

B.Sc., PHYSICS

SYLLABUS

Programme Code: 3USPHY



2026-2029

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)

(Affiliated to Bharathidasan University, Tiruchirappalli)
(Accredited by NAAC)
SUNDARAKKOTTAI, MANNARGUDI – 614 01,
THIRUVARUR (Dt.), TAMIL NADU, INDIA.



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TAMILNADU, INDIA.

B.Sc., PHYSICS

CHOICE BASED CREDIT SYSTEM – LEARNING OUTCOMES BASED CURRICULUM

FRAME WORK (CBCS – LOCF)

(For the candidates admitted in the academic year 2026 – 2027)

CHOICE BASED CREDIT SYSTEM

The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a 'cafeteria' type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning. Our College has moved to CBCS and implemented the grading system.

OUTCOME - BASED EDUCATION (OBE)

LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)

The fundamental premise underlying the learning outcomes-based approach to curriculum planning and development is that higher education qualifications are awarded on the basis of demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes and values) and academic standards expected of graduates of a programme of study. Learning outcomes specify what graduates completing a particular programme of study are expected to know, understand and be able to do at the end of their programme of study. The expected learning outcomes are used as reference points that would help to formulate graduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes which in turn will help in curriculum planning and development, and in the design, delivery and review of academic programmes. They provide general guidance for articulating the essential learnings associated with programmes of study and courses within a programme, maintain national standards and international comparability of learning outcomes and academic standards to ensure global competitiveness, and to facilitate student/graduate mobility and provide higher education institutions an important point of reference for designing teaching-learning strategies, assessing student learning levels, and periodic review of programmes and academic standards.

Some important aspects of the Outcome Based Education Course is defined as a theory, practical or theory cum practical subject studied in a semester.

Course Outcomes (COs): Course Outcomes are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Generally, three or more course outcomes may be specified for each course based on its weightage.

Programme: Programme is defined as the specialization or discipline of a Degree.

Programme Outcomes (POs): Programme outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes.

Programme Specific Outcomes (PSOs): PSOs are what the students should be able to do at the time of graduation with reference to a specific discipline.

Some important terminologies repeatedly used in LOCF.

Ability Enhancement Courses (AEC): Ability Enhancement Courses are designed to improve students' language proficiency, communication skills, analytical abilities, environmental awareness, and understanding of contemporary issues. These courses aim to enhance the overall academic and professional capabilities of students and facilitate their effective participation in higher education and employment.

Core Courses (CC): A course that is compulsorily studied by a student as a fundamental requirement of the programme is termed a Core Course (CC). These courses provide the basic knowledge and conceptual understanding of the major discipline. Core Courses constitute the foundation of the programme and ensure that all students acquire the essential competencies and academic standards prescribed for the degree. Successful completion of Core Courses is mandatory for the award of the degree.

Core Practical Courses (CP): Core Practical Courses are laboratory-based courses associated with the Core Theory Courses. These courses provide hands-on training, experimental skills, analytical techniques, and practical exposure necessary for understanding the concepts of the discipline. Students are required to successfully complete all prescribed practical courses as part of the programme requirements.

Allied Courses (AC): Allied Courses are courses offered from disciplines other than the major discipline. These courses provide students with opportunities to gain additional knowledge and skills in allied or complementary areas of study. Allied Courses promote multidisciplinary learning and broaden the academic perspective of students. The selection and completion of Allied Courses shall be governed by the regulations of the institution and the curriculum framework.

Allied Practicals (AP): Allied Practicals are practical components associated with the chosen Allied discipline. These courses provide laboratory or field-based exposure to the concepts learned in the Allied Courses and help students develop practical skills relevant to the selected area of study.

Interdisciplinary Courses (IDC): Interdisciplinary Courses are designed to provide knowledge and skills that integrate concepts from multiple disciplines. These courses encourage students to explore the interrelationship between different fields of study and develop a broader understanding of contemporary issues and applications. Students may choose Interdisciplinary Courses as prescribed in the curriculum and subject to eligibility requirements.

Discipline Specific Elective Courses (DSE): Discipline Specific Elective Courses are elective courses offered by the major discipline. These courses provide students with opportunities to acquire advanced knowledge and specialization in selected areas of the discipline. Students may choose courses from the

prescribed list of electives based on their interests, aptitude, and career aspirations. These courses are generally application-oriented and provide in-depth exposure to specific domains of study.

Skill Enhancement Courses (SECs): These courses focus on developing skills or proficiencies of the student, and aim at providing hands-on training. Skill enhancement courses can be opted by the students of any other discipline, but are highly suitable for students pursuing their academic programme. These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge.

Value Added Courses (VAC): Value Added Courses are intended to provide additional knowledge, skills, attitudes, and competencies that complement the regular curriculum. These courses focus on holistic development, professional ethics, environmental awareness, personality development, life skills, and emerging areas of knowledge. Successful completion of the prescribed Value Added Courses may be mandatory or optional as specified in the curriculum.

Field Study/Industrial Visit/Case Study: It has to be completed during the fifth semester of the degree programme. Credit for this course will be entered in the fifth semester's marks statement.

Internship: Students must complete internship training during summer holidays after the fourth semester. They have to submit a report of internship training with the necessary documents and have to appear for a viva-voce examination during fifth semester. Credit for internship will be entered in the fifth semester's mark statement.

Extra Credit Courses: In order to facilitate the students, gaining knowledge/skills by attending online courses MOOC, credits are awarded as extra credits, the extra credit are at three semesters after verifying the course completion certificates. According to the guidelines of UGC, the students are encouraged to avail this option of enriching their knowledge by enrolling themselves in the Massive Open Online Courses (MOOC) provided by various portals such as SWAYAM, NPTEL etc.

