1 : विद्यार्थियों का लेखन, वाचन कौशल के ज्ञान प्राप्ति के साथ मौलिक अभिव्यक्ति में बदलाव आएगा ।</p> <p>CO2 : विद्यार्थियों का लेखन, वाचन कौशल द्वारा मानसिक विकास होगा, पठन शक्ति, शैली का विकास होगा ।</p> <p>CO3 : विद्यार्थियों को लेखन, भाषण कौशल से भषिक – शक्ति, शैलियों का संवर्धन होगा विशेषज्ञता आएगी ।</p> <p>CO4 : विद्यार्थियों को लेखन, वाचन, श्रावण, भाषण कौशल की विशेषताओं और उपयोगिता का ज्ञान प्राप्त होगा ।</p>
9.	Syllabus
	UNIT I : हिंदी भाषा कौशल के आधार
	<p>1.1 लेखन कौशल का अर्थ एवं स्वरूप लेखन कौशल की उपयोगिता एवं महत्व</p> <p>1.2 लेखन कौशल की विधियाँ एवं विशेषताएँ</p> <p>1.3 वाचन कौशल का अर्थ, स्वरूप एवं विशेषताएँ</p> <p>1.4 वाचन कौशल की उपयोगिता एवं विधियाँ</p>
	UNIT II : हिंदी भाषा कौशल के आधार
	<p>2.1 भाषण कौशल का अर्थ एवं स्वरूप</p> <p>2.2 भाषण कौशल का महत्व एवं उपयोगिता</p> <p>2.3 भाषण कौशल की विधियाँ एवं विशेषताएँ</p> <p>2.4 श्रवण कौशल का अर्थ, स्वरूप एवं विशेषताएँ</p> <p>2.5 श्रवण कौशल का महत्व एवं उपयोगिता</p>

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

All Questions are Compulsory

मूल्यांकन प्रारूप	इकाई	अंक
बाह्य मूल्यांकन		
प्रश्न 1 : चार प्रश्नों में से किन्हीं दो प्रश्नों के उत्तर लिखिए ।	इकाई 1	15
प्रश्न 2 : चार प्रश्नों में से किन्हीं दो प्रश्नों के उत्तर लिखिए ।	इकाई 2	15 □
कुल अंक		30

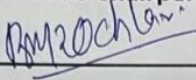
मूल्यांकन प्रारूप	अंक
आंतरिक मूल्यांकन	
<ul style="list-style-type: none"> ● AI Writing Tools की सहायता से हिंदी लेखन कौशल का अभ्यास, भाषा-संपादन, व्याकरण सुधार, सारांश लेखन एवं रचनात्मक लेखन करना। ● AI की सहायता से दिए गए विषयों पर भाषण, लेख, संवाद एवं लघु-प्रस्तुति तैयार करना तथा भाषा, शैली एवं प्रभावशीलता का विश्लेषण करना। ● AI Voice Tools का उपयोग करके हिंदी वाचन, भाषण, उच्चारण, स्वर, गति एवं प्रवाह का अभ्यास करना तथा AI आधारित Feedback प्राप्त करना। ● AI Speech-to-Text एवं Text-to-Speech Tools की सहायता से श्रवण एवं वाचन कौशल विकसित करना तथा उच्चारण की शुद्धता का अभ्यास करना। ● AI की सहायता से Reading Comprehension, प्रश्नोत्तर, शब्दार्थ, शब्दावली (Vocabulary) एवं भाषा-अभ्यास गतिविधियाँ तैयार करना। ● AI आधारित Mock Interview, Group Discussion तथा Public Speaking गतिविधियों के माध्यम से भाषण एवं संप्रेषण कौशल विकसित करना। ● AI की सहायता से हिंदी Podcast, Audio Narration एवं Listening Exercises तैयार करना तथा श्रवण कौशल का मूल्यांकन करना। 	20
कुल अंक	20

11.	संदर्भ ग्रंथ सूची – <ol style="list-style-type: none">1. हिंदी भाषा शिक्षण के विविध आयाम – प्राध्यापक डॉ. राठौर, किनले एडिशन2. अभिनव पत्र लेखन – डॉ. अनिल सिंह3. हिंदी के व्यावहारिक रूप – डॉ. संतोष मोटवानी, परिदृश्य प्रकाशन, मुंबई4. हिंदी भाषा लेखन कौशल – गुलीबाबा पब्लिकेशन प्राइवेट लिमिटेड
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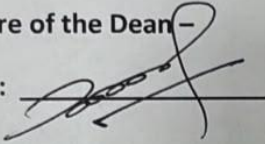
Bos in Hindi :

Sr No	Name of the Faculty	Designation and College
1.	Dr. Bhavna M.Rochlani	I/C HOD Asst. Professor CHM College Ulhasnagar
2.	Dr. Ajeet Kumar Rai	Associate Professor KC College Mumbai
3.	Dr. Santosh Motwani	Associate Professor RKT College Ulhasnagar

Name & Signature of the Ad-hoc BoS Chairperson -

Dr. Bhavna M. Rochlani : 

Name & Signature of the Dean -

Dr. Nitin Arekar : 



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

Second Year

Semester - III

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

**Vertical - 5
VEC Subject - 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 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 Lectures/Discussions/Presentations/Case Studies, etc.
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1: To introduce about ecosystems, biodiversity and to make aware for the need of conservation. CO(A)2: To sensitize students towards environmental concerns, issues, and impacts of human population. CO(A)3: To analyze the impact of human population growth and development activities on the environment, including issues related to displacement, disaster response, and rehabilitation. CO(A)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	Course Outcomes: Student will be able to CO1: Explain the interrelationships within ecosystems and analyze energy flow and succession, using examples from various ecological zones. CO2: Critically evaluate biodiversity levels and conservation strategies, applying knowledge of endemic species, threats, and ecological services to real-world scenarios. CO3: Assess the socio-environmental implications of population growth, displacement, and disasters, incorporating case studies to understand sustainable development challenges. CO4: 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:
 - Forest ecosystem
 - Grassland ecosystem
 - Desert ecosystem
 - 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

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

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

Format of Question Paper

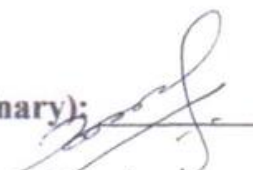
Attempt any 3 out of 4 questions.

Question No	Nature of Questions	Marks
Q1	Theory based on Unit I	10
Q2	Theory based on Unit I	10
Q3	Theory based on Unit II	10
Q4	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	<p>REFERENCES:</p> <ol style="list-style-type: none"> 1. Carson, R. (2002). <i>Silent Spring</i>. Houghton Mifflin Harcourt. 2. Gadgil, M., & Guha, R. (1993). <i>This Fissured Land: An Ecological History of India</i>. University of California Press. 3. Gleeson, B., & Low, N. (Eds.). (1999). <i>Global Ethics and Environment</i>. Routledge. 4. Gleick, P. H. (1993). <i>Water in Crisis</i>. Pacific Institute for Studies in Development, Environment & Security; Stockholm Environment Institute; Oxford University Press. 5. Sodhi, N. S., Gibson, L., & Raven, P. H. (Eds.). (2013). <i>Conservation Biology: Voices from the Tropics</i>. John Wiley & Sons. 6. Thapar, V. (1998). <i>Land of the Tiger: A Natural History of the Indian Subcontinent</i>. 7. Warren, C. E. (1971). <i>Biology and Water Pollution Control</i>. W. B. Saunders. 8. Wilson, E. O. (2006). <i>The Creation: An Appeal to Save Life on Earth</i>. W. W. Norton. 9. Harper, Charles L. (2017). <i>Environment and Society: Human Perspectives on Environmental Issues</i> (6th Edition). Routledge. 10. Rajagopalan, R. (2011). <i>Environmental Studies: From Crisis to Cure</i>. Oxford University Press. 11. Harris, Frances (2012). <i>Global Environmental Issues</i> (2nd Edition). Wiley-Blackwell.
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Name & Signature of the Dean & Ad-hoc BoS Chairperson (Interdisciplinary):


Dr. Nitin Arekar



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

First Year

Semester- III

Title: Cocurricular Course I

**Vertical - 6
Cocurricular Course - 2 Credits**

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

Title: Cocurricular Course - I

Course Code: CHMCCI6

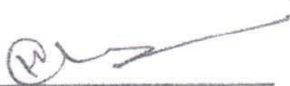
Sr. No.	Heading	Particulars
1	Description the Course:	<p>This student-friendly Co-Curricular Course is uniquely designed to promote holistic development through active participation in various college-based activities. Unlike traditional theory-based subjects, this course emphasizes hands-on involvement 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.</p> <p>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.</p> <p>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.</p>
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:	<ol style="list-style-type: none"> 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:	<p>By the end of the course, students will be able to:</p> <p>LO1: Participate meaningfully in diverse co-curricular activities and reflect on their learning experiences.</p> <p>LO2: Demonstrate improved communication, leadership, and teamwork skills.</p> <p>LO3: Exhibit increased awareness of social responsibility and civic engagement.</p> <p>LO4: Build confidence through creative, cultural, and intellectual expressions.</p> <p>LO5: Maintain a portfolio or activity log to track participation and personal development.</p>

9	Syllabus																											
	Unit I - Suggested Areas of Participation in the activities: <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • Workshops/Seminars: Report Writing, Personality Development, Soft Skills, Leadership Talks. • Speak, Show, Shine: Presentation / Poster Presentation / Viva and Learning Experience Mode of Evaluation: <ul style="list-style-type: none"> • 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. 																											
10	Scheme of Examination and Assessment Pattern Based on 3 approved Activities Semester End External - 30 marks <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Activity No</th> <th style="width: 65%;">Nature of Activities</th> <th style="width: 20%;">Marks</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1.</td> <td>Title of Approved Activity - 1</td> <td style="text-align: center;">10</td> </tr> <tr> <td style="text-align: center;">2.</td> <td>Title of Approved Activity - 2</td> <td style="text-align: center;">10</td> </tr> <tr> <td style="text-align: center;">3.</td> <td>Title of Approved Activity - 3</td> <td style="text-align: center;">10</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total</td> <td style="text-align: center;">30</td> </tr> </tbody> </table> Internal Examination: Continuous Evaluation – 20 marks <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;"></th> <th style="width: 85%;">Assessment / Evaluation</th> <th style="width: 10%;">Marks</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1.</td> <td>Reflective journal</td> <td style="text-align: center;">10</td> </tr> <tr> <td style="text-align: center;">2.</td> <td>Presentation/ poster presentation/viva</td> <td style="text-align: center;">10</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total</td> <td style="text-align: center;">20</td> </tr> </tbody> </table>	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		Assessment / Evaluation	Marks	1.	Reflective journal	10	2.	Presentation/ poster presentation/viva	10	Total		20
Activity No	Nature of Activities	Marks																										
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3.	Title of Approved Activity - 3	10																										
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	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



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

**Second Year B. Sc.
(Physics)**

Semester- III

Title: Energy conservation

**Vertical - 6
Field Project Subject – 2 Credit**

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

Title: Energy conservation

Course Code:

Sr. No.	Heading	Particulars
1	Description of the Course:	Students will carry out a project/survey to calculate energy consumption of residents using electricity bills.
2	Vertical 6	Field Project
3	Type Teaching Method	Practical Discussion/ presentation
4	Credit	2 Credits
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1 To calculate the average energy consumption on the basis of electricity bills. CO(A)2 To determine which instruments/appliances consume more electricity. CO(A)3 To sensitize students about conservation of electrical energy with optimal use of instruments/appliances. CO(A)4 Make them work in groups	
8	Course Outcomes: Upon completion of the course, student will be able to CO1: Calculate the average energy consumption on the basis of electricity bills. CO2: Learn methods of conservation of electrical energy with optimal use of instruments/appliances. CO3: Make optimal use of instruments/appliances. CO4: Learn to work in groups	
9	Syllabus	Students will carry out survey and calculate the average energy consumption using computational tools like Excel, on the basis of electricity bills. They will also determine which instruments/appliances consume more electricity. This will enable to sensitize students about conservation of electrical energy with optimal use of instruments/appliances.

10**Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

	Assessment / evaluation	Marks
1.	Survey Report	25
2.	Presentation/Group discussion/Viva	15
3.	Overall performance	10
	Total	50

11**REFERENCES:**1. <https://www.saveonenergy.com>



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

Bachelor of Science
(Physics)
(Aided Course)

Semester – IV

Choice Based and Credit Based syllabus
as per NEP 2020 with effect from the
Academic Year 2026-2027

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

**Second Year B. Sc.
(Physics)**

Semester- IV

**Title: Introduction to Quantum Mechanics
and Modern Physics**

**Vertical - 1
Major Subject – 2 Credit**

**with effect from
Academic Year 2026-2027**

Title: Introduction to Quantum Mechanics and Modern Physics

Course Code: CHMPHIV1

Sr. No.	Heading	Particulars
1	Description of the Course:	Introduction, relevance, Usefulness, Application, interest, connection with other courses, demand in the industry, job prospects etc.
2	Vertical 1	Major
3	Type Teaching Method	Theory Lecture/ discussion/ presentation
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives:	CO(A)1 Study Blackbody Radiation, Einstein's Photoelectric Effect, Compton effect, pair production. CO(A)2 Comprehend Diffraction of Particles and X-ray diffraction.. CO(A)3 Learn Heisenberg Uncertainty principle, quantum operators, Eigen Function, Eigen Value, Expectation values and able to solve problems on it. CO(A)4 Learn Physical interpretation of wave function and explain Schrodinger equation (time dependent form and steady state form)., CO(A)5 Understand how AI revolutionise modern physics
8	Course Outcomes:	Upon completion of the course, student will be able to CO1: explain Blackbody Radiation, Einstein's Photoelectric Effect , Compton effect , pair production and able to solve problems on it. CO2: understand Diffraction of Particles and X-ray diffraction.. CO3: develop the knowledge of Heisenberg Uncertainty Principle, operators in quantum mechanics Eigen Function, Eigen Value, Expectation values and able to solve problems on it. CO4: Comprehend the Physical interpretation of wave function and Schodinger's Wave Equation (time dependent form and steady state form)., CO5: explore use of AI in modern physics

UNIT I: Modern Physics

- Electromagnetic Waves
- Blackbody Radiation
- Photoelectric Effect
- Wave particle duality
- X-rays
- X-rays diffraction
- Compton effect
- Pair production
- Photons and gravity
- Modern physics with AI

Ref: AB: 2.1-2.9

UNIT II: Quantum Mechanics

- De Broglie wave
- Phase and group velocity
- Particle diffraction
- Heisenberg Uncertainty Principle
- The wave equation
- Schrodinger equation-time dependent form (TDSE)
- Expectation Values
- Operators
- Schrodinger's Equation: Steady State Form (TISE)
- Particle in box
- Finite Potential Well

- Digital Tools:PhET Simulation,WolframAlpha

Ref: AB: 3.1-3.5 5.2,5.3, 5.5-5.9

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

All questions are compulsory.

Question No	Nature of Questions	Marks
Q1 (A)	Attempt any Two (5 Marks each)	10
i)	Theory	
ii)	Theory	
iii)	Theory	
iv)	Theory	
(B)	Attempt any One (5 Marks each)	05
i)	Numerical	
ii)	Numerical	
Q2(A)	Attempt any Two (5 Marks each)	10
i)	Theory	
ii)	Theory	
iii)	Theory	
iv)	Theory	
(B)	Attempt any One (5 Marks each)	05
i)	Numerical	
ii)	Numerical	
		Total 30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Quizzes, Class Tests, presentation, project, assignment etc.	15
2.	Overall Performance	05
	Total	20

11

REFERENCES:

1. Concepts of Modern Physics – A. Beiser and Kok Wai Cheah (6th Ed.) Tata McGraw Hill.

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

**Second Year B. Sc.
(Physics)**

Semester- IV

Title: Advanced Electronics-I

**Vertical - 1
Major Subject – 2 Credit**

**with effect from
Academic Year 2026-2027**

Sr. No.	Heading	Particulars
1	Description of the Course:	This course introduces students to the fundamentals of transistors and operational amplifiers. Also as a part of digital electronics it introduces to RS nd JK flip flops. and shift registers. Also counters are introduced. This course uses digital tools like Tinkercad circuits and Everycircuit
2	Vertical 1	Major
3	Type Teaching Method	Theory Lecture/ discussion/ presentation
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1 Explain basics of transistor, its parameters, different configurations, biasing and its different methods of biasing using digital tools. CO(A)2 Understand basics of OPAMP, its different parameters, concept of feedback and applications. CO(A)3 Study the different types of flip flops. CO(A)4 Understand the basics of counters and registers and its different types.	
8	Course Outcomes: Upon completion of the course, student will be able to CO1: Draw different configurations and biasing methods of transistors. CO2: Solve problems based on various concepts/characteristics of OPAMP. CO3: Write the truth table and explain the working of Flip-Flops CO4: Explain the working of counters and different types of registers.	

UNIT I: Analog Electronics**Transistor Biasing:**

- Review of transistor terminals
- transistor action
- the symbol of transistor
- transistor as an amplifier, CB, CE, CC connections: only circuit diagrams and respective current amplification factor.
- Faithful amplification
- Inherent Variations of Transistor Parameters
- Essentials of a Transistor Biasing Circuit
- Stability Factor
- Base Resistor Method
- Emitter Bias Circuit
- Voltage Divider Bias Method.

Operational Amplifiers:

- Introduction, Block diagram, Schematic symbol of OPAMP
- Ideal characteristics of OP AMP
- Frequency Response of an OPAMP
- Bandwidth of an OPAMP
- slew rate
- Virtual ground concept
- Voltage gain
- OPAMP with Negative feedback
- Inverting Amplifier
- Input and output impedance of inverting amplifier, Non-Inverting Amplifier
- Voltage Follower
- Summing Amplifier.
- Digital tools: Tinkercad Circuits, Every circuit.

UNIT II: Digital Electronics

Flip Flops:

- RS Flip-Flops (only NOR gate latch, NAND gate latch)
- Gated Flip-Flops
- Edge-Triggered RS Flip-Flop
- Edge-Triggered D Flip-Flop
- Edge-Triggered J-K Flip-Flop
- JK Master-slave Flip-Flops.

Counters and Registers

- Synchronous and Asynchronous Counters
- Synchronous MOD 2, Mod 5 and Decade Counter Mod 10 (2X5, 5X2)
- Types of registers: SISO, SIPO, PISO, PIPO (concept to be explained with block diagram)

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

All questions are compulsory.

Question No	Nature of Questions	Marks
Q1 (A)	Attempt any Two (5 Marks each)	10
i)	Theory	
ii)	Theory	
iii)	Theory	
iv)	Theory	
(B)	Attempt any One (5 Marks each)	05
i)	Numerical	
ii)	Numerical	
Q2(A)	Attempt any Two (5 Marks each)	10
i)	Theory	
ii)	Theory	
iii)	Theory	
iv)	Theory	
(B)	Attempt any One (5 Marks each)	05
i)	Theory/Numerical	
ii)	Theory/Numerical	
		Total 30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Quizzes, Class Tests, presentation, project, assignment etc.	15
2.	Overall Performance	05
	Total	20

11

REFERENCES:

1. Digital Principles and Applications - Leach, Malvino, Saha (Tata McGraw Hill Education Pvt.Ltd., 6th Edition)
2. Principles of Electronics – V. K. Mehta and Rohit Mehta. (S. Chand & Company – Multi colour revised edition)

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

**Second Year B. Sc.
(Physics)**

Semester-IV

Title: Major Practical Course

**Vertical - 1
Major Subject - 2 Credit**

**with effect from
Academic Year 2026-2027**

Title: Major Practical Course

Course Code: CHMPHIV3

Sr. No.	Heading	Particulars
1	Description of the Course:	This course introduces students to learn the concepts of Physics through practical and hands-on mode. The experiments are designed to improve the practical skills of the students. Emphasis is on the concept of error and their estimation.
2	Vertical 1	Major
3	Type Teaching Method	Practical
4	Credit	2 Credits
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1 To learn the skills while performing experiments CO(A)2 To master the skill of handling practical equipment/apparatus. CO(A)3 To learn the concepts of physics theory and their practical application CO(A)4 To learn the errors and their estimation. CO(A)5 To learn the use of AI tools for better understanding of a concept.	
8	Course Outcomes: Upon completion of the course, student will be able to CO1: practice the skills to perform experiments. CO2: use the apparatus without fear & hesitation. CO3: correlate the physics theory concepts to practical application. CO4: apply the concept of errors for their estimation after performing the experiment. CO5: Explain a concept in physics with the application of AI tools	

Syllabus

LIST OF EXPERIMENTS:

- Determination of angle of diffraction using grating (first order only)
- To determine wavelength of monochromatic light by using biprism (delete)
- Optical lever: determination of μ
- I-V Characteristics of Solar cell with different intensity of light
- Verification of Stefan's law (Electrical Method)
- CE amplifier: determination of bandwidth
- CE amplifier : variation of gain with load
- J-K flip flop: Verify truth table of J-K flip flop.
- OPAMP: Inverting amplifier (BB)
- OPAMP Non-inverting amplifier (BB)
- Voltage Follower (BB)
- OPAMP as Integrator
- MOD2, MOD 5 & MOD 10 counter using IC7490
- Shift registers (SISO and SIPO)

LIST OF SHORT SKILL EXPERIMENTS :

- To find least count of different types of optical instruments
- To calculate and measure values of passive components
- To find percentage tolerance of different types of passive components
- To prepare chart for the devices /components used for experiments and explain it
- To prepare presentation using AI tools (e.g. presenti ai) to explain working of any one device /experiment

Note:

- Minimum TEN experiments and minimum four short skill experiments should be completed and reported in the journal.
- Certified Journal is a must, to be eligible to appear for the semester end practical examination.