Project Work: Project Work provides students with an opportunity to apply the knowledge and skills acquired during the programme to investigate a specific problem or research topic. Students shall undertake the project under the guidance of a faculty member and submit a dissertation/report followed by evaluation and viva-voce examination, wherever prescribed.

Extension Activities: Students are encouraged to participate in extension and outreach activities such as National Service Scheme (NSS), National Cadet Corps (NCC), Youth Red Cross (YRC), Red Ribbon Club (RRC), Sports and Games, Fine Arts and Performing Arts, Students' EXNORA and Rotaract community engagement programmes, environmental awareness campaigns, and other socially relevant activities. Such participation may be recognized through credits, certificates, or awards as prescribed by the institution.

Undergraduate Programme:

Programme Pattern: The Under Graduate degree programme consists of **FIVE** vital components. They are as follows:

Part -I: Ability Enhancement Course (Tamil / Hindi / French / Sanskrit)

Part-II: Ability Enhancement Course (English)

Part-III: Core Course (Theory, Practicals, Minor courses, Minor Practicals and Group Project)

Part-IV: Skill Enhancement Courses, Discipline Specific Elective Courses, Interdisciplinary Courses, Value Education, Health & Wellness, Introduction to Disaster Management, Summer Internship, Value Added Course, Environmental studies, Gender studies and Extension activity.

EXAMINATION

Continuous Internal Assessment (CIA):

UG - Distribution of CIA Marks

Passing Minimum: 40 %

Assignment-3	=	30%
Test-2	=	50%
Seminar	=	10%
Attendance	=	10%

Question Paper Pattern

Section A1 (10x1=10 marks)

One word question/ Fill in/ True or False/ Multiple Choice Questions

Two Questions from Each unit

Section A 2 (5x2=10 marks)

Short Answers / Match the following

One question from Each unit

Total Marks – 20

Section B: (5x4=20 marks)

Paragraph Answers

Either/ or type, One Question from each unit

Section C: (3x10=30)

Essay Type Answers

Answer 3 out of 5 Questions

One Question from each unit

Section A1 & A2: K1 Level

Section B: K2, K3 and K4 Level

Section C: K5 and K6 Level

Knowledge levels for assessment of Outcomes based on Blooms Taxonomy

S. No.	Level	Parameter	Description
1	K1	Knowledge / Remembering	It is the ability to remember the previously learned
2	K2	Comprehension / Understanding	The learner explains ideas or concepts
3	K3	Application/Applying	The learner uses information in a new way
4	K4	Analysis/Analyzing	The learner distinguishes among different parts
5	K5	Evaluation/Evaluating	The learner justifies a stand or decision
6	K6	Synthesis /Creating	The learner creates a new product or point of view

WEIGHTAGE of K – LEVELS IN QUESTION PAPER

(Cognitive Level) K- LEVELS	Lower Order Thinking			Higher Order Thinking			Total
	K1	K2	K3	K4	K5	K6	
END SEMESTER EXAMINATIONS (ESE)	20	20			30		70
Continuous Internal Assessment (CIA)	20	20			30		70
QUESTION PATTERN FOR END SEMESTER EXAMINATION/ Continuous Internal Assessment							
SECTION							MARKS
SECTION – A1 (No choice ,One Mark) TWO questions from each unit (10x1 =10)							20
SECTION –A2 (No choice ,Two Mark) ONE question from each unit (5x2 =10)							
SECTION - B (Either/ or type, 4-Marks) ONE questions from each unit (5x4 =20)							20
SECTION - C (3 out of 5) (10 Marks) ONE question from each unit (3x10 =30)							30
Total							70

BLUE PRINT OF QUESTION PAPER FOR END SEMESTER EXAMINATION							
DURATION: 3. 00 Hours.				Max Mark : 70			
K- LEVELS	K1	K2	K3	K4	K5	K6	Total Marks
SECTION							
SECTION –A1 (1 Mark, No choice) (10x1 =10)	10						10
SECTION –A2 (2-Marks, No choice) (5x2=10)	10						10
SECTION –B (4-Marks) (Either/or type) (5x4=20)		4	8	8			20
SECTION -C (10 Marks) (3 out of 5) (3x10=30) Courses having only K5, K6 levels, K5 level- 3 Questions, K6 level- 2 Questions (One K6 level question is compulsory)					20	10	30
Total	20	04	08	08	20	10	70

EVALUATION

GRADING SYSTEM

Once the marks of the CIA and the end-semester examination for each of the courses are available, they will be added and converted as final mark. The marks thus obtained will then be graded as per the scheme provided in Table-1.

Grade Point Average (GPA) will be calculated from the first semester onwards for all semester. From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated by semester Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA), respectively. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i} \quad . \text{WAM (Weighted Average Marks)} = \frac{\sum_{i=1}^n C_i M_i}{\sum_{i=1}^n C_i}$$

Where,

C_i is the Credit earned for the Course i

G_i is the Grade Point obtained by the student for the Course i

M_i is the marks obtained for the course i and

n is the number of Courses **Passed** in that semester.

CGPA: Average GPA of all the Courses starting from the first semester to the current semester.

CLASSIFICATION OF FINAL RESULTS:

1. For each of the first three parts, there shall be separate classification on the basis of CGPA, as indicated in Table-2.
2. For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/ Science/ Commerce/ Management as Outstanding/ Excellent/ Very Good/ Good/ Above Average/ Average, the marks and the corresponding CGPA earned by the candidate in Part-III alone will be the criterion, provided the candidate has secured the prescribed passing minimum in the all the Five parts of the Programme.
3. Grade in Part –IV and Part-V shall be shown separately and it shall not be taken into account for classification.
4. A Pass in PART- V will be mandatory although the marks will not count for the calculation of the CGPA.
5. Absence from an examination shall not be taken an attempt.

Table-1: Grading of the Courses – UG

Marks Range	Grade Point	Corresponding Grade
90 and above	10	O
80 and above and below 90	9	A+
70 and above and below 80	8	A
60 and above and below 70	7	B+
50 and above and below 60	6	B
40 and above and below 50	5	C
Below 40	NA	RA

The candidate's performance in every current semester is indicated by **Semester Grade Point Average (SGPA)** and from the second semester onwards, the continuous performance including pervious semester/s is indicated by **Cumulative Grade Point Average (CGPA)**.

Table-2: Final Result

CGPA	Corresponding Grade	Classification of Final Result
9.00 and above	O	Outstanding
8.00 to 8.99	A+	Excellent
7.00 to 7.99	A	Very Good
6.00 to 6.99	B+	Good
5.00 to 5.99	B	Above Average
4.00 to 4.99	C	Average
Below 4.00	RA	Re-appearance

The candidates who have passed in the first appearance and within the prescribed duration of the UG programme are eligible. If the candidate's Grade is O/A+ with more than one attempt, the performance is fixed as "Very Good".

VISION

- To become a centre of excellence in Physics by dissemination and creation of knowledge through teaching and research in Physics at various levels and to help create a scientific Society, which encourages logical thinking.

MISSION

- Providing best infrastructure, opportunities and environment to students through which they obtain excellence in knowledge in Physics.
- Exposing the students in developing protocols for the working modules in Physics.

PROGRAMME OUTCOMES FOR B.Sc.. DEGREE PROGRAMMES

PO No.	Programme Outcomes (Upon completion of the B.Sc. Degree Programme, the Undergraduate will be able to)
PO - 1	Disciplinary knowledge: Demonstrate comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate program of study in Bachelor Of Science.
PO - 2	Critical thinking, Problem Solving and Reflective thinking: Think critically about the issues and identify, critically analyze and solve problems from the disciplines of concern using appropriate tools and techniques and the knowledge, skills and attitudes acquired and extrapolate the same to real life situations; show critical sensibility to life experiences, With self-awareness and reflexivity of both self and society.
PO - 3	Analytical & Scientific Reasoning: Evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints; critically evaluate ideas, evidence, and Experiences from an open minded and reasoned perspective.
PO - 4	Research - related Skills: Develop a sense of capability for relevant/appropriate inquiry and asking questions, synthesize, articulate and report results and to recognize and predict cause and effect relationships, define problems, formulate and establish hypothesis, analyze and interpret and draw conclusions from data, execute and report the results of an experiment or investigation.
PO - 5	Digital literacy and Effective Communication: Use ICT in a variety of learning situations and speak, read, write and listen clearly in person and through electronic media in English and in one or more Indian languages, and make meaning of the world by connecting people, ideas, books, media and technology; efficiently communicate thoughts and ideas in a clear and concise manner.
PO - 6	Individual and Team Work: Effectively accomplish tasks individually as well as work effectively and respectfully as member or leader with diverse teams, facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the Interests of or a common cause and work efficiently as a member of a team.
PO - 7	Multicultural Competence and Social Interaction: Understand the values and beliefs of multiple cultures, global perspectives, engage and interact respectfully with diverse groups and elicit views of others, mediated disagreements and help reach conclusions in Group settings.
PO - 8	Awareness of Ethical issues, Human values and Gender Issues: Embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work and understand the value of relationship between self and the community and aware of the various issues concerning Women and society.

PO - 9	Awareness of Environment and Sustainability: Understand the impacts of technology and business practices in societal and environmental contexts, and sustainable development.
PO -10	Self directed and Lifelong learning: Acquire knowledge and skills, including learning“ how to learn“, that are necessary for participating in learning activities throughout life and to engage in independent and life-long learning in the broadest context of socio-Technological changes.

PROGRAMME SPECIFIC OUTCOMES FOR B.Sc., PHYSICS

PSO1	Academic Excellence To develop strong foundations in classical and modern physics, enabling students to analyze and solve scientific problems effectively.
PSO2	Employability and Placement To equip students with the professional competence and ethical values required for successful careers in academia, research institutions, industry, and allied sectors.
PSO3	Entrepreneurship To foster innovation, critical thinking, leadership, and problem-solving skills that encourages entrepreneurial initiatives and technology-based start-ups.
PSO4	Research and Development To develop research aptitude by applying experimental, computational, and analytical techniques for scientific investigations and technological advancements.
PSO5	Contribution to Industry and Society To apply physics knowledge for addressing societal and industrial challenges, promoting sustainable development and community welfare.
PSO6	Lifelong Learning and Professional Ethics To cultivate continuous learning, scientific temper, environmental awareness, and professional ethics for responsible citizenship and career growth.