10**Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

External Examination: Semester End External – 30 marks Time: 2:00 hour

Format of Question Paper

	Assessment / evaluation	Marks
1.	One experiment	20
2.	Certified Journal	05
3.	Viva-Voce	05
	Total	30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	One skill experiment / test based on skill experiment	10
2.	chart/ presentation	05
3.	Overall performance	05
	Total	20

11**REFERENCES:**

1. Advanced course in Practical Physics D.Chattopadhyya, PC Rakshit B Saha.(6thEdition)Book and Allied Pvt.Ltd.
2. B. Sc. PRACTICAL Physics–Harnam Singh S.Chand&Co.Ltd.2001
3. B. Sc. Practical Physics –CL Arora(1st Edition)-2001S.Chand and Co. Ltd

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

**Second Year B. Sc.
(Physics)**

Semester- IV

Title: Sound

**Vertical - 2
Minor Subject – 2 Credit**

**with effect from
Academic Year 2026-2027**

Title: Sound

Course Code: CHMPHIV4

Sr. No.	Heading	Particulars
1	Description of the Course:	This course covers wave motion, sound velocity, interference, and acoustics. It includes the study of wave types, properties of sound, and factors affecting acoustics in buildings, with a focus on practical applications like Sabine's formula. It also introduces various digital and AI-based tools to enhance the understanding and visualization of sound concepts.
2	Vertical 2	Minor
3	Type Teaching Method	Theory Lecture/ discussion/ presentation
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objective (CO) CO(A)1 Understand wave motion and sound velocity concepts through theoretical derivations and practical demonstrations. CO(A)2 Apply sound principles to analyze interference, beats, stationary waves, and acoustics of buildings. CO(A)3 Integrate AI and digital tools like PhET simulations, Online Tone Generator, and AudioCleaner.ai for visualization of wave phenomena. CO(A)4 Evaluate acoustical properties in different media and environments, linking physics theory with real-world applications.	
8	Course Outcomes: CO1 Explain characteristics of wave motion and derive relations between frequency, wavelength, and velocity of sound in gases, water, and air. CO2 Demonstrate interference and beats using simulations and tone generators to connect theory with practice. CO3 Analyze reverberation and acoustics using Sabine's formula and AI audio tools to understand sound distribution in auditoriums. CO4 Use AI-based sound visualization to bridge classical physics concepts with modern applications in audio enhancement and noise reduction.	

9

Syllabus

UNIT I: Wave Motion & Sound Velocity

- Characteristic of wave motion, transverse wave & longitudinal wave, relation between frequency and wavelength,
- Equation of Simple Harmonic Wave, Particle velocity and wave velocity.
- Energy of a progressive wave, Velocity of longitudinal waves in gases.
- Newton's formula for velocity of sound, Effect of temperature and pressure.
- Velocity of sound in water and air.
- AI Applications in Sound & Wave Visualization: PhET simulations and AudioCleaner.ai

Unit II: Sound Phenomena & Acoustics

- Stationary waves: properties, energy; transverse waves on strings, laws of vibration, Kundt's tube.
- Interference of sound waves: conditions, special cases; beats; musical sound vs. noise, characteristics of musical sound.
- Acoustics of buildings: reverberation, Sabine's formula & absorption coefficient; factors affecting acoustics; sound distribution in auditoriums.
- Digital tools: PhET simulations and online tone generators.

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

All questions are compulsory.

Question No	Nature of Questions	Marks
Q1 (A)	Attempt any Two (5 Marks each)	10
i)	Theory	
ii)	Theory	
iii)	Theory	
iv)	Theory	
(B)	Attempt any One (5 Marks each)	05
i)	Theory/ Problem	
ii)	Problem	
Q2(A)	Attempt any Two (5 Marks each)	10
i)	Theory	
ii)	Theory	
iii)	Theory	
iv)	Theory	
(B)	Attempt any One (5 Marks each)	05
i)	Theory/ Problem	
ii)	Problem	
Total		30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Quizzes, Class Tests, presentation, project, assignment etc.	15
2.	Overall Performance	05
	Total	20

11

REFERENCES:

1. H.C. Verma, Concepts of Physics-Part I (Second Reprint of 2020) Bharati Bhavan Publishers and Distributers
2. Fundamental of Physics Halliday, Resnick and Walker and Krane 9th Edition

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

**Second Year B. Sc.
(Physics)**

Semester- IV

Title: Minor Practical Course

**Vertical - 2
Minor Subject - 2 Credit**

**With effect from
Academic Year 2026-2027**

Title: Minor Practical Course

Course Code: CHMPHIV5

Sr. No.	Heading	Particulars
1	Description of the Course:	This course introduces students to learn the concepts of Physics through practical and hands-on mode. The experiments are designed to improve the practical skills of the students. Emphasis is on the concept of Sound and their application.
2	Vertical 1	Minor
3	Type	Practical
4	Credit	2 Credits
5	Hours allotted	60Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1 To learn the skills while performing experiments CO(A)2 To know how to use the apparatus without fear & hesitation CO(A)3 To learn the concepts of physics theory concepts and their practical application CO(A)4 To learn the errors and their estimation. CO(A)5 To learn the use of AI tools for better understanding of a concept.	
8	Course Outcomes: Upon completion of the course, student will be able to CO1 practice the skills to perform experiments. CO2 use the apparatus without fear & hesitation. CO3 correlate the physics theory concepts to practical application. CO4 apply the concept of errors for their estimation after performing the experiment. CO5: explain a concept in physics with the application of AI tools	

Syllabus

LIST OF EXPERIMENTS:

- Determination of angle of diffraction using grating (Ist order only)
- CE Amplifier - Frequency Response
- Optical lever: determination of μ
- I-V Characteristics of Solar cell with different intensity of light
- Verification of Stefans law (Electrical Method)
- J-K flip flop: Verify truth table of J-K flip flop.
- Concepts of Beats.
- Velocity of Sound using CRO
- Helmholtz Resonator
- MOD 2 & MOD 5 counter using IC7490
- Shift registers (SISO and SIPO)

LIST OF SHORT SKILL EXPERIMENTS :

- To find least count of different types of optical instruments
- To calculate and measure values of passive components
- To find percentage tolerance of different types of passive components
- To prepare chart for the devices /components used for experiments and explain it
- To prepare presentation using AI tools (e.g. presenti ai) to explain working of any one device /experiment

Note:

- Minimum **TEN** experiments and minimum **four** short skill experiments should be completed and reported in the journal.
- **Certified Journal is a must**, to be eligible to appear for the semester end practical examination.

10**Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

External Examination: Semester End External – 30 marks Time: 2:00 hour

Format of Question Paper

	Assessment / evaluation	Marks
1.	One experiment	20
2.	Certified Journal	05
3.	Viva-Voce	05
	Total	30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	One skill experiment/ test based on skill experiment	10
2.	Chart / Presentation using AI	05
3.	Overall performance	05
	Total	20

11**REFERENCES:**

1. Advanced course in Practical Physics D.Chattopadhyaya, PC Rakshit B Saha.(6thEdition)Book and Allied Pvt.Ltd.
2. B. Sc. PRACTICAL Physics–Harnam Singh S.Chand&Co.Ltd.2001
3. B. Sc. Practical Physics –CL Arora(1st Edition)-2001S.Chand and Co. Ltd

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

**Second Year B. Sc.
(Physics)**

Semester- IV

Title: Open Elective

**Vertical - 3
OE Subject – 2 Credit**

**with effect from
Academic Year 2026-2027**



HSNC Board's

Smt. Chandibai Himathmal Mansukhani College

(Autonomous)

(Affiliated to the University of Mumbai)

University College Code: 217 | JD Office: T14



Estd. Year
1965

Faculty of Interdisciplinary

List of Skill Based Open Electives for Second Year: Semester – IV

Sr. No.	Semester IV Subject
1	Digital Interface, Web Design And Publishing
2	3D Modeling And Character Animation Fundamentals
3	Advance Tools Of AI For Economics And Education - II
4	English For Leadership and Strategic Communication
5	Urbanization And Real Estate: Applied Urban Planning, Design And Sustainable Cities
6	Travel Agency And Tour Operators Business
7	Managing Family Wealth Through Family Office-IV
8	Advanced Web Designing & Portfolio Development
9	Basics Of Nutrition - 4
10	Reel Strategy And Influencer Management
11	Preforming Art- Dance-4
12	Data Analysis Project Based Approach
13	Strategic Political Communication, Digital Governance And AI-Driven Public Engagement Skills
14	Psychology Of Personal Relationship-II
15	Digital Society And Social Change
16	Mushroom Cultivation Training And Trading Level 4
17	Pranayama And Yogic Breathing Practices
18	Perfumery Course Level 4
19	Career Launchpad: Communication And Employability Skills
20	Beautician: Strategic Business Planning -IV
21	Current Trends In Fashion Designing: Financial Perspective Level 4
22	Basics Of Accounting-IV
23	Digital Marketing -IV
24	Online Trading For Investment Management



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

**Second Year B. Sc.
(Physics)**

Semester- IV

Title: Computer Maintenance

**Vertical - 4
VSC Subject – 2 Credit**

**With effect from
Academic Year 2026-2027**

Title: Computer Maintenance
Course Code: CHMPHIV7

Sr. No.	Heading	Particulars
1	Description of the Course:	This course is designed for learners to get exposure with various aspects of Computer and its hardware, their usage through practical and hands-on mode.
2	Vertical 4	VSC
3	Type Teaching Method	Practical
4	Credit	2 Credits
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1 Understanding the different parts of the computer and its application. CO(A)2 Equip students with the knowledge of different processors. sockets, and ports, Memory (RAM & ROM). CO(A)3 Understand the fundamentals of HDD, SSD and Partitioning and Formatting CO(A)4 Understand Cooling solutions, different Input & Output Devices, printers. CO(A)5 Introduce students to simulators, AI-assisted tools, and antivirus solutions for system maintenance and security.	
8	Course Outcomes: Upon completion of the course, student will be able to CO1: Identify the different parts of the computer. CO2: Identify different processors. sockets, and ports, Memory and configure the system. CO3: Format and partition hard disk and install OS. CO4: Gather knowledge of different Cooling solutions CO5: Use simulators, AI-assisted tools, and antivirus software to troubleshoot and secure computer systems.	

9	<p>Syllabus</p> <ol style="list-style-type: none"> 1. Study of various parts of Computer & their connections 2. Study of Mother Board 3. Types of sockets and ports present in the computer hardware. 4. Memory types, its speed and capacity. 5. Study of Various Storage Devices 6. Study of various input and output devices: Keyboard, Mouse, Monitor and Printer 7. Installation of operating system and DTP software. (Using VMware Simulators) 8. Study of Printers and Installation of printer(demonstration) 9. Antivirus Software use and its maintenance 10. Cooling system for computers 11. Study and Use of AI-Assisted System Maintenance and Security Tools
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10	<p>Scheme of Examination and Assessment Pattern Paper – 50 Marks External Examination: Semester End External – 30 marks Time: 2:00 hour Format of Question Paper</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Assessment / evaluation</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1.</td> <td>One experiment to be performed</td> <td style="text-align: center;">20</td> </tr> <tr> <td style="text-align: center;">2.</td> <td>Certified Journal</td> <td style="text-align: center;">05</td> </tr> <tr> <td style="text-align: center;">3.</td> <td>Viva-Voce</td> <td style="text-align: center;">05</td> </tr> <tr> <td></td> <td>Total</td> <td style="text-align: center;">30</td> </tr> </tbody> </table> <p>Internal Examination: Continuous Evaluation - 20 marks</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Assessment / evaluation</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1.</td> <td>Assignment or Test on practical's skill experiment</td> <td style="text-align: center;">10</td> </tr> <tr> <td style="text-align: center;">2.</td> <td>Viva -voce</td> <td style="text-align: center;">05</td> </tr> <tr> <td style="text-align: center;">3.</td> <td>Overall performance</td> <td style="text-align: center;">05</td> </tr> <tr> <td></td> <td>Total</td> <td style="text-align: center;">20</td> </tr> </tbody> </table>		Assessment / evaluation	Marks	1.	One experiment to be performed	20	2.	Certified Journal	05	3.	Viva-Voce	05		Total	30		Assessment / evaluation	Marks	1.	Assignment or Test on practical's skill experiment	10	2.	Viva -voce	05	3.	Overall performance	05		Total	20
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11	<p>REFERENCES:</p> <ol style="list-style-type: none"> 1. PC Organization by S. Chowdhury, Dhanpat Rai & Sons, Delhi 2. Computers by P. Norton
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**Smt. Chandibai Himathmal Mansukhani College
(Autonomous)**

**Second Year BA/BCom/BSc/SFC
(Marathi)**

Semester- IV

**Vertical -5
Ability Enhancement Course (AEC) -2 Credits**

**with effect from
Academic Year 2026-2027**

Title: लेखन कौशल्ये - २ (महाजालावरील लेखन)

COURSE CODE: CHMAECMARIII

Sr. No.	Heading	Particulars
1	Description the Course:	<p>राष्ट्रीय शैक्षणिक धोरण - २०२० विद्यार्थ्यांच्या सर्वांगीण विकासावर (Wholistic Development) भर देते. या धोरणात सर्वांगीण विकासाचा भाग म्हणून क्षमता वर्धन अभ्यासक्रम (Ability Enhancement Course) या स्तंभांतर्गत भाषिक कौशल्य अभ्यासक्रमाचा समावेश करण्यात आला आहे. कला, वाणिज्य व विज्ञान या विद्याशाखांमध्ये अध्ययन करणाऱ्या विद्यार्थ्यांना तिसऱ्या सत्रामध्ये 'आधुनिक भारतीय भाषां'चे अध्ययन अनिवार्य करण्यात आले आहे. सदर क्षमता वर्धन अभ्यासक्रमाचे स्वरूप प्रामुख्याने भाषाकेंद्री असावे, असेही राष्ट्रीय शैक्षणिक धोरणात नमूद करण्यात आले आहे. विद्यार्थ्यांना विविध प्रकारच्या भाषिक कौशल्यांचा तपशीलवार परिचय करून देणे, तसेच ती कौशल्ये आत्मसात करण्याची संधी विद्यार्थ्यांना उपलब्ध करून देणे, ही या अभ्यासक्रमाची महत्त्वाची उद्दिष्टे आहेत. ही उद्दिष्टे लक्षात घेऊन 'लेखन कौशल्ये - २ (महाजालावरील लेखन)' (श्रेयांकने २) या अभ्यासपत्रिकेची आखणी करण्यात आली आहे.</p> <p>आंतरमहाजाल हे एकविसाव्या शतकातील अत्यंत प्रभावी साधन आहे. जगभरातील संगणक एकमेकांशी जोडले जाऊन त्यांचे जाळे तयार झाले आहे. विविध सामाजिक माध्यमस्थळांवर स्वतःचे खाते (अकाउंट) तयार करणे आणि त्यावर मराठी भाषा व देवनागरी लिपीतून लिहिणे, ही समकालीन संपर्क व्यवहारातील आवश्यक बाब झाली आहे. यास अनुसरून आपल्या अभिव्यक्तीला व्यासपीठ मिळवून देणारी अनुदिनी (ब्लॉग) तयार करणे, विकिपीडियावर भोवतालातील भाषा, साहित्य, संस्कृतीशी निगडित माहितीपर व विश्लेषणात्मक नोंदी लिहिणे, सामाजिक माध्यमस्थळांवरील आपल्या खात्यावर सातत्याने अभ्यासपूर्ण लेखन करणे, स्वक्षमतेची निगडित समाजगट / आभासी कट्टे (कम्युनिटी ग्रुप) तयार करणे, या बाबींसाठी आवश्यक सामाजिक माध्यमस्थळ साक्षरता आणि मराठी भाषा व देवनागरी लिपीतून लिहिण्याची क्षमता 'लेखन कौशल्ये - २ (महाजालावरील लेखन)' (श्रेयांकने २) या अभ्यासपत्रिकेच्या अध्ययनातून विद्यार्थ्यांमध्ये निर्माण होईल.</p>
2	Vertical 5	Ability Enhancement Course
3	Type	Theory
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	50 Marks

7	<p>Course Objectives:</p> <p>CO1: महाजालावरील लेखन कौशल्याचे स्वरूप समजावून सांगणे.</p> <p>CO2: महाजालावर प्रभावी लेखन करण्यासाठी आवश्यक असणाऱ्या तंत्रांचा परिचय करून देणे.</p> <p>CO3: नेहमीच्या पठडीतील लेखन व महाजालावरील लेखन यांमधील साम्य-भेद स्पष्ट करणे.</p> <p>CO4: विविध सामाजिक माध्यमस्थळांवर लेखन करण्यासाठी आवश्यक कौशल्ये व क्षमता विकसित करणे.</p>
8	<p>Learning Outcomes:</p> <p>प्रस्तुत अभ्यासक्रम शिकल्यानंतर:</p> <p>LO1: विद्यार्थ्यांना महाजालावरील लेखन कौशल्याचे स्वरूप समजेल.</p> <p>LO2: विद्यार्थ्यांना महाजालावर प्रभावी लेखन करण्यासाठी आवश्यक तंत्रांचा परिचय होईल.</p> <p>LO3: विद्यार्थ्यांना नेहमीच्या पठडीतील लेखन व महाजालावरील लेखन यांमधील साम्य-भेद स्पष्ट होईल.</p> <p>LO4: विद्यार्थ्यांमध्ये विविध सामाजिक माध्यमस्थळांवर लेखन करण्यासाठी आवश्यक कौशल्ये व क्षमता विकसित होतील.</p>
9	<p style="text-align: center;">Syllabus</p> <p>UNIT I: सामाजिक माध्यमस्थळांवर मराठी भाषा व देवनागरी लिपीचा वापर करून लेखन (भाग - १)</p> <p>१. माध्यम साक्षरता</p> <p>२. अनुदिनी (ब्लॉग) लेखन</p> <p>३. विकिपीडियावरील लेखन</p> <p>(६० मिनिटांच्या १५ तासिका, श्रेयांकन १)</p> <p>(सूचना : विद्यार्थ्यांमध्ये उपरोक्त सामाजिक माध्यमस्थळांवर लेखन करण्यासाठी आवश्यक कौशल्ये व क्षमता विकसित होतील या दृष्टीने शिक्षकांनी सराव करून घ्यावा.)</p> <p>UNIT II: सामाजिक माध्यमस्थळांवर मराठी भाषा व देवनागरी लिपीचा वापर करून लेखन (भाग - २)</p> <p>१. फेसबुक, इन्स्टाग्राम, एक्स यांवरील लेखन</p> <p>२. समाज गट (कम्युनिटी ग्रुप), आभासी कट्टे यांवरील लेखन</p> <p>(६० मिनिटांच्या १५ तासिका, श्रेयांकन-१)</p> <p>(सूचना : विद्यार्थ्यांमध्ये उपरोक्त सामाजिक माध्यमस्थळांवर लेखन करण्यासाठी आवश्यक कौशल्ये व क्षमता विकसित होतील या दृष्टीने शिक्षकांनी सराव करून घ्यावा.)</p>

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

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

hours

Format of Question Paper

All questions are compulsory:

Q. No	Nature of Questions	Marks
Q1	Essay type question on Module 1	10
Q2	Essay type question on Module 2	10
Q6	MCQs 15 out of 20, 10 MCQs on each module	10
Total		30

Internal Examination: Continuous Evaluation - 20 marks

	Project and presentation / Viva	Marks
1.	<ul style="list-style-type: none"> विकिपीडियासाठी माहिती संकलन, संदर्भ व्यवस्थापन, तथ्य पडताळणी Fact Checking tool तयार करणे आणि लेख तयार करणे. AI साधने वापरून Facebook, Instagram आणि X (Twitter) साठी मराठीतील पोस्ट, Caption, Hashtags आणि Content Calendar तयार करणे. AI Copywriting Tools चा वापर करून सामाजिक माध्यमांसाठी आकर्षक व लक्षित (Targeted) मजकूर तयार करणे. AI साधनाच्या सहाय्याने Social Media Content चे भाषा विश्लेषण, शुद्धलेखन तपासणी आणि देवनागरी लिपीतील लेखन सुधारणा करणे. AI साधनाच्या सहाय्याने Community Groups आणि Virtual Discussion Platforms साठी माहितीपूर्ण पोस्ट, जनजागृती मोहीम आणि संवादात्मक मजकूर तयार करणे. AI Image Generation आणि Video Tools च्या सहाय्याने सामाजिक माध्यमांसाठी Creative Campaign तयार करणे. Blog, Wikipedia आणि Social Media Content यांची AI-assisted comparative analysis करून प्रभावी डिजिटल लेखनाचा अभ्यास करणे. <p>AI साधने: ChatGPT, Google Gemini, Claude, Perplexity AI, NotebookLM, Canva, CapCut, InVideo, Grammarly, QuillBot, Whisper, ElevenLabs</p>	20
Total		20

11

संदर्भ ग्रंथ (Reference Books) :

१. मराठी व्याकरण आणि लेखन, विनायक गंधे व मीरा जोशी, निराली प्रकाशन, पुणे, २०१२.
२. उपयोजित मराठी, (संपा.) केतकी मोडक व अन्य, पद्मगंधा प्रकाशन, पुणे, २०१२.
३. मराठी भाषिक कौशल्य विकास, (संपा.) पृथ्वीराज तौर, अथर्व पब्लिकेशन्स, धुळे, २०१८.
४. व्यावहारिक मराठी, ल. रा. नसिराबादकर, भाषा विकास संशोधन संस्था, कोल्हापूर, २०२३.
५. *Aayushi International Interdisciplinary Research Journal* (ISSN 2349-638x) Peer Reviewed Journal www.aiirjournal.com

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

**Second Year B.A.
(Marathi)**

Semester- III

Vertical -6

Field Project (FP) – 2 Credits

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

Title: क्षेत्रीय प्रकल्प Field Projects (FP)

Course Code: CHMMARIII5

Sr. No.	Heading	Particulars																
1	Description the Course:	राष्ट्रीय शैक्षणिक धोरण - २०२० विद्यार्थ्यांच्या सर्वांगीण विकासावर (Holistic Development) भर देते. या धोरणात सर्वांगीण विकासाचा भाग म्हणून स्तंभ 6 या स्तंभांतर्गत क्षेत्रीय प्रकल्प अभ्यासक्रमाचा समावेश करण्यात आला आहे. या अभ्यासक्रमामुळे क्षेत्रीय प्रकल्प (Field Project) हा अभ्यासक्रम विद्यार्थ्यांना त्यांच्या विषयाशी संबंधित वास्तव जगाशी थेट संपर्क साधून प्रत्यक्ष अनुभव घेण्याची संधी प्रदान करतो. या अभ्यासक्रमाच्या माध्यमातून विद्यार्थ्यांना संशोधनात्मक दृष्टिकोन तयार करणे, प्रत्यक्ष क्षेत्रात जाऊन माहिती संकलन करणे, निरीक्षण करणे, आणि ती माहिती सुसंगत पद्धतीने मांडणे याचे प्रशिक्षण दिले जाईल. या अभ्यासपत्रिकेमुळे विद्यार्थ्यांमध्ये संशोधन वृत्ती वाढून त्यांच्यामध्ये संशोधनपर लेखनाचे कौशल्य निर्माण होऊन ते वृद्धिंगत होईल.																
2	Vertical 6	Field Projects (FP)																
3	Type	Theory & Practical																
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	50 Marks																
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	या संदर्भातील सर्वेक्षण.
८.	साहित्यसंस्था, साहित्यविषयक महोत्सव, संमेलने यांना भेटी, मुलाखती यांच्या आधारे साहित्यविषयक विविध उपक्रम, वाचकांचा सहभाग व या सर्व साहित्यव्यवहारांचा उपक्रमांचा परिणाम याविषयी निरीक्षण, नोंदी, अहवाल
९.	स्थानिक बोलीभाषांचा अभ्यास(शब्द, वाक्यरचना, भाषिक प्रयोग या पातळीवरील नमुने संकलन, विश्लेषण व नोंद)
१०.	मोबाईल व समाजमाध्यमांवरील मराठी भाषा, इमोजी इत्यादींचा अभ्यास. (निरीक्षणे व नोंदी)
११.	तरुणाईच्या भाषेचा अभ्यास - कॉकक्ला (कॉलेज, कट्टा, क्लास येथील भाषेच्या नमुन्यांचे संकलन, विश्लेषण व नोंदी)
१२.	ग्रामीण भागातील म्हणी, वाक्प्रचार आणि त्यामागील लोकजीवनाचे प्रतिबिंब यांचा अभ्यास. (संकलन, विश्लेषण व नोंदी)
१३.	स्थानिक लोकसाहित्याचा (लोकगीते, लोककथा, आख्यायिका, दंतकथा इत्यादी) अभ्यास. (भेटी, निरीक्षण, संकलन, विश्लेषण, नोंदी)
१४.	स्थानिक सादरीकरणात्मक लोककलांचा (कीर्तन, दशावतार, लळिते, लोकनाट्य, वगनाट्य, तमाशा, लोकनृत्ये) अभ्यास. (भेटी, निरीक्षण, संकलन, विश्लेषण, नोंदी)
१५.	स्थानिक लोककलांचा (चित्रकला, कातळशिल्पे, मंदिरातील चित्रे इत्यादी) अभ्यास. (भेटी, निरीक्षण, संकलन, विश्लेषण, नोंदी)
१६.	स्थानिक ऐतिहासिक वास्तूंना भेटी देणे व अहवाल तयार करणे. (साहित्याशी संबंधित ऐतिहासिक वास्तू-लेखकांची स्मारके, संग्रहालये व अन्य वास्तू)
१७.	गावकुसातील मंदिरे, देऊळवाडे यांना भेट व त्यांच्या भाषिक व सांस्कृतिक स्वरूपाचा अभ्यास.
१८.	साहित्यसंस्थांना भेटी देऊन त्यांच्या विविध उपक्रमांची माहिती संकलित करणे.
१९.	स्थानिक नाट्यसंस्था, नाट्यविषयक चळवळींची केंद्र यांना भेट देणे. त्यांच्या विविध उपक्रमांची माहिती घेणे, संकलन व सर्वेक्षण करणे.
२०.	परिसरातील महाविद्यालयातील एकांकिका समूह, त्यांची संस्कृती, अर्थकारण इत्यादींचा अभ्यास करून त्याचा अहवाल तयार करणे, रिपोर्टाज लेखन करणे.
२१.	परिसरातील सामाजिक संस्था, सामाजिक चळवळी यासंदर्भात मुलाखती व रिपोर्टाज लेखन करणे.
२२.	परिसरातील वर्तमानपत्रांची कार्यालये व मुद्रणालयांना भेट देणे, तेथील कामाचे निरीक्षण करून संबंधितांच्या मुलाखती घेणे व त्या आधारे अहवाल/ रिपोर्टाज लेखन करणे.
२३.	स्थानिक लेखकांची भेटी घेणे, त्यांच्या लेखन कार्याविषयी मुलाखत घेणे.
२४.	स्थानिक कलाकार, कारागीर, सुप्रसिद्ध व्यक्ती किंवा अन्य व्यक्तींच्या मुलाखती घेणे व शब्दांकन करणे.
२५.	स्थानिक लोककलावंतांचा चरित्रकोश तयार करणे, असंघटित कामगार व शेतकऱ्यांच्या भाषेचा कोश बनवणे.
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08

Scheme of Examination and Assessment Pattern
50 Marks

All questions are compulsory:

Q. No	Nature of Questions	Marks
Q1	Objectives, Literature Review , Methodology, Data Analysis, Conclusion and Recommendations	15
Q2	Overall Project Report Structure and Style	5
Q6	Presentation Skills & Communication	10
	Total	30

Internal Examination: Continuous Evaluation - 40 marks

	Assessment / evaluation	Marks
1.	Attendance and interaction	10
2.	Presentation Skills & Communication	10
	Total	20

**Smt. Chandibai Himathmal Mansukhani
College**

(Autonomous)

Second Year B.A

(Hindi)

Semester – IV

Title : हिंदी भाषा : व्यावहारिक प्रयोग

Vertical - 5

AEC – 2 Credits

with effect from

Academic Year 2025-2026

Title : हिंदी भाषा : व्यावहारिक प्रयोग**Course Code : CHMAECHINIV**

Sr.No.	Heading	Particulars
1.	Description of the Course :	<p>भाषा का जीवन में सदैव महत्व रहा है, जीवन और भाषा का चोली – दामन का संबंध है, जब हमारी भाषा मधुर और सार्थक होती है तो श्रेता पर विशिष्ट प्रभाव पड़ता है, भाषा का यदि सही और सार्थक रूप से प्रयोग किया जाए तो मुनष्य जीवन में कहीं भी असफल नहीं हो सकता है, इसी भाषा के माध्यम से हम सभी को अपनी ओर आकर्षित भी करते हैं, वर्तमान युग में रोजगार में बहुत से क्षेत्र भाषा से जुड़े हुए हैं, जिसके माध्यम से विद्यार्थी इनका लाभ ग्रहण कर सकते हैं, भाषाई क्षमता हमारे विचारों की संवाहक होती है, आज डिजिटल युग में अभिव्यक्ति के कई माध्यमों का प्रसार हुआ है, इन माध्यमों में भाषा ही सशक्त तत्व है जो आपकी अभिव्यक्ति को पूरे जगत को अवगत कराती है, भाषा का महत्व हर समय, हर माध्यम में रहा है, परंतु भाषा का सार्थक रूप का प्रयोग आज बहुत आवश्यक है। आज हिंदी अंतरराष्ट्रीय स्तर पर प्रयोग में लाई जा रही है, तकनीक, सूचना प्रौद्योगिकी सोशल मीडिया, राजनीति की भाषा हिंदी बन चुकी है, जीवन में कई क्षेत्रों में व्यावहारिक स्तर पर हमें अपनी भाषा के लिखित स्वरूप के कार्यों को करना होता है और ऐसे में कार्य-दक्षता महत्व रखती है, हिंदी भाषा में व्यावहारिक प्रयोग को केंद्र में रखकर और इन्हीं पहलुओं को ध्यान में रखते हुए इस पाठ्यक्रम का गठन किया गया है, हम हिंदी भाषा को सही और शुद्ध रूप में प्रयोग कर अभिव्यक्ति को सफल बनाएँ और बिना व्याकरण के यह संभव नहीं है, इस दृष्टि से पाठ्यक्रम सर्वाधिक लाभकारी सिद्ध होगा</p>
2.	Vertical : 5	AEC
3.	Type : Teaching Methods :	Theory + Practium Lecture / Discussion / Presentation / Self Study, etc.

4.	Credit :	2 Credits (1 Credit = 15 Hours for Theory)
5.	Hours Allotted :	30 Hours
6.	Marks Allotted :	50 Marks
7.	Course Objectives : CO(A)1: विद्यार्थियों को राजभाषा हिंदी का विधिवत ज्ञान प्रदान करना । CO(A)2: विद्यार्थियों को राजभाषा हिंदी के संवैधानिक महत्त्व से परिचित करवाना । CO(A)3: विद्यार्थियों को संज्ञा आदि का ज्ञान प्रदान करना । CO(A)4: विद्यार्थियों को कारकों, वाक्य रचना एवं भाषिक चिन्हों आदि का ज्ञान प्रदान करना ।	
	Course Outcomes : CO1 : विद्यार्थियों को राजभाषा हिंदी का ज्ञान प्राप्त होगा, एवं दक्षता प्राप्त होगी । CO2 : विद्यार्थियों को राजभाषा हिंदी के संवैधानिक महत्त्व की जानकारी प्राप्त होगी । CO3 : विद्यार्थियों को हिंदी – संज्ञा आदि का ज्ञान प्राप्त होने के साथ भाषा के शुद्ध, व्यावहारिक रूप का ज्ञान होगा । CO4 : विद्यार्थियों को कारकों, वाक्य रचना एवं भाषिक चिन्हों आदि का ज्ञान प्राप्त होगा ।	
9.	Syllabus	
	UNIT I :	
	1. हिंदी भाषा – सामान्य परिचय	
	2. राजभाषा हिंदी – संवैधानिक महत्त्व	
	3. वर्णमाला – स्वर एवं व्यंजन	
	4. शब्द भेद – सामान्य परिचय (संज्ञा आदि)	
	UNIT II :	
	1. वाक्य – सामान्य परिचय	
	2. वर्तनी – शुद्धता का प्रयोग एवं सावधानियाँ	
	3. कारक एवं विराम चिन्ह	
	4. निबंध लेखन – (सामाजिक निबंध, आत्मकथात्मक निबंध, समसामायिक निबंध)	

10.

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination : Semester End External – 30 Marks Time : 1:00 Hours

Format of Question Paper

All Questions are Compulsory

मूल्यांकन प्रारूप	इकाई	अंक
बाह्य मूल्यांकन		
प्रश्न 1 : चार प्रश्नों में से किन्हीं दो प्रश्नों के उत्तर लिखिए ।	इकाई 1	15
प्रश्न 2 : चार प्रश्नों में से किन्हीं दो प्रश्नों के उत्तर लिखिए ।	इकाई 2	15
	कुल अंक	30

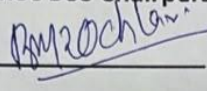
मूल्यांकन प्रारूप	अंक
आंतरिक मूल्यांकन	
<ul style="list-style-type: none"> ● AI की सहायता से हिंदी भाषा, राजभाषा हिंदी एवं उसके संवैधानिक महत्व पर शोध, सारांश एवं डिजिटल प्रस्तुति (Presentation) तैयार करना। ● AI Grammar एवं Writing Tools का उपयोग करके वर्णमाला, शब्द-भेद, वाक्य-रचना, कारक, विराम-चिह्न तथा वर्तनी शुद्धता का अभ्यास करना एवं त्रुटियों का विश्लेषण करना। ● AI की सहायता से हिंदी व्याकरण पर आधारित प्रश्नसंच (Question Bank), Quiz तथा Interactive अभ्यास-पत्र तैयार करना। ● AI Writing Tools का उपयोग करके सामाजिक, आत्मकथात्मक एवं समसामयिक विषयों पर निबंध लेखन करना तथा AI द्वारा तैयार निबंध और विद्यार्थी द्वारा लिखे गए निबंध का तुलनात्मक विश्लेषण करना। ● AI की सहायता से कठिन शब्दों के अर्थ, पर्यायवाची, विलोम, शब्दावली तथा सरल भाषा में व्याख्या तैयार करना। ● AI Voice Tools का उपयोग करके शुद्ध उच्चारण, वाचन एवं मौखिक अभिव्यक्ति का अभ्यास करना तथा उच्चारण संबंधी Feedback प्राप्त करना। 	20
कुल अंक	20

11.	संदर्भ ग्रंथ सूची – <ol style="list-style-type: none">1. बाबूराम सक्सेना – सामान्य भाषा विज्ञान, हिंदी साहित्य सम्मेलन, प्रयाग ।2. कामताप्रसाद गुरू – हिंदी व्याकरण, लोकभारती प्रकाशन, इलाहाबाद ।3. आचार्य देवेन्द्र नाथ शर्मा – भाषा विज्ञान की भूमिका, राधाकृष्ण प्रकाशन, दिल्ली ।4. भाषा विज्ञान एवं भाषा शास्त्र – कपिलदेव द्विवेदी, विश्वविद्यालय प्रकाशन, वाराणसी ।5. भोलानाथ तिवारी, भाषा विज्ञान, किताब महल, इलाहाबाद ।
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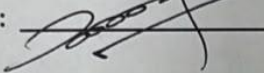
BoS in Hindi :

Sr No	Name of the Faculty	Designation and College
1.	Dr. Bhavna M. Rochlani	I/C HOD Asst. Professor CHM College Ulhasnagar
2.	Dr. Ajeet Kumar Rai	Associate Professor KC College Mumbai
3.	Dr. Santosh Motwani	Associate Professor RKT College Ulhasnagar

Name & Signature of the Ad-hoc BoS Chairperson -

Dr. Bhavna M. Rochlani : 

Name & Signature of the Dean -

Dr. Nitin Arekar : 



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

Second Year B.Sc.

Semester- IV

Vertical – 5

**Ability Enhancement Course (English)
2 Credits**

**(To be offered to Students who
opted Sindhi AEC in Sem I & II)**

**with effect from
Academic Year 2026-2027**

Title: Advanced English for Workplace and Academic Communication
Course Code: CHMBSCAECIV

Sr. No.	Heading	Particulars
1	Description of the Course:	<p>In an increasingly competitive academic and professional landscape, learners require advanced communication skills that enable clarity, precision, critical thinking, and professionalism. This course focuses on practical, real-world communication abilities needed for college-level academic work, job applications, workplace collaboration, and digital interactions.</p> <p>Through hands-on tasks, real-world assignments, and communication practice, learners become adept in using English confidently and appropriately in diverse settings.</p>
2	Vertical 5	AEC: Advanced English for Workplace and Academic Communication
3	Type Teaching Methods:	Theory+ Practicum (Lecture/ Discussion/ Presentation/ Reading sessions/ Worksheets/ etc.)
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: <ol style="list-style-type: none"> 1. To develop advanced communication skills required for academic and professional success. 2. To train learners in report writing, summary writing, and formal documentation. 3. To enhance proficiency in digital and virtual communication platforms. 4. To strengthen presentation, interview, and workplace communication skills. 5. To build confidence in expressing ideas clearly to varied audiences. 	
8	Learning Outcomes: After completing this course, learners will be able to: LO-1: Demonstrate clarity, precision, and professionalism in communication. LO-2: Interpret and summarize written texts, visuals, and data accurately. LO-3: Prepare well-structured reports, emails, and professional documents.	

- LO-4:** Use digital tools and virtual communication etiquette effectively.
- LO-5:** Communicate confidently in interviews, presentations, and teamwork situations

9

Syllabus

UNIT I: Communication for Academic & Professional Settings (15 Hours)

A. Communication in Academic & Workplace Contexts

1. Features of formal communication
2. Audience-centered communication
3. Ethics in communication: integrity, attribution, clarity
4. Explaining concepts in simple and clear language
5. Interpreting graphs, charts, tables, and infographics
6. Summarizing data concisely

B. Grammar & Style for Professional Writing

1. Tone: formal, neutral, objective
2. Avoiding redundancy and ambiguity
3. Active vs. passive structures
4. Editing, revising, and proofreading techniques

UNIT II: Practical Documentation & Employability Skills (15 Hours)

1. Report writing (academic/field-based/observational)
2. Project summary reports
3. Preparing short presentations
4. Creating informational posters or digital slides
5. Writing a formal complaint or request email
6. Creating a short informational or awareness write-up

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

All questions are compulsory:

Question No	Nature of Questions	Marks
Q. 1	Short Notes (Attempt any 3 out of 5) - Unit 1 OR Attempt Essay Type question. (1 out of 2) - Unit 1	15
Q. 2	Short Notes (Attempt any 3 out of 5) - Unit 2 OR Attempt Essay Type question. (1 out of 2) - Unit 2	15
	Total	30

Internal Examination: Continuous Evaluation - 20 marks

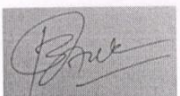


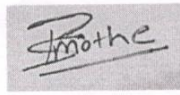
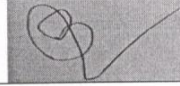
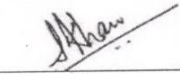
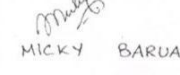

	Assessment / evaluation	Marks
1.	Assignments on any one of the following topics: Academic/Scientific Report/ Informational Poster / Digital Infographic (Students are required to use AI assistance in the preparation of their drafts. Eg: Notion AI, Otter.ai, Grammarly, Google Gemini, Canva, Piktochart, etc)	15
2.	Class Attendance and Participation	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. Cargill, Margaret, and Patrick O'Connor. *Writing Scientific Research Articles*. Wiley-Blackwell, 2013.
4. Eastwood, John. *Oxford Guide to English Grammar*. Oxford UP, 2005.
5. Gerson, Sharon J., and Steven M. Gerson. *Technical Communication: Process and Product*. 9th ed., Pearson, 2021.
6. Hewings, Martin. *Advanced Grammar in Use*. Cambridge UP, 2013.
7. Kumar, Sanjay, and Pushp Lata. *Communication Skills*. 2nd ed., Oxford UP, 2018.
8. McCarthy, Michael, and Felicity O'Dell. *Academic Vocabulary in Use*. Cambridge UP, 2008.
9. Nordquist, Richard. *The Essentials of English Grammar*. McGraw-Hill Education, 2016.
10. Seely, John. *The Oxford Guide to Writing and Speaking*. Oxford UP, 2005.
11. Zinsser, William. *On Writing Well: The Classic Guide to Writing Nonfiction*. Harper Perennial, 2016.