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**CHOICE BASED CREDIT SYSTEM – LEARNING OUTCOMES BASED
CURRICULUM FRAMEWORK (CBCS – LOCF)**

(For the candidates admitted in the academic year 2026-2027)

ELIGIBILITY: A Pass in 10+2 with Physics and Mathematics as one of the core subjects

Sem	Part	Courses	Course Code	Title	Ins. Hours /Week	Credits	Exam. Hours	Maximum Marks		
								Int.	Ext.	Total
I	I	Ability Enhancement Course–I (AEC-I)	U26TAEC11	(Tamil\$ / Other Languages+, #)	6	3	3	30	70	100
	II	Ability Enhancement Course–II (AEC-II)	U26EAEC11	English Course – I	6	3	3	30	70	100
	III	Core Course-I (CC-I)	U26PH101	Properties of Matter and Acoustics	4	4	3	30	70	100
		Core Practical-I (CP-I)	U26PH102P	Physics Practical–I	4	4	3	40	60	100
		Allied Course-I (AC-I)	U26AMM101	Algebra and Calculus	3	3	3	30	70	100
		Allied Practical-I (AP-I)	U26AMM102P	Algebra and Calculus with MATLAB Programming Practical	3	3	3	40	60	100
	IV	Value Education	26UGVED	Value Education	2	2	3	30	70	100
		Interdisciplinary Course–I (IDC -I) #			2	2	3	30	70	100
				Total	30	24	-	-	-	800
II	I	Ability Enhancement Course–III (AEC-III)	U26TAEC22	(Tamil\$ / Other Languages+,#)	6	3	3	30	70	100
	II	Ability Enhancement Course–IV (AEC-IV)	U26EAEC22	English Course – II	6	3	3	30	70	100
	III	Core Course-II (CC-II)	U26PH203	Mechanics and Theory of Relativity	4	4	3	30	70	100
		Core Practical-II (CP-II)	U26PH204P	Physics Practical–II	4	4	3	40	60	100
		Allied Course-II (AC-II)	U26AMM203	Trigonometry and Fourier Series	3	3	3	30	70	100
		Allied Practical-II (AP-II)	U26AMM204P	Trigonometry and Fourier Series with SCILAB Practical	3	3	3	40	60	100
	IV	Skill Enhancement Course-1 (SEC-I) ##	U26SEPH21	Lasers and Fiber Optics	2	2	3	30	70	100
		Interdisciplinary Course–II (IDC-II) #			2	2	3	30	70	100
				Total	30	24	-	-	-	800

III	I	Ability Enhancement Course–V (AEC-V)		(Tamil\$ / Other Languages+, #)	6	3	3	30	70	100
	II	Ability Enhancement Course–VI (AEC-VI)		English Course – III	6	3	3	30	70	100
	III	Core Course–III (CC-III)		Thermal Physics	4	4	3	30	70	100
		Core Practical–III (CP-III)		Physics Practical–III	4	4	3	40	60	100
		Allied Course–III (AC-III)		Introduction to Computer and Office Automation	3	3	3	30	70	100
		Allied Practical-III (AP-III)		Office Automation Lab	3	3	3	40	60	100
	IV	Skill Enhancement Course–II (SEC–II) ##		Artificial Intelligence in Physics	2	2	3	30	70	100
		Interdisciplinary Course–III (IDC-III) #			2	2	3	30	70	100
		Health & Wellness @		Health & Wellness	--	1	--	20	80	100
				Total	30	25	-	-	-	900
IV	I	Ability Enhancement Course–VII (AEC-VII)		(Tamil\$ / Other Languages+,#)	6	3	3	30	70	100
	II	Ability Enhancement Course–VIII (AEC- VIII)		English Course–IV	6	3	3	30	70	100
	III	Core Course-IV (CC-IV)		Electricity and Magnetism	4	4	3	30	70	100
		Core Practical-IV (CP-IV)		Physics Practical–IV	4	4	3	40	60	100
		Allied Course-IV (AC-V)		Fundamentals of C Programming	3	3	3	30	70	100
		Allied Practical-IV (AP-IV)		C Programming Lab	3	3	3	40	60	100
	IV	Skill Enhancement Course-III (SEC-III) ##		Medical Instrumentation	2	2	3	30	70	100
		Interdisciplinary Course–IV (IDC-IV) #			2	2	3	30	70	100
				Total	30	24	-	-	-	800
	Summer Internship / Industrial Activity during the Summer Vacation after II Year									
V	III	Core Course-V (CC-V)		Optics	4	4	3	30	70	100
		Core Course-VI (CC-VI)		Atomic and Molecular Physics	5	4	3	30	70	100
		Core Course-VII(CC-VII)		Electronics	5	4	3	30	70	100
		Core Course-VIII(CC-VIII)		Materials Science	5	4	3	30	70	100
		Core Practical-V (CP- V)		Physics Practical–V	5	4	3	40	60	100
	IV	Skill Enhancement Course - IV(SEC-IV) ##		Biophysics	2	2	3	30	70	100
		Discipline Specific Elective Course-I(DSEC-I)		Research Methodology/ Numerical Methods and C Programming / Molecular Biophysics	2	2	3	30	70	100
		Introduction to Disaster			2	2	3	30	70	100

		Management								
		Summer Internship /		Summer Internship with	--	2	-	20	80	100
		Industrial Activity @@		Viva-Voce						
		Total			30	28	-	-	-	900
VI	III	Core Course-IX (CC-IX)		Theoretical Physics	4	4	3	30	70	100
		Core Course-X (CC-X)		Nuclear Physics	5	4	3	30	70	100
		Core Practical–VI (CPVI)		Physics Practical–VI	5	4	3	40	60	100
		Core Project Work(CPW) @@		Project Work (with Viva-Voce)	6	4	3	20	80	100
	IV	Skill Enhancement Course -V (SEC-V) ##		Astrophysics	2	2	3	30	70	100
		Discipline Specific Elective Course-II (DSEC-II)		Digital Electronics and Microprocessor 8085/ Electrical Wiring Fundamentals/ Digital Photography	2	2	3	30	70	100
		Environmental Studies		Environmental Studies	2	2	3	30	70	100
		Gender Studies		Gender Studies	2	1	3	30	70	100
		Value Added Course		General Studies for Competitive Examinations	2	2	--	30	70	100
		Extension Activities *		Extension activity	--	1	--	--	--	--
		Total			30	26	-	-	-	900
						180	151	-	-	-