Syllabus Committee:

Sr. No	Name of the Faculty	Designation and College	Signature
1.	Prof. (Dr.) Kailas Aute	Professor & Head, Dept. of English, Smt. CHM College	
2.	Prof. (Dr.) B. R. Hiramani,	(VC Nominee, University of Mumbai) Pancham Khemraj College, Sawantwadi	
3.	Prof. (Dr.) Vikas Raskar	(Subject Expert outside University) Hutatma Rajguru Mahavidyalay, Rajguru Nagar, Khed, (Affiliated to Savitribai Phule University)	
4.	Prof. (Dr.) Prashant Mothe	(Subject Expert outside University) Aadarsh Mahavidyalay, Umerga, Dharashiv, (Affiliated to Dr. Baba Saheb Ambedkar Marathwada University)	
5.	Mr. Ananda Pandhare	Asst. Professor, Dept. of English, Smt. CHM College	
6.	Ms. Sana Khan	Asst. Professor, Dept. of English, Smt. CHM College	
7.	Dr. Micky Barua	Faculty Vidyalkar Institute of technology, Alumni Member	 MICKY BARUA
8.	Ms. Sofy Verghese	Accenture, Industry Representative	

Name & Signature of the Ad-hoc BoS Chairperson: Prof. (Dr.) Kailas Aute

Name & Signature of the Dean: Prof. (Dr.) Nitin Arekar



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

Second Year

Semester - IV

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

**Vertical - 5
VEC Subject - 2 Credits**

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

Title: Environmental Management and Sustainable Development - II

Course Code: CHMVEC2

Sr. No.	Heading	Particulars
1	Description the Course:	This course examines the relationship between environmental pollution and human health, with detailed coverage of air, water, soil, noise, thermal, and radioactive pollution and their sources, standards, and impacts. It enables learners to understand pollution generation processes, waste management challenges, and the assimilative capacity of the environment. The course also introduces environmental laws, constitutional provisions, and regulatory frameworks, along with tools such as Environmental Management Systems (ISO 14001), life cycle analysis, and cost–benefit analysis. Emphasis is placed on sustainable practices, pollution control measures, the 3R concept, ecolabeling, and global initiatives such as the Sustainable Development Goals and Mission LiFE.
2	Vertical 5	VEC
3	Type & Teaching Methods	Theory + Practicum Lectures/Discussions/Presentations/Case Studies, etc.
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives:	<p>CO(A)1: To develop a comprehensive understanding of various types of environmental pollution, their sources, standards, and impacts on human health and ecosystems.</p> <p>CO(A)2: To familiarize students with environmental laws, constitutional provisions, and regulatory frameworks related to environmental protection and management.</p> <p>CO(A)3: To equip learners with knowledge of environmental management tools, pollution control measures, and sustainable waste management practices.</p> <p>CO(A)4: To create awareness about global and national sustainability initiatives such as the Sustainable Development Goals, Mission LiFE, and their role in achieving sustainable development.</p>

8	<p>Course Outcomes: Student will be able to</p> <p>CO1: Identify and analyze different types of environmental pollution and assess their impacts on human health and ecological systems.</p> <p>CO2: Explain key environmental laws, constitutional provisions, and institutional mechanisms for environmental protection.</p> <p>CO3: Apply environmental management tools and sustainable waste management practices in real-world contexts.</p> <p>CO4: Evaluate sustainability initiatives such as the SDGs and Mission LiFE and relate them to environmental management and sustainable development practices.</p>
9	<p style="text-align: center;">Syllabus</p> <p>UNIT I: Environmental Pollution and Health</p> <ul style="list-style-type: none"> • Understanding pollution: Production processes and generation of wastes; Assimilative capacity of the environment; Definition of pollution; Point sources and non-point sources of pollution. • Air pollution: Sources of air pollution; Primary and secondary pollutants; Indoor air pollution; Adverse health impacts of air pollutants; National Ambient Air Quality Standards. • Water pollution: Sources of water pollution; River, lake and marine pollution, groundwater pollution; water quality parameters and standards; adverse health impacts of water pollution on human and aquatic life. • Soil pollution and solid waste: Soil pollutants and their sources; Solid and hazardous waste; Impact on human health. • Noise pollution: Definition of noise; Unit of measurement of noise pollution; Sources of noise pollution; Noise standards; adverse impacts of noise on human health. • Thermal and Radioactive pollution: Sources and impact on human health and ecosystems. <p>UNIT II: Environmental Management</p> <ul style="list-style-type: none"> • Introduction to environmental laws and regulation: Constitutional provisions- Article 48A, Article 51A (g) and other derived environmental rights; • Introduction to environmental legislations on the forest, wildlife and pollution control. Environmental management system: ISO 14001 Life cycle analysis; Cost-benefit analysis • Pollution control and management; Waste Management- Concept of 3R (Reduce, Recycle and Reuse) and sustainability; Ecolabeling /Ecomark scheme. • Introduction to Millennium Development Goals, Sustainable Development Goals, & Mission Life.

10**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.

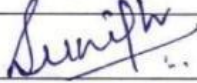
Question No	Nature of Questions	Marks
Q1	Theory Question based on Unit I	10
Q2	Theory Question based on Unit I	10
Q3	Theory Question based on Unit II	10
Q4	Theory Question based on Unit II	10
TOTAL		30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Assignment / Project	10
2.	Case Study / Assignment	10
TOTAL		20

11**REFERENCES:**

1. Barrow, C. J. (2012). *Environmental management for sustainable development* (2nd ed.). Routledge.
2. Doabia, T. S. (2023). *Environmental and pollution laws in India* (4th ed.). Eastern Book Company.
3. Kumar, S. (2009). *Environmental policies in India*. Northern Book Centre.
4. Rajagopalan, R. (2023). *Environmental studies* (4th ed.). Oxford University Press India.
5. Rogers, P. P., Jalal, K. F., & Boyd, J. A. (2007). *An introduction to sustainable development*. Earthscan.
6. Singh, J., Singh, A., & Gupta, S. (2019). *Environmental science and engineering*. New Age International Publishers.

Sr No	Name of the Faculty	Designation and College	Signature
1.	Dr. Sunil Lalchandani	Dean, Faculty of Interdisciplinary	



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

First Year

Semester- IV

Title: Cocurricular Course I

**Vertical - 6
Cocurricular Course - 2 Credits**

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

Title: Cocurricular Course - I

Course Code: CHMCCI6

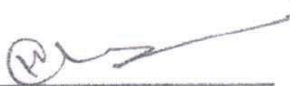
Sr. No.	Heading	Particulars
1	Description the Course:	<p>This student-friendly Co-Curricular Course is uniquely designed to promote holistic development through active participation in various college-based activities. Unlike traditional theory-based subjects, this course emphasizes hands-on involvement 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.</p> <p>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.</p> <p>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.</p>
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:	<ol style="list-style-type: none"> 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:	<p>By the end of the course, students will be able to:</p> <p>LO1: Participate meaningfully in diverse co-curricular activities and reflect on their learning experiences.</p> <p>LO2: Demonstrate improved communication, leadership, and teamwork skills.</p> <p>LO3: Exhibit increased awareness of social responsibility and civic engagement.</p> <p>LO4: Build confidence through creative, cultural, and intellectual expressions.</p> <p>LO5: Maintain a portfolio or activity log to track participation and personal development.</p>

9	Syllabus																											
	Unit I - Suggested Areas of Participation in the activities: <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • Workshops/Seminars: Report Writing, Personality Development, Soft Skills, Leadership Talks. • Speak, Show, Shine: Presentation / Poster Presentation / Viva and Learning Experience Mode of Evaluation: <ul style="list-style-type: none"> • 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. 																											
10	Scheme of Examination and Assessment Pattern Based on 3 approved Activities Semester End External - 30 marks <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Activity No</th> <th style="width: 65%;">Nature of Activities</th> <th style="width: 20%;">Marks</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1.</td> <td>Title of Approved Activity - 1</td> <td style="text-align: center;">10</td> </tr> <tr> <td style="text-align: center;">2.</td> <td>Title of Approved Activity - 2</td> <td style="text-align: center;">10</td> </tr> <tr> <td style="text-align: center;">3.</td> <td>Title of Approved Activity - 3</td> <td style="text-align: center;">10</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total</td> <td style="text-align: center;">30</td> </tr> </tbody> </table> Internal Examination: Continuous Evaluation – 20 marks <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;"></th> <th style="width: 70%;">Assessment / Evaluation</th> <th style="width: 20%;">Marks</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1.</td> <td>Reflective journal</td> <td style="text-align: center;">10</td> </tr> <tr> <td style="text-align: center;">2.</td> <td>Presentation/ poster presentation/viva</td> <td style="text-align: center;">10</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total</td> <td style="text-align: center;">20</td> </tr> </tbody> </table>	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		Assessment / Evaluation	Marks	1.	Reflective journal	10	2.	Presentation/ poster presentation/viva	10	Total		20
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																										
	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



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

**Second Year B. Sc.
(Physics)**

Semester- IV

Title: Energy conservation

**Vertical - 6
Field Project Subject – 2 Credit**

**with effect from
Academic Year 2026-2027**

Title: Energy conservation

Course Code:

Sr. No.	Heading	Particulars
1	Description of the Course:	Students will carry out a project in Physics.
2	Vertical 6	Field Project
3	Type Teaching Method	Practical Discussion/ presentation
4	Credit	2 Credits
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1 To prepare a project/demonstration based on renewable energy sources. CO(A)2 use of digital tools to spread the awareness amongst the society CO(A)3 make them work in groups CO(A)4 make them aware of the energy consumption related matters/issues	
8	Course Outcomes: Upon completion of the course, student will be able to CO1: implement the use of renewable energy resources in a house. CO2: use the digital platform for spreading awareness in the society. CO3: learn to work in groups CO4: find an alternative of the non-renewable energy sources	
9	Syllabus Based on the survey carried out by the students and report prepared after analyzing the collected data during their semester three field project, the learners will make a demonstration/project that will demonstrate energy conservation through use of renewable energy sources. Preferably make a video of their project.	

10**Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

	Assessment / evaluation	Marks
1.	Project demonstration	20
2.	Group Presentation and viva	20
3.	write up of the Project	10
	Total	50

11**REFERENCES:**1. <https://www.saveonenergy.com>



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

Bachelor of Science
(Physics)
(Aided Course)

Semester – V

Choice Based and Credit Based Syllabus
as per NEP 2020 with effect from the
Academic Year 2026-2027

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

**Third Year B. Sc.
(Physics)**

Semester V

**Title: Thermal and Statistical Physics
Vertical - 1
Major Subject – 2 Credit**

**with effect from
Academic Year 2026-2027**

Title: Thermal and Statistical Physics

Course Code: CHMPHYV1

. No.	Heading	Particulars
1	Description of the Course	This course introduces students to thermodynamics and statistical physics. It gives exposure to important ideas of statistical mechanics and quantum statistics. The course includes problem solving techniques in thermodynamics, statistical mechanics and quantum statistics. Further introduction to google colab to solve real life examples adds flavour to the subject.
2	Vertical 1	Major
3	Type Teaching Method	Theory Lecture/ discussion/ presentation
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1. To understand the concept required to study thermal physics. CO(A)2. To understand the important ideas of statistical mechanics. CO(A)3. To study the difference between Maxwell Boltzmann, Fermi Dirac and Bose Einstein statistics and solve problems based on them. CO(A)4. Hands on experience to AI(google colab)	
8	Course Outcomes: Upon completion of the course, student will be able to: CO1 Solve problems related to thermal physics CO2 Solve problems based on statistical mechanics CO3 Compare statistical distribution of different types of systems. CO4 Solve simple problems using google colab	

UNIT I: Thermal Physics

- Review of basic concepts,
- Particle states,
- system states,
- Microstates and Macrostates of a system,
- Equilibrium and fluctuations,
- Irreversibility,
- The equiprobability postulate,
- Statistical Ensemble,
- The number of states accessible to a system,
- phase space.
- Solving simple problems using google colab.

UNIT II: Statistical Mechanics and Quantum Statistics

- Introduction,
- Statistical distributions,
- Maxwell-Boltzmann statistics,
- molecular energies in an ideal gas,
- Quantum statistics: Bose-Einstein Statistics(except Bose-Einstein condensate),
- Black body radiation,
- Rayleigh-Jeans formula,
- Planck radiation laws,
- Fermi-Dirac Statistics,
- Comparison of results,
- Solving simple problems using google colab.

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

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

Format of Question Paper

All questions are compulsory.

Question No	Nature of Questions	Marks
Q1 Unit I	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
Q2 Unit II	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
		Total 30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Tests	10
2.	Classroom activity participation (worksheet / open book test)	10
	Total	20

10

11

REFERENCES:

1. Statistical and Thermal physics: An Introduction: S. Lokanathan & R. S. Gambhir, PHI, Sixth printing Nov. 2013. (Unit-I : 1.1 to 1.10)
2. AB: Concepts of Modern Physics: Arthur Beiser and Kok Wai Cheah, Mc Graw Hill International, 6th edition. (Unit-II: 9.1-9.6 (except Bose-Einstein condensate))

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

**Third Year B. Sc.
(Physics)**

Semester V

Title: Solid State Physics

Vertical- 1

Major Subject- 2 Credits

**with effect from
Academic Year 2026-2027**

Title: Solid State Physics
Course Code: CHMPHYV2

Sr. No.	Heading	Particulars
1	Description the Course:	This course introduces students to the basic concepts of crystal physics, band theory of solids, conduction in semiconductors and superconductivity. AI tools of Computational Physics like Wolframalpha is used to understand the crystal structures and to visualize and analyze the crystal planes.
2	Vertical 1	Major
3	Type Teaching Methods	Theory Lecture/discussion/presentations
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: <ol style="list-style-type: none"> 1. To learn about the basics of crystallography and study the different crystal structures. 2. To learn about the band theory of solids. 3. To learn conduction in semiconductors. 4. To learn about superconductivity. 5. To learn about crystal structures and to visualize and analyze crystal planes using AI tools like Wolfram Alpha. 	
8	Learning Outcomes: Upon completion of the course, student will be able to: <ul style="list-style-type: none"> LO1 Understand the basics of crystallography and compare the different crystal structures. LO2 Develop understanding of band theory of solids, demarcation among the types of materials LO3 Comprehend about conduction in semiconductors and BCS theory of superconductivity. LO4 Demonstrate quantitative problem solving skills in all the topics covered. LO5 To visualize and analyze the crystal structures crystal planes using AI tools like Wolfram Alpha. 	

Syllabus

UNIT I:

Crystal Physics

- Crystal Physics: Lattice points and space lattice,
- The basis and crystal structure, Unit Cells and lattice parameters, Primitive Cells,
- Crystal Systems, Bravais space lattices,
- Metallic crystal structures, (To compare cubic crystal structures computationally using Wolfram alpha)
- Relation between the density of crystal material and lattice constant in a cubic lattice,
- Directions, Planes, Miller Indices,
- Important planes in simple cubic structure (To visualize and analyze crystal planes computationally using Wolfram Alpha),
- Distribution of atoms in atomic planes in a simple cubic crystal, separation between planes in a cubic crystal.

Superconductivity

- A survey of Superconductivity,
- An account of mechanism of Superconductors,
- Effects of magnetic field,
- Flux Exclusion: The Meissner effect,
- The Penetration depth,
- Type I and Type II Superconductors
- Applications of superconductivity (SQUIDS, MRI-Magnetic resonance imaging, Maglev train)

UNIT II:

Quantum theory of free electrons

- Sommerfeld free electron model, Potential energy box,
- Fermi Dirac statistics, The Fermi distribution function,
- Density of energy states and Fermi energy,
- Mean energy of electron gas at 0 K,
- Electrical conductivity from quantum mechanical considerations,
- Failure of Sommerfeld's free electron theory.

Band Theory of Solids

1. Band theory of solids,
2. The Kronig- Penney model (Omit solution of determinant),
3. Brillouin zones,
4. Number of wave functions in a band,
5. Motion of electrons in a one-dimensional periodic potential,
6. Distinction between metals, insulators and intrinsic semiconductors.

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

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

Format of Question Paper

Question No	Nature of Questions	Marks
Q1 Unit I	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
Q2 Unit II	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
		Total 30

2. Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Tests	10
2.	Classroom activity participation (worksheet / open book test)	10
		Total 20

11

REFERENCE BOOKS:

1. Solid State Physics: S. O. Pillai, New Age International, 6th Ed.
Unit-I: Chapter 4: II, III, IV, V, VI, XIV, XV, XVI, XVII, XVIII, XIX, XX, XXII.
Chapter 6: XXXVI, XXXVII, XXXVIII, XXXIX, XXXX, XXXXI
Unit-II: Chapter 8: II,III,IV,VII,X11,XIII
2. Electronic Devices and Circuits: Millman, Halkias & Satyabrata Jit. (3rd Ed.) Tata McGraw Hill
3. Introduction to Solid State Physics - Charles Kittel, 7th Ed. John Wiley & Sons.
4. Modern Physics and Solid State Physics: Problems and solutions New Age International.
5. Elementary Solid State Physics-Principles and Applications: M.Ali Omar, Pearson Education, 2012.
6. <https://www.wolframalpha.com/>

Additional References:

1. Solid State Physics: A. J. Dekker, Prentice Hall.

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

**Third Year B. Sc.
(Physics)**

Semester V

**Title: Physics Major Practical-V
Vertical - 1**

Physics Major Practical V – 2 Credit

**with effect from
Academic Year 2026-2027**

Title: Physics Major Practical -V

Course Code: CHMPHYV3

Sr. No.	Heading	Particulars
1	Description of the Course:	This course introduces students to the basic skills of experiments in Physics by understanding relevant concepts and by using the laboratory equipment.
2	Vertical 1	Major
3	Type Teaching Method	Practical
4	Credit	2
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1. To learn the skills while performing experiments. CO(A)2. To learn the use of various laboratory equipment without fear and hesitation. CO(A)3. To learn the concepts of physics theory and their practical application CO(A)4. To learn the errors and their estimation.	
8	Course Outcomes: Upon completion of the course, student will be able to: CO1 practice the skills to perform experiments. CO2 use the apparatus without fear & hesitation. CO3 correlate the physics theory concepts to practical application. CO4 apply the concept of errors for their estimation after performing the experiment.	

Syllabus

Practical Course I

1. Searle's Goniometer
2. Determination of 'g' by Kater's pendulum
3. Edser's 'A' pattern
4. Determination of wavelength by Step slit
5. Velocity of sound in air using CRO
6. Determination of e/m by Thomson's method
7. To determine the Resolving Power of a Prism.
8. To determine the wavelength of Sodium Light using Plane Diffraction Grating.
9. Double refraction
10. Diode as temperature sensor

SKILL EXPERIMENTS

1. Estimation of errors from actual experimental data
2. Optical Leveling of Spectrometer
3. Schuster's method
4. Laser beam profile
5. Use of electronic balance: Find the density of a solid cylinder
6. Plotting of graph using Wolfram alpha and Google colab

Note:

1. **Minimum 8 experiments from the list of experiments and minimum 4 skill experiments must be completed and reported in the journal.**
2. **Exemption:** Exemption of two experiments may be given, if student carries out any one or more than one of the following activities:
 - If the student collects & reports the information of at least five Physicists with their work or any three events on physics, in the journal.
 - If the student executes a mini project to the satisfaction of teacher in-charge of practical.
 - If the student participates in a study tour or visit & submit a study tour report.
3. A separate index and certificate in journal is must for each semester course.