ALLIED COURSE (AC)

S. No.	Semester	Title of the Course
1	I	Algebra and Calculus
2		Algebra and Calculus with MATLAB Programming Practical
3	II	Trigonometry and Fourier Series
4		Trigonometry and Fourier Series with SCILAB Practical
5	III	Introduction to Computer and Office Automation
6		Office Automation Lab
7	IV	Fundamentals of C Programming
8		C Programming Lab

SKILL ENHANCEMENT COURSE (SEC)

S. No.	Semester	Title of the Course
1	II	SEC-I Lasers and Fiber Optics
2	III	SEC-II Artificial intelligence in Physics
3	IV	SEC-III Medical Instrumentation
4	V	SEC-IV Biophysics SEC-V Astrophysics

DISCIPLINE SPECIFIC ELECTIVE COURSE (DSEC)

S. No.	Semester	Title of the Course
1	VI	DSEC-I Research Methodology Numerical Methods and C Programming Molecular Biophysics
2		DSEC-II Digital Electronics and Microprocessor 8085 Electrical Wiring Fundamentals Digital Photography

INTERDISCIPLINARY COURSE (IDC)

S. No.	Semester	Course Code	Title of the Course
1	I	U26IDPH11	Physics For Everyday Life
2	II	U26IDPH22	Home Electrical Installation
3	III		Energy Physics
4	IV		Communication Electronics

VALUE ADDED COURSE ** (VAC)

Semester	Course	Course Code	Title of the Course
II	VAC - I	U26PHVA21	Interdisciplinary Physics in Ancient Indian Knowledge Systems
IV	VAC - II	U26PHVA42	Data Science Using Python and R Programming

INTERDISCIPLINARY COURSE (IDC)# FOR WHO HAVE NOT OPT TAMIL AS PART – I		
Those who have studied Tamil upto 10 th +2 but opt for other languages in degree	I Semester	Special Tamil – I
	II Semester	Special Tamil – II
Those who have not studied Tamil in school level	I Semester	Basic Tamil – I
	II Semester	Basic Tamil – II

INTERDISCIPLINARY COURSE (IDC) \$\$ FOR NCC CADETS ONLY	
NCC Course is a Compulsory Course for the NCC Cadets in the III Semester:	NCC Course is a Compulsory Course for the NCC Cadets in the IV Semester:
Introduction to NCC	1. Special Subject Army (or) 2. Special Subject Navy (or) 3. Special Subject Air force

SUMMARY OF CURRICULUM STRUCTURE OF UG PROGRAMMES – SCIENCE

Sl. No.	Part	Types of the Courses	No. of Courses	Credits for each Course	Total Credits	Marks	
1.	I	Ability Enhancement Course (AEC-Tamil)	4	3	12	400	
2.	II	Ability Enhancement Course (AEC-English)	4	3	12	400	
3.	III	Core Course (CC)	10	4	40	1000	
4.		Core Practical (CP)	6	4	24	600	
5.		Allied Course (AC)	4	3	12	400	
6.		Allied Practical (AP)	4	3	12	400	
7.		Core Project Work (CPW)	1	4	4	100	
8.	IV	Skill Enhancement Course (SEC)	5	2	10	500	
9.		Discipline specific Elective Course (DSEC)	2	2	4	200	
10.		Interdisciplinary Course (IDC)	4	2	8	400	
11.		Value Education	1	2	2	100	
12.		Health and Wellness	1	1	1	100	
13.		Introduction to Disaster Management	1	2	2	100	
14.		Summer Internship / Industrial Activity	1	2	2	100	
15.		Value Added Course	1	2	2	100	
16.		Environmental Studies	1	2	2	100	
17.		Gender Studies	1	1	1	100	
18.		EXTENSIONACTIVITIES* (NCC / NSS / SPORTS / ANTI DRUG CELL / YRC & Any Other Activities)	--	1	1	--	
Total			51	-	151	5100	
Additional Value Added Course in semester II and IV**			2**	2	4**	200	
MOOC – SWAYAM / NPTEL							

\$	For those who have studied Tamil upto10 th +2(Regular Stream)															
+	Syllabus for other Languages should be on par with Tamil at degree level															
#	Those who have studied Tamil up to10 th +2 but opt for other languages in degree level under Part-I should study special Tamil and those who have not studied Tamil in the school level should study Basic Tamil in Part–IV under the Interdisciplinary Course.															
\$\$	NCC Course is one of the Choices in the Interdisciplinary Course. Only the NCC Cadets are eligible to choose this course. However, NCC Course is a Compulsory Course for the NCC Cadets.															
@	Health and Wellness: Assessments: • Use self-reflective worksheets to assess their understanding • submit the worksheets to internal audit / external audit • Every student’s activity report should be documented and the same have to be assessed by the Physical Director with Mentor. The evaluation should be for 100 marks. No examination is required. Scheme of Evaluation: <table><tr><th>Part</th><th>Description</th><th>Marks</th></tr><tr><td>A</td><td>Report</td><td>40</td></tr><tr><td>B</td><td>Attendance</td><td>20</td></tr><tr><td>C</td><td>Activities (Observation During Practice)</td><td>40</td></tr><tr><td colspan="2">Total</td><td>100</td></tr></table>	Part	Description	Marks	A	Report	40	B	Attendance	20	C	Activities (Observation During Practice)	40	Total		100
Part	Description	Marks														
A	Report	40														
B	Attendance	20														
C	Activities (Observation During Practice)	40														
Total		100														
@ @	Summer Internship / Industrial Activity Internship will be carried out during the summer vacation after the second year. Viva-Voce will be conducted by the college and Marks shall be sent to the University and the same will be included in the 5th semester Mark Statement. Summer Internship / Industrial Activity& Project Work Scheme of Evaluation: <table><tr><th>Description</th><th>Marks</th></tr><tr><td>Report</td><td>80</td></tr><tr><td>Viva-Voce</td><td>20</td></tr><tr><td>Total</td><td>100</td></tr></table>	Description	Marks	Report	80	Viva-Voce	20	Total	100							
Description	Marks															
Report	80															
Viva-Voce	20															
Total	100															
*	Extension Activities shall be outside instruction hours.															
**	Additional value added courses credit will not be included in the total CGPA. These courses are extra-credit courses. Instruction hours for these courses is 30 hours															

SEMESTER - I



SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)
SUNDARAKKOTTAI, MANNARGUDI – 614 016.
(For the candidates admitted from the academic year 2026 -2027)
DEPARTMENT OF PHYSICS
B.Sc., PHYSICS

Semester: I – CC - I: PROPERTIES OF MATTER AND ACOUSTICS

Ins. Hrs./Week: 4

Course Credit: 4

Course Code: U26PH101

COURSE OBJECTIVES

- To understand the basic concepts of elasticity, bending, surface tension, viscosity, and acoustics.
- To learn the laws, principles, and mathematical relations involved in mechanical properties of matter and sound.
- To gain practical knowledge in determining physical constants through experiments.
- To study the applications of elasticity, viscosity, surface tension, and acoustics in daily life and industry.
- To develop scientific and analytical skills in understanding the behavior of materials, liquids, and sound waves.

UNIT- I: Elasticity

(12 Hours)

Introduction-Hooke's law – Stress-Strain diagram – Factors affecting elasticity- Different moduli of elasticity - Relation between the elastic moduli – Poisson's ratio –Twisting couple on a cylinder – Determination of rigidity modulus by static torsion – Work done in twisting a wire - Torsion pendulum - Determination of rigidity modulus and moment of inertia.

UNIT - II: Bending of Beams

(14 Hours)

Bending of beams - Expression for bending moment – Cantilever – Expression for depression of the loaded end of a cantilever — Young's modulus by measuring the tilt in a loaded cantilever –Oscillation of a cantilever - Non-uniform bending – Expression for depression- Uniform bending – Expression for elevation –Experimental determination of Young's modulus using pin and microscope method (Non-uniform bending – Uniform bending) –Determination of Young's modulus by Mirror and Telescope method- Determination of Young's modulus by Koenig's method

UNIT - III: Surface Tension

(11 Hours)

Definition –Explanation of surface tension on kinetic theory – Surface Energy-Interfacial surface Tension – Angle of contact -Neumann's triangle- Excess pressure inside a liquid drop and soap bubble -Excess pressure inside a curved liquid surface– Experimental determination of surface tension - Jaeger's method - Drop- weight method -Capillary rise method - Variation of surface tension with temperature.

UNIT- IV: Viscosity

(12 Hours)

Newton's law of viscous flow – streamlined and turbulent motion – Reynold's number - Poiseuille's formula for the flow of a liquid through a horizontal capillary tube – Experimental determination of co-efficient of a liquid by Poiseuille's method -Ostwald's viscometer – Terminal velocity - Stokes's formula and Experimental determination of Stokes's Method- Viscosity of gases – Mayer's formula -Variation of viscosity with temperature and pressure - Lubrication.

UNIT -V: Acoustics

(11 Hours)

Newton's Formula for the velocity of sound – Musical Sound and Noise – Speech – Characteristics of Musical sound – Intensity of sound – Measurement of intensity of sound – Decibel and Phon-Bel Reverberation –

Sabine's Reverberation formula – Factors Affecting the Acoustics of Buildings – Sound distribution in an Auditorium – Requisites for good acoustics – Ultrasonic Production and detection by Piezo electric method.

UNIT – VI: Current Contours (For Continuous Internal Assessment only – Self Study)

Modulus of toughness and modulus of elasticity for different types of concrete - Elasticity and Seismic waves – Bending beam load cell – Composite beams – Surface tension and wetting behaviour of nanofluids – Viscosity of nanofluids – Acoustics sensors.

Total Lecture Hours – 60

COURSE OUTCOMES

Upon successful completion of this course the students would be able:

1. Differentiate the moduli of elasticity of different materials
2. Analyze the moduli of elasticity of materials made in the form of beams.
3. Understand the practical applications of surface tension in real life.
4. Acquire the knowledge of the flow of liquids based on their viscous nature and the
5. variation of viscosity with temperature and pressure
6. Understand the various characteristics of sound and their practical implications.

TEXT BOOK(S)

1. Barber, J. R, Elasticity, Springer, 2023.
2. Brijlal & N. Subramanian, A Text Book of Sound, Vikas Publishing. Pvt.Ltd, 2008.
3. R. Murugesan,, Properties of matter, S. Chand & Co. Pvt. Ltd., Revised edition, 2019.
4. Murugesan R., Sivaprasath Kiruthiga , Properties of Matter and Acoustics, 2025.
5. Paul Filippi, AimeBergassoli , Dominique Habault , Acoustics: Basic Physics, Theory, and Methods, 1998.