General Instructions:

1. · All the measurements and readings should be written with proper units in SI system only.
2. · After completing all the required number of experiments in the semester and recording them in journal, student will have to get their journal certified and produce the certified journal at the time of practical examination to be eligible to appear in the Semester End Practical Examination
3. · While evaluating practical, weightage should be given to diagram, observations,

tabular representation, experimental skills and procedure, graph, calculation and result.

4. Skill of doing the experiment and its concepts should be more important than the accuracy of result.

Instruction Regarding Semester End Practical Examination

1. For practical examinations, the learner will be examined in **One experiment** from the list of experiments.
2. Evaluation in viva voce will be based on regular experiments and skill experiments.
3. A candidate will be allowed to appear for the Semester End Practical Examination only if the candidate submit a certified journal at the time of practical examination or provide a certificate from the Head of the Department / Institute to the effect that the candidate has completed the practical course of that semester of T.Y.B. Sc. Physics as per the minimum requirement

**Scheme of Examination and Assessment Pattern
Paper – 50 Marks**

- **Semester End Practical Examination - 30 marks Time: 3hours**

	Assessment / evaluation	Marks
	One Experiment	20
	Viva-voce	05
	Journal	05
	Total	30

- **Internal Examination: - 20 marks**

	Assessment / evaluation	Marks
	Test based on skill experiment	10
	skill experiment (journal)	05
	Overall performance	05
	Total	20

11

REFERENCES:

1. Advanced course in Practical Physics: D. Chattopadhyaya, PC. Rakshit &
2. B. Saha (8th Edition) Book & Allied (P) Ltd.
3. BSc Practical Physics: Harnam Singh. S. Chand & Co. Ltd. – 2001.
4. A Text book of Practical Physics: Samir Kumar Ghosh New Central Book Agency (4th edition).
5. B Sc. Practical Physics: C. L. Arora (1st Edition) – 2001 S. Chand & Co.

- | | |
|--|--|
| | <ol style="list-style-type: none">6. Practical Physics: C. L. Squires – (3rd Edition) Cambridge Univ. Press.7. University Practical Physics: D C Tayal, Himalaya Publication.8. Advanced Practical Physics: Worsnop & Flint. |
|--|--|

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

**Third Year B. Sc.
(Physics)**

Semester V

**Title: Physics Major Practical-VI
Vertical - 1**

Physics Major Practical VI – 2 Credit

**with effect from
Academic Year 2026-2027**

Title: Physics Major Practical -VI

Course Code: CHMPHYV4

Sr. No.	Heading	Particulars
1	Description of the Course:	This course introduces students to the basic skills of experiments in Physics by understanding relevant concepts and by using the laboratory equipment.
2	Vertical 1	Major
3	Type Teaching Method	Practical
4	Credit	2
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1. To learn the skills while performing experiments. CO(A)2. To learn the use of various laboratory equipment without fear and hesitation. CO(A)3. To learn the concepts of physics theory and their practical application CO(A)4. To learn the errors and their estimation.	
8	Course Outcomes: Upon completion of the course, student will be able to: CO1 practice the skills to perform experiments. CO2 use the apparatus without fear & hesitation. CO3 correlate the physics theory concepts to practical application. CO4 apply the concept of errors for their estimation after performing the experiment.	

9	Syllabus
	Practical Course II <ol style="list-style-type: none">1. Maxwell's L/C bridge2. Study of transistorized astable multivibrator3. Design and study of transistorized bistable multivibrator4. Application of Op-Amp as a window comparator5. Application of Op-Amp as a Log amplifier6. Wein Bridge Oscillator

7. Arithmetic Circuits: 4 – bit Addition & Subtraction using IC 7483 & IC 7486
8. Photodiode and Phototransistor Characteristics
9. To draw the B - H curve of iron rod by using a Solenoid and to determine the energy loss due to Hysteresis
10. LM-317 as variable voltage source

SKILL EXPERIMENTS

1. Digital storage oscilloscope (DSO): Amplitude, Period and Phase shift measurement
2. Internal resistance of voltage and current source
3. Dual trace CRO: Phase shift measurement
4. Build and test an RC time circuit: measure charge /discharge curve on DSO
5. Build and test half-adder and full- adder circuit & verify truth table.
6. Study of transistorized astable multivibrator using Falstad simulator

Note:

1. **Minimum 8 experiments from the list of experiments and minimum 4 skill experiments must be completed and reported in the journal.**
2. **Exemption:** Exemption of two experiments may be given, if student carries out any one or more than one of the following activities:
 - If the student collects & reports the information of at least five Physicists with their work or any three events on physics, in the journal.
 - If the student executes a mini project to the satisfaction of teacher in-charge of practical.
 - If the student participates in a study tour or visit & submit a study tour report.
3. A separate index and certificate in journal is must for each semester course.

General Instructions:

1. · All the measurements and readings should be written with proper units in SI system only.
2. · After completing all the required number of experiments in the semester and recording them in journal, student will have to get their journal certified and produce the certified journal at the time of practical examination to be eligible to appear in the Semester End Practical Examination
3. · While evaluating practical, weightage should be given to diagram, observations, tabular representation, experimental skills and procedure, graph, calculation and result.
4. · Skill of doing the experiment and its concepts should be more important than the accuracy of result.

Instruction Regarding Semester End Practical Examination

1. For practical examinations, the learner will be examined in **One experiment** from the list of experiments.

2. Evaluation in viva voce will be based on regular experiments and skill experiments.
3. A candidate will be allowed to appear for the Semester End Practical Examination only if the candidate submit a certified journal at the time of practical examination or provide a certificate from the Head of the Department / Institute to the effect that the candidate has completed the practical course of that semester of T.Y.B. Sc. Physics as per the minimum requirement

10

**Scheme of Examination and Assessment Pattern
Paper – 50 Marks**

- **Semester End Practical Examination - 30 marks Time: 3hours**

	Assessment / evaluation	Marks
	One Experiment	20
	Viva-voce	05
	Journal	05
	Total	30

- **Internal Examination: - 20 marks**

	Assessment / evaluation	Marks
	Test based on skill experiment	10
	skill experiment (journal)	05
	Overall performance	05
	Total	20

11

REFERENCES:

1. Advanced course in Practical Physics: D. Chattopadhyaya, PC. Rakshit &
2. B. Saha (8th Edition) Book & Allied (P) Ltd.
3. BSc Practical Physics: Harnam Singh. S. Chand & Co. Ltd. – 2001.
4. A Text book of Practical Physics: Samir Kumar Ghosh New Central Book Agency (4th edition).
5. B Sc. Practical Physics: C. L. Arora (1st Edition) – 2001 S. Chand & Co.
6. Practical Physics: C. L. Squires – (3rd Edition) Cambridge Univ. Press.
7. University Practical Physics: D C Tayal, Himalaya Publication.
Advanced Practical Physics: Worsnop & Flint.

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

**Third Year B. Sc.
(Physics)**

Semester V

Title: Electronic instrumentation -I

Vertical - 1

Elective – 2 Credit

**with effect from
Academic Year 2026-2027**

Title: Electronic Instrumentation-I

Course Code: CHMPHYV6

Sr. No.	Heading	Particulars
1	Description of the Course:	This course covers sensors, signal conditioning, data acquisition systems, audio and display technologies, and biomedical instrumentation. It also introduces AI-based techniques such as adaptive calibration, anomaly detection, and pattern recognition for intelligent instrumentation and healthcare applications.
2	Vertical 1	Elective
3	Type Teaching Method	Theory
4	Credit	2
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives:	<p>CO(A)1. Apply knowledge of signal processing and regulators to stabilize and condition electronic signals.</p> <p>CO(A)2. Demonstrate understanding of data acquisition systems, DACs, and ADCs for effective signal conversion.</p> <p>CO(A)3. Analyze and evaluate audio devices and display technologies for instrumentation outputs.</p> <p>CO(A)4. Comprehend the principles and applications of medical instrumentation such as ECG, EEG, MRI, and ultrasonography.</p> <p>CO(A)5. Integrate AI tools into instrumentation for smarter signal processing, conversion, and healthcare applications.</p>
8	Course Outcomes:	<p>Upon completion of the course, student will be able to:</p> <p>CO1: Design and analyze rectifiers, clippers, and switching regulators.</p> <p>CO2: Design DAC & ADC systems for measurements & Identify structure of DAS.</p> <p>CO3: Develop competency in assessing microphones, loudspeakers, and display devices for performance and applications.</p> <p>CO4: To interpret biomedical signals and understand diagnostic instruments.</p> <p>CO5: Use AI-based methods for anomaly detection, pattern recognition, and predictive analytics in instrumentation systems.</p>

Unit I: Transducers, Sensors and Optoelectronic Devices,

- **Transducers:** Definition, Classification, Selection of transducers.
 - Electrical transducers: Thermistor, Thermocouple
 - Pressure Transducer: Strain gauges (wire, foil, & semiconductor)
 - Displacement transducer: LVDT.
- **Chemical sensors:** Gas sensor (Fundamental aspects), Humidity sensor (Resistive)
- **Optoelectronic Devices:** LDR, LED (Construction, Working & Applications), Multicolour LED, Seven Segment Display, Photodiode (Construction, Characteristics & applications), Phototransistor. Half wave precision rectifier, Active Peak detector, Active Positive Clamper [M & B], Active Positive and Negative Clippers.
- **Microphones:** characteristics, types (list only), carbon microphone and dynamic type microphone (principle, construction and working).
- **Loudspeakers:** Characteristics, Dynamic (Moving coil type) speaker, Multi way speaker system (woofer and tweeter).
- AI in **smart audio, display systems** through adaptive calibration and anomaly detection.

Unit II: Data Acquisition, Modern Techniques and Appliances

- **Data acquisition system:** Objectives of DAS, Signal conditioning of inputs, Single channel Data Acquisition system, Multichannel Data Acquisition system.
D to A Converters: Resistive divider network, Binary ladder Network.
A to D Converters: Successive approximation type, Voltage to Time (Single & Dual slope).
- **Microwave Oven:** Operating principle, block diagram, features.
- **Medical instruments:** Bio-Potential, Types of electrodes, ECG, CT scan and MRI (principle, block diagram and features), Ultrasonography: working principle
- AI in **data acquisition, converter accuracy and medical instrumentation** with pattern recognition, image reconstruction, and predictive healthcare analytics.

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

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

Format of Question Paper

Question No	Nature of Questions	Marks
Q1 Unit I	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
Q2 Unit II	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
		Total 30

- **Internal Examination: Continuous Evaluation - 20 marks**

	Assessment / evaluation	Marks
1.	Tests	10
2.	Classroom activity participation (worksheet / open book test)	10
		Total 20

11

Reference Books:

1. A Textbook of Applied Electronics – R S Sedha, S Chand & Company, New Delhi.
2. Basic Electronics Solid state - B. L. Thereja, S Chand & Company, New Delhi.
3. Electronic Instrumentation – H S Kalsi, Tata McGraw-Hill Publishing Company Limited, New Delhi.
4. Measurement and Instrumentation Principles: Alan S. Morris, Butterworth - Heinemann.
5. Transducers and display systems: B. S. Sonde, Tata McGraw-Hill Publishing Company Limited, New Delhi.
6. Digital principles and applications: A.P. Malvino and D. P. Leach. Tata McGraw-Hill.
7. Data Converters– B. S. Sonde, Tata McGraw-Hill Publishing Company Limited, New Delhi.
8. Modern Electronic Instruments and Measurement techniques- Albert D. Helfrick, Willam D. Cooper, Prentice Hall India Pvt. Ltd, New Delhi.
9. A course in electrical and electronic Measurements and Instrumentation: A. K. Sawhney, Dhanpat Rai and Sons.
10. <https://www.scribd.com/document/258017718/A-K-sawhney-A-Course-in-Electrical-and-Electronic-Measurements-and-Instrumentation>
11. Instrumentation Devices & Systems, 2nd Edition Tata McGrawHill- C.S.

Rangan, G.R. Sarma, V.S. Mani.

12. Consumer Electronics R. P. Bali, Pearson Education (2008).

13. S. P. Bali, "Consumer Electronics", Pearson Education Asia Pvt., Ltd., 2008 Edition.

14. Introduction to Bio-medical Electronics: Joseph-Du-bary, McGraw Hill Co. Ltd.

15. Medical instrumentation Application and design- J. C. Wobster

16. Biomedical instruments and measurements – L. Cromwell, F. J. Weibel,

17. Printice hall of India of India Pvt. Ltd, New Delhi.

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

**Third Year B. Sc.
(Physics)**

Semester V

Title: Electronic Instrumentation Practical-I

Vertical -1

Elective- 2 credits

**with effect from
Academic Year 2026-2027**

Title: Electronic Instrumentation Practical- I

Course Code: CHMPHYV7

Sr. No.	Heading	Particulars
1	Description of the Course:	This advanced practical physics course delivers hands-on training in electronic circuits, sensors, and biomedical instrumentation. Students build hardware like op-amps, filters, and converters while integrating AI-driven Python diagnostics for ECG signals. The course emphasizes conceptual engineering skills over numerical precision.
2	Vertical 1	Major
3	Type Teaching Method	Practical
4	Credit	2
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives:	<p>CO(A)1. Apply fundamentals of electronic circuits for sensing, conversion, and amplification.</p> <p>CO(A)2. Demonstrate skills in measurement and display systems using op-amps and digital devices.</p> <p>CO(A)3. Comprehend applications of medical instrumentation through lab work and field exposure.</p> <p>CO(A)4. Integrate AI methods to enhance signal analysis and diagnostics.</p>
8	Course Outcomes:	<p>Upon completion of the course, student will be able to:</p> <p>CO1: Build and test basic op-amp and transistor circuits.</p> <p>CO2: Analyze sensor behavior and convert signals into outputs.</p> <p>CO3: Evaluate audio and display devices for practical use.</p> <p>CO4: Apply biomedical and AI tools for interpreting signals</p>

9

List of Experiments:

1. Thermistor as sensor in temperature to voltage converter using OPAMP.
2. Study of seven segment display.
3. OPAMP D/A Converter: Binary weighted resistors.
4. OPAMP D/A Converter: Ladder network.
5. Positive and Negative Clippers/ Clampers using op-amp.
6. Constant Current source using OPAMP and PNP transistor (o/p current less than 50 mA).
7. Square and Triangular wave generator using OPAMPs with concept of duty cycle.
8. Half wave precision rectifier using precision op-amps.
9. Characteristics of Photo diode and photo transistors.
10. Simple microphone amplifier using a transistor.
11. low voltage audio amplifier using lm386
12. Field visit to Medical Centre.
13. AI-based ECG Signal Classification using Python

Note:

1. **Minimum 8 experiments from the list of experiments and minimum 4 demo experiments must be completed and reported in the journal.**
2. A separate index and certificate in journal is must for each semester course.

General Instructions:

1. All the measurements and readings should be written with proper units in SI system only.
2. After completing all the required number of experiments in the semester and recording them in journal, student will have to get their journal certified and produce the certified journal at the time of practical examination to be eligible to appear in the Semester End
3. While evaluating practical, weightage should be given to diagram, observations, tabular representation, experimental skills and procedure, graph, calculation and result.
4. Skill of doing the experiment and its concepts should be more important than the accuracy of result.

Instruction Regarding Semester End Practical Examination

1. For practical examinations, the learner will be examined in **One experiment** from the list of experiments.
2. Evaluation in viva voce will be based on regular experiments and skill experiments.
3. A candidate will be allowed to appear for the Semester End Practical Examination only if the candidate submit a certified journal at the time of practical examination or provide a certificate from the Head of the Department / Institute to the effect that the candidate has completed the practical course of that semester of T.Y.B. Sc. Physics as per the minimum requirement.

10

**Scheme of Examination and Assessment Pattern
Paper – 50 Marks**

- **Semester End Practical Examination - 30 marks Time: 3hours**

	Assessment / evaluation	Marks
	One Experiment	20
	Viva-voce	05
	Journal	05
	Total	30

- **Internal Examination: - 20 marks**

	Assessment / evaluation	Marks
	Test based on any one experiment	10
	AI experiment/ Field visit write up	05
	Overall performance	05
	Total	20

11

Reference Books:

1. H & C: Modern Electronic Instrumentation & Measurement Techniques by Albert D. Helfrick & William D. Cooper (PHI) Edition.
2. C & D: OPAMPs and linear integrated circuits” by Coughlin & F. F. Driscoll (6th edition PHI)
3. G: OPAMPs and linear integrated circuits by R.A. Gayakwad (4th edition, PHI).
4. M: Electronic Principles by A. P. Malvino, (PHI), 6th edition.
5. K: Electronic Instrumentation by H. S. Kalsi, (TMH) 2nd Edition
6. M & L: Digital Principle and Applications” by Malvino and Leach, (TMH), 5th edition,
7. RPJ: Modern Digital Electronics, R. P. Jain, (TMH), 3rd edition.

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

**Third Year B. Sc.
(Physics)**

Semester-V

Title: Applied Electronics

**Vertical - 2
Minor Subject – 2 Credit**

**with effect from
Academic Year 2026-2027**

Title: Applied Electronics
Course Code: CHMPHYV8

Sr. No.	Heading	Particulars
1	Description of the Course:	Introduction, relevance, Usefulness, Application, interest, connection with other courses, demand in the industry, job prospects etc. The learners will be able to visualize electronic circuits in real time using computational tools.
2	Vertical 2	Minor
3	Type Teaching Methods	Theory Lecture/discussion/presentations
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	<p>Course Objectives:</p> <p>CO(A)1. To learn about the construction, working, and characteristics of BJTs and its application as switches.</p> <p>CO(A)2. To learn about AM, FM, and different types of modulation techniques.</p> <p>CO(A)3. To learn about the functioning and characteristics of JFET and its switching applications.</p> <p>CO(A)4. To learn about the operational amplifiers (OPAMP) in basic linear circuit configurations such as amplifiers, adders, and subtractors. Evaluate different op-amp applications like integrators, differentiators, and comparators in signal processing tasks.</p> <p>CO(A)5. To learn about electronic circuits in real time using computational tools.</p>	
8	<p>Course Outcomes: Upon completion of the course, student will be able to:</p> <p>CO1 Understand the construction, working, and characteristics of BJTs and its application as switches.</p> <p>CO2 Understand the fundamental principles of each modulation technique, recognizing their applications in various communication systems.</p> <p>CO3 Understand the functioning and characteristics of JFET and its switching applications.</p> <p>CO4 Understand the operational amplifiers (OPAMP) in basic linear circuit configurations such as amplifiers, adders, and subtractors, will be able to evaluate different op amp applications like integrators, differentiators, and comparators in signal processing tasks.</p> <p>CO6: Visualize and understand electronic circuits in real time using computational tools</p>	

UNIT I: Transistors and Radio Communication

A. Bipolar Junction Transistor (BJT): Introduction, Types of transistors, Construction and working of transistor, Transistor as amplifier, Characteristics of transistor (CB, CE & CC), Gain in transistor, Transistor as switch.

Note: Cover Sufficient number of problems on above given topics.

B. Radio communication: 1) Amplitude Modulation: Need of modulation, concept of modulation, AM waveform, mathematical expression of AM, concept of sideband, demodulation principles. AM Receiver: TRF and super heterodyne receiver.

2) Frequency Modulation: Definition, mathematical representation, frequency spectrum, bandwidth and modulation index.

3) Concept of ASK, PSK, FSK, PAM, PWM, PPM, PCM

UNIT II: FET and Op-Amp

C. Field Effect Transistors (FET): Introduction, Types of FET, Construction and working of JFET, Difference between JFET and BJT, Characteristics of JFET, Important terms, JFET as switch

D. Operational Amplifiers Introduction, Schematic symbol of operational amplifier, Features of Operational Amplifier, Op-amp as inverting amplifier, Op-amp as non-inverting amplifier, Applications of Op-amp: as voltage follower, as adder, as subtractor, Op-amp as integrator, Op-amp as differentiator, Op-amp as comparator

Note: Cover Sufficient number of problems on above given topics.

Use of AI Tools in Applied Electronics: Use of Falstad circuit simulator to visualize electronic circuits in real time.

10**Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

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

Format of Question Paper

Question No	Nature of Questions	Marks
Q1 Unit I	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
Q2 Unit II	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
		Total 30

2. Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Tests	10
2.	Classroom activity participation (worksheet / open book test)	10
		Total 20

11**REFERENCE BOOKS:**

- Principles of Electronics – V. K. Mehta and Rohit Mehta. (S. Chand Multicolor revised edition)
- Kennedy: Electronics Communication Systems by Kennedy
- Electronic Principles, Malvino & Bates -7th Edition TMH Publication.
- Electronic Devices and Circuits, Allen Mottershead -PHI Publication.
- Functional Electronics, K.V. Ramanan-TMH Publication
- Communication Electronics: Principles and applications by Louis E Frenzel, 3rd edition TMH Publications.
- Telecommunication Switching Systems and Network by Vishwanathan and Thiagarajan, PHI publication.
- Electronics Communication Systems by Denis Roddy and John Coolen, PHI publication 11. Individual Passin

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

**Third Year B. Sc.
(Physics)**

Semester V

Title: Study of Solar Panel and its Installation

Vertical -4

VSC- 2 credits

**with effect from
Academic Year 2026-2027**

Title: Study of Solar Panel and its installation (VSC)

Course Code: CHMPHYV9

Sr. No.	Heading	Particulars
1	Description of the Course:	Introduction, Relevance, Usefulness, Application, Interest, Connection with other courses, Demand in the Industry, Job Prospects etc.
2	Vertical 4	VSC
3	Type Teaching Method	Practical
4	Credit	2
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives: The students are expected to	<p>CO(A)1. generate awareness among students about Renewable Energy sources and Solar Energy System</p> <p>CO(A)2 .develop concept of Working Solar Cell and Solar Photo Voltaic (SPV) Module.</p> <p>CO(A)3. understand components of solar photovoltaic system and its parameters .</p> <p>CO(A)4.earn I-V characteristics and calculation of power, fill factor and efficiency of solar panel</p> <p>CO(A)5.learns understand the room energy audit, installation and interconnections of solar panel</p> <p>CO(A)6 .Explore the working of solar cell using simulator</p>
8	Course Outcomes: Upon completion of the course, student will be able to:	<p>CO1:gain the basics of renewable energy sources and solar energy system and its applications.</p> <p>CO2: comprehend knowledge about solar cell and Solar Photo Voltaic (SPV) Module</p> <p>CO3: identify basics of components of solar photovoltaic system its parameters</p> <p>CO4: comprehend knowledge of installation and interconnection of solar panel</p> <p>CO5: demonstrate the working of solar cell using simulator</p>
9	List of Experiments:	<p>1. Photovoltaic effect and working of solar cell Aim and Objective: Explain Photovoltaic effect, Construction & Working Solar Cell and Solar Photo Voltaic (SPV) Module</p> <p>2. Study of solar panel and main components of solar photo voltaic system Aims and objectives: Explain structure of solar panel, types of solar panel and main components solar photovoltaic system</p> <p>3. Study of Electrical Parameters of Solar Cells:</p>

Aims and Objectives: Explain short circuit current, I_{sc} , open circuit voltage V_{oc} , Maximum power current I_{MP} , Maximum power voltage V_{MP} , Maximum power voltage (MPP), Fill Factor, efficiency with I- V characteristics.

4. Study of I–V Characteristics of a Solar Panel

Aim and Objective: To plot current vs. voltage (I–V) and power vs. voltage (P–V) characteristics of a photovoltaic panel under different illumination levels and determine open-circuit voltage, short-circuit current, and maximum power point (MPP) and calculate the fill factor and efficiency of a solar panel.

5. Study of effect of load on output power of a Solar Panel

Aim and Objective: To measure the current, voltage and calculate power for different resistive loads of the solar panel

6. Effect of Shading on Solar Panel Performance

Aim and Objective: To study how shading (25 %, 50% etc.) affects on a solar panel current, voltage, and output power.

7. Effect of Different Colour Light on Solar Panel Performance

Aim and Objective: To study how different coloured lights (red, green, blue) affect the voltage, current, and power output of a solar panel. Compare which light wavelength gives maximum output.

8. Study of series connections of solar panels and the output power

Aims and objectives: To investigate the electrical behavior (voltage, current, power) of solar panels connected in series and parallel configurations.

9. Study of parallel connections of solar panels and the output power

Aims and objectives: To investigate the electrical behavior (voltage, current, power) of solar panels connected in series and parallel configurations.

10. Energy Audit

Aim and Objective: To calculate daily system energy demand using different household appliances

11. Installation of 2 kW solar panel system and load calculation

Aims and objectives: To determine the number of solar panels required for a 2-kilowatt solar system

12. Interconnections to the solar module (Using a Small PV Panel)

Aims and objectives: To study the correct polarity and wiring sequence of a solar module and perform the interconnection between the solar panel and charge controller using a small (10–20 W) photovoltaic module.

13. Installation of solar panel

Aims and objectives: To study the effect of tilt angle and row spacing on solar panel installation using a small indoor model and calculate recommended spacing using site latitude.

14. Maintenance and troubleshooting of PV Modules

Aim and Objective: Maintenance on solar PV modules, wiring and mounting structures by inspecting for dust, shading, corrosion, loose connections, physical damage, and environmental wear, and ensuring proper cleaning and system health.

15. Fault Diagnosis & Repair (Electrical Troubleshooting)

Aim and Objective: To diagnose intentionally introduced faults in a PV module system such as open circuits, short circuits, loose connections, reverse polarity, blown fuses, bypass diode failure, and weak cells and to restore normal operation using systematic troubleshooting.

16. Use of simulator Explorify.com

Note:

1. Minimum 8 experiments from the list of experiments and minimum 4 demo experiments must be completed and reported in the journal.

2. A separate index and certificate in journal is must for each semester course.

General Instructions:

1. All the measurements and readings should be written with proper units in SI system only.
2. After completing all the required number of experiments in the semester and recording them in journal, student will have to get their journal certified and produce the certified journal at the time of practical examination to be eligible to appear in the Semester End Practical Examination
3. While evaluating practical, weightage should be given to diagram, observations, tabular representation, experimental skills and procedure, graph, calculation and result.
4. Skill of doing the experiment and its concepts should be more important than the accuracy of result.

Instruction Regarding Semester End Practical Examination

1. For practical examinations, the learner will be examined in **One experiment** from the list of experiments.
2. Evaluation in viva voce will be based on regular experiments and skill experiments.
3. A candidate will be allowed to appear for the Semester End Practical Examination only if the candidate submit a certified journal at the time of practical examination or provide a certificate from the Head of the Department / Institute to the effect that the candidate has completed the practical course of that semester of T.Y.B. Sc. Physics as per the minimum requirement.

10

**Scheme of Examination and Assessment Pattern
Paper – 50 Marks**

- **Semester End Practical Examination - 30 marks Time: 3hours**

	Assessment / evaluation	Marks
	One Experiment	20
	Viva-voce	05
	Journal	05
	Total	30

- **Internal Examination: - 20 marks**

	Assessment / evaluation	Marks
	Skill testing related to any one experiment.	15
	Overall performance	05
	Total	20

11

Reference Books:

1. Solar Electricity Handbook. A Simple, Practical Guide to Solar Energy - Designing and Installing Photovoltaic Solar Electric Systems. Michael Boxwell · 2010. Greenstream Publishing
https://archive.org/details/solarelectricity0000boxw_l615
www.solarelectricityhandbook.com
2. Solar Based Geen Energy Solutions Basics, Sizing & Installation, Dr Dinesh V Kala, Book Media
3. From Sunlight to Electricity: A practical handbook on solar photovoltaic applications (Third Edition), Suneel Deambi.
4. Solar PV System: Design, Installation, Operation and Maintenance, L. Ashok Kumar, K. Mohana Sundaram, Nova Publisher.

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

**Third Year B. Sc.
(Physics)**

Semester V

Title: IKS in Physics in Vedic Science and Indian Scientists

Vertical - 5

IKS in Physics – 2 Credit

**with effect from
Academic Year 2026-2027**

Title: IKS: Physics in Vedic Science and Indian Scientists

Course Code:CHMPHYV5

Sr. No.	Heading	Particulars
1	Description of the Course:	This course introduces undergraduate physics students to the rich scientific heritage of Indian Knowledge system from the Vedic period to medieval India. Students will study the contributions of renowned Indian scientists such as Rishi Kanad, Aryabhata, Bhaskaracharya, C. V. Raman, Dr. Homi Bhabha etc. The course also explores ancient theories of motion, sound, astronomy, mathematics. Through historical study, students will gain appreciation of India's contributions to astronomy, mathematics, and scientific thought.
2	Vertical 1	Major
3	Type Teaching Method	Theory
4	Credit	2
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives:	<p>CO(A)1. know the fundamental concepts of physics as developed in ancient Indian Knowledge Systems</p> <p>CO(A)2. create awareness about the scientific contributions of Indian scholars from ancient to modern times.</p> <p>CO(A)3. enable students to understand the historical evolution of physical concepts such as matter, motion, gravitation, sound, electricity, astronomy, aeronautics, and marine science.</p> <p>CO(A)4. develop critical and comparative thinking by relating ancient Indian scientific ideas with modern physics principles.</p> <p>CO(A)5. promote interdisciplinary learning by connecting physics with philosophy, history, culture, and technology.</p> <p>CO(A)6. foster scientific temper, cultural appreciation, and ethical understanding of knowledge traditions.</p>

8	<p>Course Outcomes: Upon completion of the course, student will be able to:</p> <p>CO1 recall and describe the key concepts of physics present in Vedic and classical Indian texts.</p> <p>CO2 explain the contributions of ancient Indian scholars such as Rishi Kanad, Aryabhata, and Bhaskaracharya to the development of physical sciences.</p> <p>CO3 analyze ancient theories of motion, gravitation, sound, and atomic concepts in comparison with modern physics principles.</p> <p>CO4 demonstrate an understanding of ancient Indian knowledge related to aeronautics, marine science, astronomy, and materials.</p> <p>CO5: evaluate the relevance of Indian Knowledge Systems in the contemporary scientific and technological context</p> <p>CO6: communicate scientific ideas and historical insights effectively through presentations, projects, and written assignments.</p>
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9	<p style="text-align: center;">Syllabus</p> <p>Unit I: Physics in Vedic Science Physics in Vedas, Rishi Kanad, The concept of anu, Five types of motions, Comparison between laws of motion mentioned in sutras of Rishi Kanad and Sir Isaac Newton, theory of gravitation, distance and time units, History of Electricity: From Ancient Times to the Modern Times, Sound and acoustics in Vedic science.</p> <p>Unit II: Ancient Aeronautics and Marine science and Introduction to Indian Physicists Aeronautics, Definition of a plane, Airway, the mechanisms in a plane, energy sources needed to fly an aeroplane, Types of aircrafts, Metals described in the Vimana Shastra, Marine science, Ancient Astronomy.</p> <p>Indian scientists: Bhaskaracharya, Aryabhata, Sir C. V. Raman, Satyendra Nath Bose, Homi Jahangir Bhabha, Subrahmanyam Chandrasekhar, Vikram Ambalal Sarabhai, Meghnad Saha</p>
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Scheme of Examination and Assessment Pattern

Paper – 50 Marks

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

Format of Question Paper

Question No	Nature of Questions	Marks
Q1 Unit I	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
Q2 Unit II	Attempt any Three out of Six (5 Marks each)	15
		Total 30

2. Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Tests	10
2.	Classroom activity participation (worksheet / open book test)	10
		Total 20

11

REFERENCES:

1. Vedic Physics, Keshav Dev Verma, Motilal Banarsidass Publishers, New Delhi
2. Bhaskaracharya - Gunakar Mule - Gyan Vigyan Prakashan, New Delhi
3. Arya Bhatta - Gunakar Mule - Gyan Vigyan Prakashan, New Delhi
4. Vaimanika Shastra Rediscovered - A Project Study—Wg. Cdr. M. P. Rao (Retd), Bangalore.
5. Modern Physics and Vedanta—Swami Jitatmananda—Bharatiya Vidya Bhawan.
6. Cosmos—Carl Sagan, Ballantine Books—New York

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

**Third Year B. Sc.
(Physics)**

Semester V

Title: Science Fairs and Demo Shows

Vertical - 6

Community Engagement Project – 2 Credit

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

Title: Science Fairs and Demo Shows

Course Code: CHMPHYV10

Sr. No.	Heading	Particulars
1	Description of the Course:	Hosting interactive events featuring popular demonstrations, Teaching physics concepts to school and junior college students through hands-on projects like building rockets, robots, simple machines or simple circuits, popularizing the subject of Physics through hands on experience.
2	Vertical 6	CEP
3	Type Teaching Methods	Project Lecture/discussion/presentations
4	Credit	2 Credits
5	Hours allotted	30 hrs (Field Work/ Demonstration /Exhibition) + 15hrs (Discussion + Report Writing) : Total - 45
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1.To understand and demonstrate basic concepts of physics. CO(A)2.To build the capacity among school and junior college students to build simple projects . CO(A)3.To popularize the subject of Physics by learning through hands on experience.	
8	Course Outcomes: Upon completion of the course, student will be able to: CO1 demonstrate basic concepts of physics. CO2 build the capacity among school and junior college students to build simple projects CO3 impart skills of learning physics through hands on experience thereby making the teaching-learning enjoyable.	
9	Syllabus	<ol style="list-style-type: none">1. Hosting interactive events featuring popular demonstrations like Newton's laws of motion, angular momentum, centre of mass, pressure, electromagnetism.2. Teaching physics concepts to school and 11th, 12th students through hands-on projects like building rockets, robots, or simple circuits.3. Develop interactive physics experiments for school kids, focusing on topics like motion, light, or sound and helping them to construct such projects themselves.

Sr. No.	Heading	Particulars																											
1	Description of the Course:	Hosting interactive events featuring popular demonstrations, Teaching physics concepts to school and junior college students through hands-on projects like building rockets, robots, simple machines or simple circuits, popularizing the subject of Physics through hands on experience.																											
2	Vertical 6	CEP																											
3	Type Teaching Methods	Project Lecture/discussion/presentations																											
10	<p style="text-align: center;">Scheme of Examination and Assessment Pattern Paper – 50 Marks</p> <p>1. External Examination: Semester End External - 30 marks</p> <table border="1" data-bbox="331 751 1495 1014"> <thead> <tr> <th></th> <th>Assessment /evaluation Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Objectives, Literature Review , Methodology, Feedback Analysis, Conclusion and Recommendations</td> <td>15</td> </tr> <tr> <td>2</td> <td>Overall Project Report Structure and Style</td> <td>05</td> </tr> <tr> <td>3</td> <td>Presentation Skills & Communication</td> <td>10</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total</td> <td>30</td> </tr> </tbody> </table> <p style="text-align: center;">2. Internal Examination: Continuous Evaluation - 20 marks</p> <table border="1" data-bbox="347 1125 1490 1276"> <thead> <tr> <th></th> <th>Assessment / evaluation criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Small project/ demonstration model</td> <td>10</td> </tr> <tr> <td>2.</td> <td>Overall participation</td> <td>05</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total</td> <td>20</td> </tr> </tbody> </table>			Assessment /evaluation Criteria	Marks	1	Objectives, Literature Review , Methodology, Feedback Analysis, Conclusion and Recommendations	15	2	Overall Project Report Structure and Style	05	3	Presentation Skills & Communication	10	Total		30		Assessment / evaluation criteria	Marks	1.	Small project/ demonstration model	10	2.	Overall participation	05	Total		20
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11	<p>REFERENCES :</p> <ol style="list-style-type: none"> 1. https://www.arvindguptatoys.com/ 2. https://www.sciencebuddies.org/science-fair-projects/ 																												



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

Bachelor of Science
(Physics)
(Aided Course)

Semester – VI

Choice Based and Credit Based Syllabus
as per NEP 2020 with effect from the
Academic Year 2026-2027

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

**Third Year B. Sc.
(Physics)**

Semester VI

**Title: Classical Physics
Vertical - 1
Major Subject – 2 Credit**

**with effect from
Academic Year 2026-2027**

Title: Classical Physics
Course Code: CHMPHYVI1

Sr. No.	Heading	Particulars
1	Description of the Course	Introduction, relevance, Usefulness, Application, interest, connection with other courses, demand in the industry, job prospects etc. This course covers the essentials of classical mechanics — central force motion, Lagrangian formalism, fluid dynamics, rigid body rotation, and nonlinear systems. It emphasizes applications and relevance in physics and engineering, while introducing AI-assisted tools for derivation and chaos visualization.
2	Vertical 1	Major
3	Type Teaching Method	Theory Lecture/ discussion/ presentation
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1. To learn different aspects of classical mechanics CO(A)2. understand the kinds of motions that can occur under a central potential and their applications to planetary orbits CO(A)3. To learn the moving coordinate system, rectilinear as well as rotating CO(A)4. To learn the concepts needed for the important formalism of Lagrange's equations and derive the equations using D'Alembert's principle. CO(A)5. To explore the use of AI-based tools to simulate orbital motion, fluid dynamics, and assist in solving Lagrangian equations.	
8	Course Outcomes: Upon completion of the course, student will be able to: CO1: Demonstrate an understanding of the fundamental concepts and various aspects of classical mechanics CO2: Apply the principles of rotating and moving co-ordinate systems to explain motion on the rotating Earth, the Foucault pendulum and Larmor's theorem CO3: Analyze the kinematics and dynamics of ideal fluids and utilize conservation principles of mass, momentum, and energy to solve fluid flow problems. CO4: Apply D'Alembert's principle and Lagrangian formalism to derive and analyze the equations of motion of mechanical systems. CO5: Use AI tools to derive equations, visualize chaos (logistic map, bifurcations), and	

simulate mechanical systems.

9

Syllabus

UNIT I: Central Force Fluid Motion and Rigid body rotation

- Motion under a central force
- Elliptic orbits
- The Kepler problem. **KRS:3.13-3.15**
- Moving origin of coordinates
- Rotating coordinate systems
- Laws of motion on the rotating earth
- The Foucault pendulum
- Larmor's theorem. **KRS: 7.1-7.5**
- Equation of motion for an ideal fluid
- Conservation laws for fluid motion. **KSR :8.6 to 8.8**
- **AI Applications in Orbital and Fluid Simulations**

UNIT II: Lagrange's equations and Non-Linear Mechanics

- D'Alembert's principle
- Constraints
- Examples of holonomic constraints and nonholonomic constraints
- degrees of freedom and generalized coordinates
- illustrative problems.
- Lagrange's equation in one dimension
- Lagrange's equation in three dimensions
- Lagrange's equations using D'Alembert's principle & Examples
- Systems subject to constraints, Constants of motion and ignorable coordinates. **HG:1.4**
PVP: 4.2 to 4.9, 5.2 to 5.4,7.2 ,7.3 KRS: 9.1 to 9.6
- Transition to chaos: Bifurcations and strange attractors, Aspects of chaotic behavior (Logistic map). **BO: 11.4,11.5 A GA:12.2, 12.3,12.4**
- **AI-Assisted Derivation and Chaos Visualization.**

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

All questions are compulsory.

Question No	Nature of Questions	Marks
Q1 Unit I	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
Q2 Unit II	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
		Total 30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Tests	10
2.	Classroom activity participation (worksheet / open book test)	10
Total		20

11

REFERENCES:

1. **KRS:** Mechanics: Keith R. Symon (Addison Wesley, 3rd Ed.)
2. **HG:** Classical Mechanics: Herbert Goldstein, (Narosa 2nd Ed.)
3. **BO:** Classical Mechanics- a Modern Perspective: V. D. Barger and M. G. Olsson. (Mc Graw Hill International 1995 Ed.)
4. **PVP:** Classical Mechanics, P. V. Panat (Narosa)
5. **GA:** Classical Mechanics by G.Aruldas PHI Learning Private Limited
6. Wolfram, PhET simulations, <https://chaosbook.org/>

Additional Reference Books:

1. An Introduction to Mechanics: Daniel Kleppner & Robert Kolenkow, Tata McGraw Hill (Indian Ed. 2007).
2. Classical Mechanics – System of Particles & Hamiltonian Dynamics: Walter Greiner (Springer).
3. Introduction to Classical Mechanics: P. S. Puranik & R. G. Takwale (Tata McGraw Hill).