REFERENCE BOOK(S)

1. Fundamentals of General properties of matter, S. Chand &Co. Pvt. Ltd, 2012.
2. Basil C McEwen, 12 September, The Properties of Matter, 2011.
3. Brijlal& N. Subramanian, Properties of matter, Vikas Publishing. Pvt. Ltd, 2005.
4. R.L. Saihgal, A Text Book of Sound, S. Chand & Co. Pvt. Ltd, New Delhi, 2010.
5. Hanako Ayabito & Mitsuko Katsukawa , Ultrasonics: Theory, Techniques & Practical Applications, 2013.

E- RESOURCES

1. <http://shorturl.at/dkux4>
2. <https://cutt.ly/Vhlco3J>
3. <https://youtu.be/amGa5RRrCcss>
4. www.britannica.com
5. www.engineeringenotes.com

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3	2	1	2	2	3	3	1	3	2	2	3	2	2
CO2	3	3	3	2	2	1	3	2	1	1	3	3	2	3	2	3
CO3	3	2	3	2	1	1	2	1	1	1	3	3	3	3	2	1
CO4	3	3	3	2	1	2	2	2	1	1	3	3	3	3	3	3
CO5	3	2	2	1	2	1	1	2	1	1	3	3	3	3	3	2
CO6	2	3	3	2	3	3	3	3	2	2	2	3	3	2	3	2

S-Strong (3) M-Medium (2) L-Low (1)



SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)
SUNDARAKKOTTAI, MANNARGUDI – 614 016.
(For the candidates admitted from the academic year 2026 -2027)
DEPARTMENT OF PHYSICS
B.Sc., PHYSICS

Semester: I-CP- I: PHYSICS PRACTICAL I

Ins. Hrs. /Week: 4

Course Credit: 4

Course Code: U26PH102P

COURSE OBJECTIVES

- To familiarize students with the use of basic measuring instruments.
- To understand the experimental determination of physical quantities.
- To develop practical skills in conducting physics experiments and taking accurate measurements.
- To verify important physical laws related to elasticity, viscosity, vibrations, magnetism, and optics through laboratory experiments.
- To improve observation, analytical, and scientific reporting skills through hands-on experimental work.

List of Experiments (Any Eight Experiments)

1. Measurement of length (or diameter) using Vernier calipers, Screw gauge and travelling microscope.
2. Determination of Young's modulus - Non-uniform bending using pin and microscope.
3. Determination of Young's modulus - Uniform bending using pin and microscope.
4. Determination of Young's modulus - Cantilever depression using scale and telescope.
5. Surface tension and interfacial surface tension – Drop weight method.
6. Surface tension by capillary rise method.
7. Coefficient of viscosity of a liquid - Poiseuille's flow method.
8. The viscosity of highly viscous liquid - Stoke's method.
9. Verification of laws of vibration of a stretched string and determination of the frequency of a tuning fork – Sonometer.
10. Determination of frequency of a tuning fork using Melde's string apparatus.
11. Absolute determination of M and H using deflection and vibration magnetometer.
12. Spectrometer - Determination of refractive index of a solid prism.

Total Lecture Hours – 60

COURSE OUTCOMES

Upon successful completion of this course the students would be able:

1. Use the measuring instruments for accurate measurement of physical quantities required for the experiment.
2. Know the elastic properties of structural materials from the experimental results.
3. Realize practically the properties of liquids such as surface tension and viscosity.
4. Acquire the experimental skill of verifying laws in Physics.
5. Understand experimentally the vibrations of stretched strings.
6. Evaluate optical and magnetic properties of materials using instruments.

TEXT BOOK(S)

1. Dr. S. Somasundaram, Practical Physics, Apsara Publications, Tiruchirappalli, 2023.
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi 2022.
3. C. L. Arora, *B.Sc. Practical Physics*, S. Chand & Company Pvt. Ltd., New Delhi, 2023.
4. S. L. Gupta and V. Kumar, *Practical Physics*, Pragati Prakashan, Meerut, 2019.
5. Indu Prakash and Ramakrishna, *A Text Book of Practical Physics*, Kitab Mahal Publishers, Allahabad, 2015.
6. Sanjay Sharma, *Basic Electronics and Linear Circuits Laboratory Manual*, Katson Books, New Delhi, 2016.

REFERENCE BOOK(S)

1. S. Srinivasan, A Text Book of Practical Physics., Sultan Chand Publications, 2023.
2. P. R. Sasi Kumar, *Practical Physics*, PHI Learning Pvt. Ltd., New Delhi, 2011.
3. N. Subrahmanyam and Brij Lal, *A Textbook of Optics*, S. Chand & Company Pvt. Ltd., New Delhi, 2017.
4. M. N. Avadhanulu and P. G. Kshirsagar, *A Textbook of Engineering Physics*, S. Chand & Company Pvt. Ltd., New Delhi, 2023.
5. A. P. Malvino and D. P. Leach, *Digital Principles and Applications*, McGraw-Hill Education, New York, 2024.