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

**Third Year B. Sc.
(Physics)**

Semester VI

Title: Nuclear Physics

Vertical- 1

Major Subject- 2 Credits

**with effect from
Academic Year 2026-2027**

Title: Nuclear Physics
Course Code: CHMPHYVI2

Sr. No.	Heading	Particulars
1	Description the Course:	This course introduces students to the basic concepts of Nuclear Physics as well as some of the important applications of nuclear physics. Topics include decay modes – (alpha, beta & gamma decay), nuclear models (liquid drop model, introduction to shell model). Applications of Nuclear Physics in the field of particle accelerators and energy generation, nuclear forces and elementary particles. The lecture course will be integrated with problem solving.
2	Vertical 1	Major
3	Type Teaching Methods	Theory Lecture/discussion/presentations
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1. To describe and analyze various radioactive decay processes, including alpha, beta, and gamma decays, along with their underlying mechanisms and laws of conservation. CO(A)2. To understand and compare different nuclear models, such as the liquid drop model and shell model, to interpret nuclear stability and reactions CO(A)3. To discuss the principles, design, and applications of particle accelerators in probing nuclear and subatomic structures. CO(A)4. To explore the concepts of nuclear energy production, including fission and fusion processes, and their technological and societal implications CO(A)5. To introduce the fundamental ideas of elementary particles and their interactions, providing a bridge between nuclear and particle physics	
8	Course Outcomes: Upon completion of the course, student will be able to: CO1 analyze alpha, beta, and gamma decay processes using appropriate nuclear models and conservation laws. CO2 apply the liquid drop model and other nuclear models to interpret nuclear binding energy, stability, and reaction mechanisms. CO3 describe the working principles and functions of various particle accelerators and their role in nuclear and particle physics research. CO4 evaluate the principles of nuclear fission and fusion to understand the generation and applications of nuclear energy.	

CO5 classify elementary particles and explain their fundamental interactions within the framework of modern particle physics.

9

Syllabus

UNIT I: Radioactive decay & Nuclear Models

1. Radioactive decay processes

Alpha decay: Velocity and energy, the absorption of alpha particles: range, ionization and stopping power, Geiger Nuttal law, Disintegration Energy of spontaneous alpha-decay, Gamow's theory of alpha decay

IK: 13. 1, 13.2, SBP: 4. II. 1, 4. II. 2, 1.II.3

Beta decay: Introduction, velocity and energy of beta particles, Different modes of beta disintegration, Pauli's neutrino hypothesis, Detection of neutrino - Cowan and Reines Experiment(Qualitative)

IK: 14.1, SBP: 4. III.1, 4. III.3, 4. III.5,

Gamma decay: Introduction

SBP: 4. IV. 1

3. Build a nucleus using PhET simulations <https://phet.colorado.edu/en/simulations/build-a-nucleus>

2. **Nuclear Models:** Liquid drop model, Weizsacker's semi-empirical mass formula, Mass parabolas - Prediction of stability against beta decay for members of an isobaric family SBP: 5.1, 5.3, 5.4

UNIT II: Nuclear Energy, Force and Elementary Particles

1. **Nuclear energy:** Introduction, Energy released in fission of U^{235} , Fission chain reaction, Nuclear reactors(Qualitative)

SBP : 6.1, 6.5, 6.7, 6.9

Particle Accelerators: Cyclotron and Idea of Large Hadron Collider (Qualitative)

SBP: 1.I.4

<https://home.cern/science/accelerators/large-hadron-collider>

2. **Nuclear force and Elementary particles:** Introduction, Meson theory of Nuclear Force.

SBP: 8.1, 8.6

Elementary particles: Introduction, Classification of elementary particles, Conservation laws (linear & angular momentum, energy, charge, baryon number & lepton number)

DCT: 18.1, 18.2, 18.4

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

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

Format of Question Paper

Question No	Nature of Questions	Marks
Q1 Unit I	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
Q2 Unit II	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
		Total 30

2. Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Tests	10
2.	Classroom activity participation (worksheet / open book test)	10
		Total 20

11

REFERENCE BOOKS:

1. SBP: Nuclear Physics, S.B. Patel (New Age International P. Ltd.).
2. IK: Nuclear Physics, Irving Kaplan (2nd Ed.) (Addison Wesley).
3. DCT: Nuclear Physics, D. C. Tayal (Himalayan Publishing House) (5th Ed.)
4. AB: Concepts of Modern Physics: Arthur Beiser, Shobhit Mahajan, S Rai Choudhury (6th Ed.) (TMH).

Additional Reference Books:

1. SNG: Nuclear Physics, S. N. Ghoshal (S. Chand & Co.)
2. Modern Physics: Kenneth Krane (2nd Ed.), John Wiley & Sons.
3. Atomic & Nuclear Physics: N Subrahmanyam, Brij Lal. (Revised by Jivan Seshan.) S. Chand.
4. Introduction to Elementary Particles: David Griffith, Second Revised Edition, Wiley VCH.

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

**Third Year B. Sc.
(Physics)**

Semester VI

**Title: Special Theory of Relativity
Vertical - 1**

Major – 2 Credit

**with effect from
Academic Year 2026-2027**

Title: Special Theory of Relativity

Course Code: CHMPHYVI3

Sr. No.	Heading	Particulars
1	Description of the Course:	This course introduces students to the essence of special relativity which revolutionized the concept of physics in the last century by unifying space and time, mass and energy, electricity and magnetism. This course also gives a very brief introduction of general relativity.
2	Vertical 1	Major
3	Type Teaching Method	Theory Lecture/ discussion/ presentation
4	Credit	2
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	<p>Course Objectives: The students are expected to</p> <p>CO(A)1. familiarise with the Michelson-Morely experiment, Lorentz Fitzgerald contraction hypothesis, and ether drag hypotheses</p> <p>CO(A)2. apply mathematical formulation of special theory of relativity through Lorentz transformations (space and time, velocity, momentum and energy, electric and magnetic fields), and its consequences (time dilation, length contraction velocity addition)</p> <p>CO(A)3. introduce and explain the concept of relativistic mass and how it modifies the classical definitions of momentum and force in the context of special relativity</p> <p>CO(A)4. learn concept of general relativity, equivalence principle, gravitational redshift, blueshift, and pulsars, quasars and blazars</p> <p>CO(A)5. apply the concept and solve numerical problems involving length contraction, time dilation, velocity addition, Doppler effect, relativistic mass, energy, momentum, transformations, and astrophysical phenomena.</p>	
8	<p>Course Outcomes: Upon completion of the course, student will be able to:</p> <p>CO1 explain the significance of Michelson-Morely experiment and limitations of classical mechanics.</p> <p>CO2 derive and apply Lorentz transformation equations to space, time, velocity, momentum and energy, and electric and magnetic fields.</p> <p>CO3 solve problems based on relativistic consequences such as time dilation, length contraction, Doppler effect, velocity addition, relativistic momentum, and energy</p> <p>CO4 demonstrate the relationship between mass and energy, analyze relativistic momentum and energy.</p> <p>CO5 explain the principle of equivalence, general relativity, and phenomena like gravitational redshift</p>	

Syllabus**Unit I: Relativistic Kinematics**

- Review: Inertial and Non-inertial frames of reference, invariance of physical quantity, Galilean transformation, Newtonian relativity, Conflict of Newtonian mechanics with electromagnetism.)
- Michelson-Morely experiment (omit derivation part);
- Lorentz Fitzgerald length contraction hypothesis,
- Ether drag hypothesis (conceptual) ;
- Postulates of the special theory of relativity,
- Concept of Simultaneity,
- Derivation of Lorentz transformation equations of space and time co-ordinates (Space-Time Equivalence),
- Inverse Lorentz transformation equations(omit derivation part) ,
- Relativistic Length contraction(space contraction) and related problem solving,
- Relativistic Time dilation related problem solving;
- The Relativistic addition of velocities and related problem solving,
- Aberration and Doppler effect in relativity;
- Space –time diagrams,
- Twin paradox;
- Application: GPS Technology.

RR 1.5-1.7, 1.9, 2.1-2.3, 2.6-2.7, A1, B1, B2

Unit II: Relativistic Dynamics and Electromagnetism

- (Review: Newton's law of motion and momentum conservation, Energy conservation in classical mechanics, Basic of electric and magnetic fields.)
- Concept of relativistic mass (omit derivation),
- Relativistic definition of momentum and force;
- Einstein's Mass-Energy relation ($E = mc^2$)
- Relativistic force law and the dynamics of a single particle
- Relativistic theory of energy and linear momentum
- Relativistic concept of longitudinal mass and transverse mass

- The transformation properties of momentum, energy, mass;
- The transformation equation of force (omit derivation);
- The interdependence of Electric and Magnetic fields,
- The transformation for E and B;
- Electric and magnetic field intensities of an uniformly moving point charge;
- The principle of equivalence and brief introduction to general relativity;
- Gravitational red shift, blue shift, pulsars, quasars ,blazars,
- Problem based on all above topics.
- AI application in relativistic phenomena (Gravitational waves, black hole imaging)

RR 3.2-3.3, 3.5, 3.7, 4.2 -4.4, C2, C3

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

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

Format of Question Paper

Question No	Nature of Questions	Marks
Q1 Unit I	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
Q2 Unit II	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
		Total 30

2.Internal Examination: Continuous Evaluation - 20 marks

	Assessment/ Evaluation	Marks
1	Tests	10
2	Classroom activity participation (worksheet / open book test)	10
		Total 20

11

REFERENCES:

1. **Reference Books:**

1. RR: Introduction to Special Relativity Wiley India Pvt. Ltd. by Robert Resnick (Student Edition)

3. **Additional Reference Books:**

1. The Special Theory of Relativity PHI PVT Ltd by Srirajan Banarji & Asit Banerjee
2. A Prime of Special Relativity New Age International Publisher by P. L. Sardesai.
3. Special theory of Relativity CRC Press by A. P. French.
4. Concepts of Modern Physics 6th Edition McGraw Hill by Arthur Beiser.

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

**Third Year B. Sc.
(Physics)**

Semester-VI

Title: Electronics

**Vertical - 1
Major Subject – 2 Credit**

**with effect from
Academic Year 2026-2027**

Title: Electronics
Course Code: CHMPHYVI4

Sr. No.	Heading	Particulars
1	Description the Course:	This course introduces students to the basics of semiconductor devices JFET, MOSFET, SCR and UJT. The learners will learn about OP-AMP applications. They will be introduced to basic concepts of transistor multivibrators, 555 timer and its applications. They will acquire a fundamental understanding of regulated power supplies. The learners will be able to visualize electronic circuits in real time using computational tools.
2	Vertical 1	Major
3	Type Teaching Methods	Theory Lecture/discussion/presentations
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1. To learn about basics of semiconductor devices JFET, MOSFET, SCR and UJT, its characteristics, biasing, specification parameters and its applications.. CO(A)2. To learn about OP-AMP applications. CO(A)3. To learn about basics concepts of transistor multivibrators, timing pulse generation, 555 timer and its applications. CO(A)4. To learn about explain regulated power supplies its characteristics and its types. CO(A)5. To learn about electronic circuits in real time using computational tools.	
8	Course Outcomes: Upon completion of the course, student will be able to: CO1 Gain the basic knowledge of semiconductor devices JFET, MOSFET, SCR and UJT and its applications. CO2 Understand about OP-AMP applications. CO3 Comprehend knowledge of transistorized multivibrators, multivibrators using 555 timer and its applications. CO4 Acquire a fundamental understanding of regulated power supply, shunt and series regulator CO6 Visualize and understand electronic circuits in real time using computational tools	

UNIT I: Transistors and SCR

Field Effect Transistor: Introduction of JFET, Advantages and disadvantages of JFET over BJT, Classification of FET , Construction of n-channel and p- channel JFET, Biasing of JFET: biasing in ohmic region (Gate bias), biasing in active region (self-bias), Operation of n-channel JFET, JFET characteristics: Drain characteristics (output characteristics), Transfer characteristics, parameters of JFET (dynamic resistance(r_d), Transconductance (g_m) and amplification factor) , Applications of JFET, JFET as common source amplifier , JFET as analog Switch, JFET as voltage variable resistor (VVR).

MB: 11.1 to 11.9 2.

MOSFET: Circuit symbol and construction of n-channel and p-channel MOSFET, Principle of operation and characteristics of n-channel Depletion and Enhancement mode MOSFET, digital switching (Analog, Digital and Switching circuits).

MB: 12.1, 12.2, 12.4, 12.6 3.

SCR: Construction (structure & circuit symbol), operation of SCR, firing and Gate triggering of SCR, characteristics of SCR, specification parameters of SCR. AM: 28.1

UJT: Circuit symbol & construction of UJT, operating principle, characteristics of UJT, specification parameters of UJT and relaxation oscillator.

AM: 28.5

UNIT II: Amplifiers, Multivibrators and Power Supplies

Transistor multivibrator: Astable, Monostable and Bistable multivibrators

AM: 18.11

Op-AMP applications: log amplifier, instrumentation amplifier, square and triangular wave generator using OP-AMP and Wien-Bridge oscillator using OP-AMP.

MB: 15.1 to 15.5 KVR: 13.3.1, 13.4.2, 14.3.4.2, 14.5.2.2, 14.5.3 2.

555 Timer: Functional block diagram, Monostable and Astable operation, Application of 555 timer: voltage-controlled oscillator, Ramp generator, pulse width modulator and pulse position modulator

MB: 21.7, 21.8, 21.9.5

Regulated Power supplies: supply characteristics, Voltage regulator parameter, Basic configurations of voltage regulator, Shunt and series regulators, short circuit protection.

MB: 22.1, 22.2, 22.3, 22.4, 22.5

Use of Computational Tools in Electronics: Use of computational tools like Falstad circuit simulator to visualize electronic circuits in real time.

10**Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

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

Format of Question Paper

Question No	Nature of Questions	Marks
Q1 Unit I	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
Q2 Unit II	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
		Total 30

2. Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Tests	10
2.	Classroom activity participation (worksheet / open book test)	10
		Total 20

11**REFERENCE BOOKS:**

1. MB: Electronic Principles, Malvino & Bates -7th Edition TMH Publication.
2. AM: Electronic Devices and Circuits, Allen Mottershead -PHI Publication.
3. KVR: Functional Electronics, K.V. Ramanan-TMH Publication

Additional References:

1. RYB: Basics Electronic Devices and Circuits – R. Y. Borse
2. VKM: Principles of Electronics: V.K. Mehta & Rohit Mehta, Multicolour Illustrative Edition, S. Chand & Company
3. ML: Digital Principles and Applications, Malvino and Leach (4th Edition) (TMH).
4. <https://www.falstad.com/circuit/>

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

**Third Year B. Sc.
(Physics)**

Semester-VI

Title: Atomic and Molecular Physics

**Vertical - 1
Major Subject – 2 Credit**

**with effect from
Academic Year 2026-2027**

Title: Atomic and Molecular Physics

Course Code:CHMPHYVI5

Sr. No.	Heading	Particulars
1	Description the Course:	This course introduces students to the basic concepts of Atomic Physics and Molecular Physics. It includes application of Quantum Mechanics in Atomic Physics, concept of electron spin, vector atom model, effect of magnetic field on atomic spectra, Molecular spectroscopy of diatomic molecules, Raman Spectroscopy, NMR, ESR and their applications..
2	Vertical 1	Major
3	Type Teaching Methods	Theory Lecture/discussion/presentations
4	Credit	2 Credits
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives:	<p>CO(A)1.To apply quantum mechanics concepts in atomic physics.</p> <p>CO(A)2.To study effect of magnetic field on atoms and its application</p> <p>CO(A)3.To study vector atom model to understand atomic spectra.</p> <p>CO(A)4.develop problem-solving skills in applying quantum mechanical tools to atomic and molecular systems</p> <p>CO(A)5. This course will be useful to get an insight into atomic and molecular spectroscopy and their applications.</p>
8	Course Outcomes:	<p>Upon completion of the course, student will be able to:</p> <p>CO1: explain the quantum mechanical model of atoms, the origin of quantized energy levels, and the significance of quantum numbers</p> <p>CO2 :describe the effects of external fields (Zeeman effect) on atomic spectra</p> <p>CO3: learn the theory and apply the methods of atomic and molecular spectroscopy (discrete energy levels, rotational, vibrational, electronic transitions, molecular spectra) to analyze them.</p> <p>CO4 : interpret rotational, vibrational, and electronic spectra of diatomic molecules</p> <p>CO5 : comprehend the practical applications of Atomic and Molecular Spectroscopy.</p>

UNIT I: Hydrogen Atom and Spin Orbit Coupling**Unit I**

1. Hydrogen atom: Schrödinger's equation for Hydrogen atom, Separation of variables, Quantum Numbers, Angular momentum, Space quantization, Stern Gerlach Experiment (Review), Pauli Exclusion principle, Symmetric and Anti-symmetric wave functions

B: 9.1, 9.2, 9.3, 9.8, 10.1, 10.3

Study of hydrogen atom models by using PhET simulations

2. Spin orbit coupling, Total angular momentum, Vector atom model: L-S and j-j coupling, the normal Zeeman effect, Quantum theory of Zeeman Effect, Anomalous Zeeman effect, The Lande g – factor (Review)

B: 10.2, 10.7, 10.8, 10.9,

SA: 9.14, 9.15, 9.16, 9.17

UNIT II: Molecular physics

1. Molecular spectra (Diatomic Molecules): Rotational energy levels, Rotational spectra, Vibrational energy levels, Vibrational spectra, Electronic Spectra & the Franck Condon principle
Infrared spectrometer

B: 14.1, 14.3, 14.5, 14.8

GA: 7.16

2. Raman effect: Quantum Theory of Raman effect, Pure Rotational Raman spectra of linear molecules, Raman activity of vibrations, Experimental set up of Raman Effect BM: 4.1, 4.1.1, 4.2.1, 4.3.1

GA: 8.6

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

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

Format of Question Paper

Question No	Nature of Questions	Marks
Q1 Unit I	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
Q2 Unit II	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
		Total 30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Tests	10
2.	Classroom activity participation (worksheet / open book test)	10
		Total 20

11

REFERENCE BOOKS:**Reference Books:**

- B:** Perspectives of Modern Physics: Arthur Beiser (McGraw Hill)
- SA:** Introduction to Atomic & Nuclear Physics: H. Semat & J. R. Albright (5th Ed.) Chapman & Hall
- GA:** Molecular structure and spectroscopy: G Aruldas (2nd Ed) PHI learning Pvt Ltd.
- BM:** Fundamentals of Molecular Spectroscopy: C. N. Banwell & E. M. McCash (TMH) (4th Ed.)

Additional References Books:

- Atomic Physics (Modern Physics): S. N. Ghoshal. S. Chand Publication
- <https://phet.colorado.edu/en/simulations/models-of-the-hydrogen-atom>

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

**Third Year B. Sc.
(Physics)**

Semester VI

**Title: Physics Major Practical-VII
Vertical - 1**

Physics Major Practical VII– 2 Credit

**with effect from
Academic Year 2026-2027**

Title: Physics Major Practical -VII

Course Code: CHMPHYVI6

Sr. No.	Heading	Particulars
1	Description of the Course:	This course introduces students to the basic skills of experiments in Physics by understanding relevant concepts and by using the laboratory equipment.
2	Vertical 1	Major
3	Type Teaching Method	Practical
4	Credit	2
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1.To learn the skills while performing experiments. CO(A)2.To learn the use of various laboratory equipment without fear and hesitation. CO(A)3.To learn the concepts of physics theory and their practical application CO(A)4.To learn the errors and their estimation.	
8	Course Outcomes: Upon completion of the course, student will be able to: CO1 practice the skills to perform experiments. CO2 use the apparatus without fear & hesitation. CO3 correlate the physics theory concepts to practical application. CO4 apply the concept of errors for their estimation after performing the experiment.	

9	Syllabus
	List of Experiments: <ol style="list-style-type: none">1. Surface tension of mercury by Quincke's method2. Thermal conductivity by Lee's method3. Lloyd's single mirror: determination of wavelength4. Determination of Planck's Constant by using Photo electric cell5. To determine the coefficient of Thermal Conductivity of Cu by Searle's Method.6. JFET as switch (series and shunt)7. JFET as a common source amplifier

8. Study of JFET characteristics
9. UJT characteristics
10. SCR characteristics
11. To determine the wavelength of Laser using Plane Diffraction Grating.
12. De-Sauty's bridge for capacitance measurement.

List of Demonstration Experiments:

1. Open CRO, Power Supply, and Signal Generator: Discuss block diagram. (using simulation as well as physical)
2. Data sheet reading for diodes, Transistor, Op amp and Optoelectronic devices.
3. Circuit designing – single stage amplifier, Transistor Multivibrator etc. and testing on breadboard
4. Use of LCR meter
5. Constant deviation spectrometer (CDS)
6. Transformer (theory, construction and working), types of transformers and energy losses associated with them.

Note:

1. **Minimum 8 experiments from the list of experiments and minimum 4 demo experiments must be completed and reported in the journal.**
2. **Exemption:** Exemption of two experiments may be given, if student carries out any one or more than one of the following activities:
 - If the student collects & reports the information of at least five Physicists with their work or any three events on physics, in the journal.
 - If the student executes a mini project to the satisfaction of teacher in-charge of practical.
 - If the student participates in a study tour or visit & submit a study tour report.
3. A separate index and certificate in journal is must for each semester course.

General Instructions:

4. All the measurements and readings should be written with proper units in SI system only.
5. After completing all the required number of experiments in the semester and recording them in journal, student will have to get their journal certified and produce the certified journal at the time of practical examination to be eligible to appear in the Semester End Practical Examination
6. While evaluating practical, weightage should be given to diagram, observations, tabular representation, experimental skills and procedure, graph, calculation and result.
7. Skill of doing the experiment and its concepts should be more important than the accuracy of result.

Instruction Regarding Semester End Practical Examination

1. For practical examinations, the learner will be examined in **One experiment** from the list of experiments.
2. Evaluation in viva voce will be based on regular experiments and demo experiments.

3. A candidate will be allowed to appear for the Semester End Practical Examination only if the candidate submit a certified journal at the time of practical examination or provide a certificate from the Head of the Department / Institute to the effect that the candidate has completed the practical course of that semester of T.Y.B. Sc. Physics as per the minimum requirement

10

**Scheme of Examination and Assessment Pattern
Paper – 50 Marks**

- **Semester End Practical Examination - 30 marks Time: 3hours**

	Assessment / evaluation	Marks
	One Experiment	20
	Viva-voce	05
	Journal	05
	Total	30

- **Internal Examination: - 20 marks**

	Assessment / evaluation	Marks
	Test based on demo experiment	10
	Demo experiment (journal)	05
	Overall performance	05
	Total	20

REFERENCES:

1. Advanced course in Practical Physics: D. Chattopadhyaya, PC. Rakshit & B. Saha (8th Edition) Book & Allied (P) Ltd.
2. BSc Practical Physics: Harnam Singh. S. Chand & Co. Ltd. – 2001.
3. A Text book of Practical Physics: Samir Kumar Ghosh New Central Book Agency (4th edition).
4. B Sc. Practical Physics: C. L. Arora (1st Edition) – 2001 S. Chand & Co.
5. Practical Physics: C. L. Squires – (3rd Edition) Cambridge Univ. Press.
6. University Practical Physics: D C Tayal, Himalaya Publication.
7. Advanced Practical Physics: Worsnop & Flint.

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

**Third Year B. Sc.
(Physics)**

Semester VI

**Title: Physics Major Practical-VIII
Vertical - 1**

Physics Major Practical VIII– 2 Credit

**with effect from
Academic Year 2026-2027**

Title: Physics Major Practical -VIII

Course Code: CHMPHYVI7

Sr. No.	Heading	Particulars
1	Description of the Course:	This course introduces students to the basic skills of experiments in Physics by understanding relevant concepts and by using the laboratory equipment.
2	Vertical 1	Major
3	Type Teaching Method	Practical
4	Credit	2
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives: CO(A)1.To learn the skills while performing experiments. CO(A)2.To learn the use of various laboratory equipment without fear and hesitation. CO(A)3.To learn the concepts of physics theory and their practical application CO(A)4.To learn the errors and their estimation.	
8	Course Outcomes: Upon completion of the course, student will be able to: CO1 practice the skills to perform experiments. CO2 use the apparatus without fear & hesitation. CO3 correlate the physics theory concepts to practical application. CO4 apply the concept of errors for their estimation after performing the experiment.	

List of Experiments:

1. OPAMP as monostable multivibrator
2. OPAMP as astable multivibrator
3. Schmitt Trigger using OP – AMP
4. Application of IC 555 as a voltage to frequency converter
5. 555 Timer as astable Multivibrator
6. 555 Timer as monostable Multivibrator
7. Application of IC 555 as Voltage to Time Converter
8. Design and study of transistorized monostable multivibrator
9. LM-317 as Current regulator
10. UJT as a Relaxation Oscillator
11. Study of Pulse modulation
12. Study of Pulse width modulation

List of Demonstration Experiments:

1. Michelson Interferometer (YouTube video)
2. h/e vacuum photocell
3. Study of Hall effect (YouTube video)
4. Digital storage Oscilloscope (DSO)
5. Absorption spectrum of specific liquids
6. Study of diffraction using CD/DVD .

Note:

1. **Minimum 8 experiments from the list of experiments and minimum 4 demo experiments must be completed and reported in the journal.**
2. **Exemption:** Exemption of two experiments may be given, if student carries out any one or more than one of the following activities:
 - If the student collects & reports the information of at least five Physicists with their work or any three events on physics, in the journal.
 - If the student executes a mini project to the satisfaction of teacher in-charge of practical.
 - If the student participates in a study tour or visit & submit a study tour report.
3. A separate index and certificate in journal is must for each semester course.

General Instructions:

1. All the measurements and readings should be written with proper units in SI system only.
2. After completing all the required number of experiments in the semester and recording them in journal, student will have to get their journal certified and produce the certified journal at the time of practical examination to be eligible to appear in the Semester End Practical Examination
3. While evaluating practical, weightage should be given to diagram, observations, tabular representation, experimental skills and procedure, graph, calculation and result.
4. Skill of doing the experiment and its concepts should be more important than the

accuracy of result.

Instruction Regarding Semester End Practical Examination

1. For practical examinations, the learner will be examined in **One experiment** from the list of experiments.
2. Evaluation in viva voce will be based on regular experiments and demo experiments.
3. A candidate will be allowed to appear for the Semester End Practical Examination only if the candidate submit a certified journal at the time of practical examination or provide a certificate from the Head of the Department / Institute to the effect that the candidate has completed the practical course of that semester of T.Y.B. Sc. Physics as per the minimum requirement

10

**Scheme of Examination and Assessment Pattern
Paper – 50 Marks**

- **Semester End Practical Examination - 30 marks Time: 3hours**

	Assessment / evaluation	Marks
	One Experiment	20
	Viva-voce	05
	Journal	05
	Total	30

- **Internal Examination: - 20 marks**

	Assessment / evaluation	Marks
	Test based on demo experiment	10
	Demo experiment write up	05
	Overall performance	05
	Total	20

REFERENCES:

1. Advanced course in Practical Physics: D. Chattopadhyaya, PC. Rakshit & B. Saha (8th Edition) Book & Allied (P) Ltd.
2. BSc Practical Physics: Harnam Singh. S. Chand & Co. Ltd. – 2001.
3. A Text book of Practical Physics: Samir Kumar Ghosh New Central Book Agency (4th edition).
4. B Sc. Practical Physics: C. L. Arora (1st Edition) – 2001 S. Chand & Co.
5. Practical Physics: C. L. Squires – (3rd Edition) Cambridge Univ. Press.
6. University Practical Physics: D C Tayal, Himalaya Publication.
7. Advanced Practical Physics: Worsnop & Flint.

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

**Third Year B. Sc.
(Physics)**

Semester VI

Title: Electronic instrumentation -II

Vertical - 1

Elective – 2 Credit

**with effect from
Academic Year 2026-2027**

Title: Electronic Instrumentation-II

Course Code: CHMPHYVI8

Sr. No.	Heading	Particulars
1	Description of the Course:	Introduction, relevance, Usefulness, Application, interest, connection with other courses, demand in the industry, job prospects etc.
2	Vertical 1	Elective
3	Type Teaching Method	Theory
4	Credit	2
5	Hours allotted	30 Hours
6	Marks allotted	50 Marks
7	Course Objectives: The students are expected to: CO(A)1. Analyze/design and implement combinational logic circuits.. CO(A)2. Understand architecture, silent features, instruction set, and programming of microprocessor 8085. CO(A)3. Develop the programming skills in C++ language and learn debugging the C++ programs. CO(A)4. Learn programming using cursor ai	
8	Course Outcomes: Upon completion of the course, student will be able to: CO1: design simple combinational logic circuits such as multiplexers, decoders, and encoders. CO2: Write and execute simple assembly language programs of microprocessor 8085 CO3: write Simple programs in C++ using variables, control structures, functions, and operators. CO4: use cursor ai for programming.	
9	Unit I: Digital Electronics	

- **Combinational Logic Design:** Introduction, Boolean identities, K – map (2, 3 and 4 variable), **Ref: N G P 4.1 – 4.8.**
- **Design and implementations of:** Decoders, Encoders, Multiplexers, Demultiplexers, use of MUX and DEMUX in Combinational Logic design. Code Converters (based on – binary, BCD, Gray and Excess – 3 codes). Tri-State logic, buffers, D latch. **Ref: N G P - 5.1 (only introduction), 5.3, 7.1 -7.6 (except 7.5) RPJ - 4.20. RG: 3.5.1, 3.5.2, 3.5.3, 3.5.4 & 3.5.5**
- **8085 Microprocessor:** Introduction, Features of Inter 8085, Pin Diagram of 8085, 8085 CPU Architecture, Arithmetic and Logical Group (ALU, Accumulator, Temporary Register, Flag Register (PSW)), Register Group (Temporary Registers (W and Z), General purpose registers, Special Purpose registers).
- **8085 Instruction Set:** Introduction, Flowchart, Classification of Instruction Set (Data Transfer Group, Arithmetic Group, Logical Group, Branching Group, Stack and Machine Control Group), Notations used in Instructions and Opcode, Data Transfer Group, Program Examples for Data Transfer Group, Arithmetic Operation Group, Branch Group, Logical Group, Addressing Modes, 8085 Programmers Model.0
RG: 1.1.2, 1.1.3, 1.2, 1.3, 2.1-2.6, 3.1

Unit II: Basic Concepts of Object- O r i e n t e d Programming and C++

- Basic concepts of Object-Oriented Programming, Benefits of OOP, Object- Oriented Languages, Applications of OOP. What is C++?, Applications of C++, A simple C++ program, More C++ Statements, Example with Class, Structure of C++ Program, Creating the Source File, Compiling and Linking. Learn Programming using cursor ai
Ref EB: 1.5, 1.6, 1.7 & 1.8 EB: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7 & 2.8
- Introduction, Tokens, Keywords, Identifiers and Constants, Basic Data Types, User-Defined Data Types, Derived Data Types, Symbolic Constants, Type Compatibility, Declaration of Variables, Dynamic Initialization of Variables, Reference Variables, Operators in C++, Scope Resolution Operator, Member Dereferencing Operators, Memory Management Operators, Manipulators, Type Cast Operator, Expressions and Their Types, Special Assignment Expressions, Implicit Conversions, Operator Overloading, Operator Precedence.
Ref EB: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14, 3.15, 3.16, 3.17, 3.18, 3.19, 3.20, 3.21, 3.22 & 3.23
- Control Structures, Functions: The Main Function, Function Prototyping, Call by Reference, Return by Reference, Inline Functions, Default Arguments, Constant Arguments, Function Overloading, Math Library Functions.
Ref EB: 3.24, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9 & 4.11

10**Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

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

Format of Question Paper

Question No	Nature of Questions	Marks
Q1 Unit I	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
Q2 Unit II	Attempt any Three out of Six (5 Marks each) Fill in the blanks, answer in one sentence, short answer, numerical problems	15
		Total 30

2. Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Tests	10
2.	Classroom activity participation (worksheet / open book test)	10
		Total 20

11**Reference Books:**

1. R. P. Jain, Modern Digital Electronics, Tata McGraw Hill, 4th Edition.
2. Digital principles and applications: A.P. Malvino and D. P. Leach. Tata McGraw-Hill.
3. RG: Microprocessor Architecture, Programming and Applications with the 8085, Ramesh Gaonkar, 5th Edition.
4. EB: Object Oriented Programming with C++ by E Balagurusamy, Third / Fourth Edition, Tata McGraw-Hill Publishing Company Limited.

Additional Reference Books:

1. Microprocessor and Applications by Vibhute and Borole, Techmax Publications.
2. Microprocessor, Principles & Applications by Gilmore (2nd Ed) TMH.
3. Programming with C++ by D. Ravichandran, Tata McGraw-Hill Publishing Company Limited.
4. Starting out with C++ by Tony Gaddis, Third Edition, Addison Wesley Publishing Company.
5. Digital Electronics - by A.P Godse & D.A Godse Technical publications, Pune, Revised third edition, 2008. Pg. No:2.25-2.70 (for K-maps).

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

**Third Year B. Sc.
(Physics)**

Semester VI

Title: Electronic Instrumentation Practical-II

Vertical -1

Elective- 2 credits

**with effect from
Academic Year 2026-2027**

Title: Electronic Instrumentation Practical- II

Course Code: CHMPHYVI9

Sr. No.	Heading	Particulars
1	Description of the Course:	Introduction, Relevance, Usefulness, Application, Interest, Connection with other courses, Demand in the Industry, Job Prospects etc.
2	Vertical 1	Elective
3	Type Teaching Method	Practical
4	Credit	2
5	Hours allotted	60 Hours
6	Marks allotted	50 Marks
7	Course Objectives: The students are expected to CO(A)1. Understand digital circuits like decoders, encoders, multiplexers, and their applications. CO(A)2. Understand architecture, instruction set, data manipulation and memory operations of 8085 microprocessor. CO(A)3. Develop programming skills in C++ using loops, conditions, and functions CO(A)4. Learn programming using cursor ai	
8	Course Outcomes: Upon completion of the course, student will be able to: CO1: design and implement combinational logic circuits like decoders, encoders, multiplexers, and demultiplexers. CO2: Write and execute assembly language programs for 8085 Microprocessor.. CO3: Write and execute simple C++ programs using input/output, loops, and control structure statements. CO4: use cursor ai for programming.	

9

List of Experiments:

1. Study of 3:8 Decoder (74LS138), 8:3 Priority Encoder (74LS148) and their applications.
2. Study of 8:1 Multiplexer (74LS151), 1: 4 De-multiplexer (74LS155) and their applications.
3. Study of unidirectional buffer (74LS244) and bidirectional buffer (74LS245).
4. Design using K –map and implement 4:1 MUX, 1:4 DEMUX, 2bit comparator, Full adder and Full subtractor. [Note: Use suitable circuit simulator for implementation]
5. Designing (using K –map) and implementation of code convertors. (any two – Binary to Gray, Gray to Binary, BCD to Excess – 3 and Excess-3 to BCD)
6. 8085 Microprocessor: Write an assembly language program for code conversion (any two).
7. Write An ALP: a) To Evaluate simple arithmetic Expression (like $Y = a \times b + c \times d$ where a, b, c and d are 8-bit HEX numbers) b) To Add parity bit to 7-bit ASCII characters.
8. 8085 Microprocessor: 8-bit data manipulation (Addition, subtraction, and multiplication).
9. 8085 Microprocessor: Arrange a given data in ascending/descending order.
10. 8085 Microprocessor: Transfer data from one memory block to another memory block.
11. 8085 Microprocessor: 16-bit Data manipulation (Addition, subtraction).
12. C++
 - (a) Program based on Input, Output Statements. (Programs to read any two numbers through keyboard and to perform simple arithmetic operations and to display the result
 - (b) Program based on Control Statements
 - (i) Program based on if-else statement
 - (ii) Program based on nested if statement
13. C++:
 - (a) Program based on for loop, while loop and do-while loop.
 - (b) Program using switch statements and if-else ladder.
14. C++: Program to study function declaration, function calling and function prototype.

Note:

1. **Minimum 8 experiments from the list of experiments and minimum 4 skill experiments must be completed and reported in the journal.**
2. A separate index and certificate in journal is must for each semester course.

General Instructions:

1. All the measurements and readings should be written with proper units in SI system only.
2. After completing all the required number of experiments in the semester and recording them in journal, student will have to get their journal certified and produce the certified journal at the time of practical examination to be eligible to appear in the Semester End Practical Examination
3. While evaluating practical, weightage should be given to diagram, observations, tabular representation, experimental skills and procedure, graph, calculation and result.
4. Skill of doing the experiment and its concepts should be more important than the accuracy of result.

Instruction Regarding Semester End Practical Examination

1. For practical examinations, the learner will be examined in **One experiment** from the list of experiments.
2. Evaluation in viva voce will be based on regular experiments and skill experiments.
3. A candidate will be allowed to appear for the Semester End Practical Examination only if the candidate submit a certified journal at the time of practical examination or provide a certificate from the Head of the Department / Institute to the effect that the candidate has completed the practical course of that semester of T.Y.B. Sc. Physics as per the minimum requirement.

10

**Scheme of Examination and Assessment Pattern
Paper – 50 Marks**

- **Semester End Practical Examination - 30 marks Time: 3hours**

	Assessment / evaluation	Marks
	One Experiment	20
	Viva-voce	05
	Journal	05
	Total	30

- **Internal Examination: - 20 marks**

	Assessment / evaluation	Marks
	Skill testing related any One Experiment	10
	Overall performance	05
	Viva-voce	05
	Total	20

11

Reference Books:

1. R. P. Jain, Modern Digital Electronics, Tata McGraw Hill, 4th Edition. 2. Digital principles and applications: A.P. Malvino and D. P. Leach. Tata McGraw Hill.

3. RG: Microprocessor Architecture, Programming and Applications with the 8085, Ramesh Gaonkar, 5th Edition.

4. EB: Object Oriented Programming with C++ by E Balagurusamy, Third / Fourth Edition, Tata McGraw-Hill Publishing Company Limited.

Additional Reference Books:

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4. Starting out with C++ by Tony Gaddis, Third Edition, Addison Wesley Publishing Company.

5. Digital Electronics - by A.P Godse & D.A Godse Technical publications, Pune, Revised third edition, 2008. Pg. No:2.25-2.70 (for K-maps)

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

**Third Year B. Sc.
(Physics)**

Semester VI

Title: On Job Training

Vertical -6

Elective- 2 credits

**with effect from
Academic Year 2026-
2027**

Title: On Job Training
Course Code: CHMPHYVI10

Sr. No.	Heading	Particulars
1	Description of the Course:	Introduction, Relevance, Usefulness, Application, Interest, Connection with other courses, Demand in the Industry, Job Prospects etc.
2	Vertical 6	OJT
3	Type Teaching Method	Training
4	Credit	4
5	Hours allotted	120 Hours
6	Marks allotted	50 Marks
7	Course Objectives: The students are expected to <ol style="list-style-type: none"> 1. CO(A)1. Appreciate the relevance of subject of Physics as practical application. 2. CO(A)2. Learn application of Physics in industry/ educational institution/NGO. 3. CO(A)3. Get work experience by using the acquired knowledge 	
8	Course Outcomes: Upon completion of the course, student will be able to: CO1: understand the practical application of Physics CO2: apply the skills to implement the theoretical knowledge in physical world. CO3: work in industry/ educational institution/NGO etc.	

9	Syllabus Learners may undertake OJT in the following categories: <ol style="list-style-type: none"> 1. Industrial: Engagement with industries, companies, public sector institution etc. 2. Social: NGOs, community organizations etc. 3. Research: research projects in laboratories, academic centres etc.
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Scheme of Examination and Assessment Pattern

Paper – 50 Marks

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

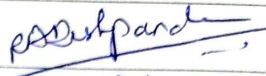




Format of Question Paper

Sr. No	Assessment/ evaluation	Marks
1	Quality of presentation and communication	15
2	OJT Report	15
		Total 30


2. Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Completion of 120 hours	10
2.	Performance during OJT	10
		Total 20


Board of studies (BoS) Physics

Sr. No.	Name of the Faculty	Designation and College	Signature
1	Dr. Rashmi Deshpande	Associate Professor Smt. CHM College	
2	Mrs. Geetha Nair	Associate Professor Smt. CHM College	
3	Dr. Preyoshi Bose	Assistant Professor Smt. CHM College	
4	Mr. Sarang Kavali	Assistant Professor Smt. CHM College	
5	Dr. Smita Kale	Assistant Professor Smt. CHM College	
6	Dr. Anita Ravi	Associate Professor K.C. College	
7	Dr. Manoj Mahajan	Assistant Professor V. G. Vaze College	
8	Mr. Pritesh Randive	Scientific Officer HBCSE (TIFR)	

Name & Signature of the BoS Chairperson: _____


Dr. Rashmi Deshpande
Associate Professor

Name & Signature of the BoS Chairperson: _____


Dr. Neena Anand
Associate Professor