E - RESOURCES

1. <https://youtu.be/GTnPEtksTEc>
2. <https://youtu.be/veQ-LfJhfxM>
3. <https://youtu.be/hV0qG7BTJJI>
4. www.physicsclassroom.com
5. <https://shorturl.at/MMWbg>

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3	1	1	2	2	2	1	1	3	2	2	3	2	2
CO2	3	3	3	2	2	1	2	2	3	1	3	3	2	3	2	3
CO3	3	2	3	2	1	2	2	2	1	1	3	3	3	3	2	1
CO4	3	3	3	2	1	2	2	2	1	1	3	3	3	3	3	3
CO5	3	2	2	1	2	1	2	2	1	1	3	3	3	3	3	2
CO6	2	3	3	2	3	3	3	3	2	2	2	3	3	2	3	2

S-Strong (3) M-Medium (2) L-Low (1)

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)



SUNDARAKKOTTAI, MANNARGUDI - 614016
(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF MATHEMATICS

Allied Course-I

(For B.Sc., Data Science and B.Sc., Physics & Chemistry)

Semester: I - AC – I: Algebra and Calculus

Ins. Hrs./Week:3

Course Credit:3 Course Code: U26AMM101

COURSE OBJECTIVES:

- To Understand matrix operations and applications
- To Solve systems using matrices and eigenvalue methods
- To Apply differentiation techniques to mathematical problems
- To Evaluate integrals using standard methods and formulas
- To Solve ordinary differential equations systematically

UNIT -I: Matrices

(9 Hours)

Formation of Matrices–Special types of matrices – Scalar multiplication of a matrix – Equality of matrices - Addition of matrices – Subtraction – Symmetric matrix – Skew symmetric matrix – Hermitian and Skew Hermitian matrices – Multiplication of matrices – Inverse matrix – Related problems.

UNIT –II: Matrices (Continued....)

(9 Hours)

Inner product – Solution of simultaneous equations – Rank of a Matrix – Linear dependence and independence of vectors - Eigen values, Eigen vectors – Cayley Hamilton's Theorem (proof not needed) – Simple Problems

UNIT–III: Differentiation

(9 Hours)

Basic Formulae on Differentiation - Maxima & Minima – Concavity, Convexity – Points of inflexion- Partial differentiation – Euler's Theorem - Total differential coefficients (proof not needed) –Simple problems only.

UNIT-IV: Integration

(9 hours)

Basic Formulae on Integration – Integration of rational algebraic functions – integration of irrational functions - Evaluation using Integration by parts – Properties of definite integrals –Reduction formula 1) $\int x^n e^{ax} dx$ 2) $\int \sin^n x dx$ 3) $\int \cos^n x dx$ (n being a positive integer) – Related Problems.

UNIT- V: Differential Equations

(9 Hours)

Formation of Differential Equations - Linear Equations – Second order of types

$(aD^2 + bD + c)y = F(x)$ where a, b, c are constants and $F(x)$ is one of the following

(i) e^{ax} (ii) $\sin(ax)$ or $\cos(ax)$ (iii) x^n , n being an integer (iv) $e^{ax}f(x)$.

UNIT-VI: Current Contours (For Continuous Internal Assessment Only – self-study)

Addition of matrices – Subtraction – Symmetric matrix – Skew symmetric matrix

Total Lecture Hours – 45

COURSE OUTCOME

After the completion of the course, students should be able to,

1. Find the solutions of transformation of equation by increasing and decreasing roots.
2. Analyze vector dependence and matrix characteristics.
3. Understand the concept of maxima and minima and partial differential equation.
4. Understand the different types of Integral Equations and their properties.
5. Perform the problems in different methods of Differential Equations.
6. Identify symmetric and skew-symmetric matrices and perform matrix operations.

TEXT BOOK(S)

1. Manicavachagam Pillai. T.K & Others. 2008. Algebra Volume II. Revised Editions. S.V Publications, Chennai.
2. Narayanan. S, Manicavachagam Pillai.T.K. 2008. Calculus Volume I. S. Viswanathan Pvt. Limited, Chennai.
3. Narayanan.S, Manicavachagam Pillai.T.K.2008.Calculus Volume II. S.Viswanathan Pvt. Limited, Chennai.
4. Narayanan.S, Manicavachagam Pillai.T.K.2003.Differential Equations. S.Viswanathan Pvt. Limited, Chennai.

UNIT – I Chapter 2: Sec. 1 to 8 of [1].

UNIT – II Chapter 2: Sec. 9 to 16 only of [1].

UNIT – III Chapter 5: Sec. 1, 2 of [2].

Chapter 8: Sec. 1.1, 1.3 and 1.6 of [2].

UNIT – IV Chapter 1: Sec. 7.3, 8, 9, 11, 12, 13.1, 13.3, 13.4 of [3].

UNIT – V Chapter 5: Sec. 1, 2, 3 and 4 of [4].

REFERENCE BOOK(S)

1. Arumugam, Issac 2007. Allied Mathematics. New Gamma Publishing House, Palayamkottai.
2. Khanna M.L. 2004. Differential Calculus. Jai prakash Nath and Co., Meerut.
3. Khanna M.L. 1994. Integral Calculus. 19 th Edition. Jai Prakash Nath & Co. Meerut.

4. Sannu Rahi. 2009. Algebra. Tata McGraw Hill Publishing Company Limited, NewDelhi.
5. Singh U.P, Srivastava R.J, Siddiqui N.H. 2003. Calculus. Dominant Publishers andDistributors, New Delhi.

E.RESOURCES

- 1.<https://nptel.ac.in>
- 2.<https://ocw.mit.edu>
- 3.<https://www.khanacademy.org>
- 4.<https://tutorial.math.lamar.edu>

Course Learning Outcome (for Mapping with POs and PSOs)

	Pos										PSOs		
	1	2	3	4	5	6	7	8	9	10	1	2	3
CLO1	3	3	2	3	1	3	1	2	2	2	3	2	1
CLO2	3	2	1	2	3	2	2	2	2	2	3	2	1
CLO3	3	2	2	1	2	1	2	1	3	2	3	2	1
CLO4	2	1	2	2	3	2	2	3	1	2	3	2	1
CLO5	3	2	2	2	3	3	2	2	2	1	3	2	1
CLO6	3	2	2	1	2	1	1	1	3	3	2	2	1

Strong: 3

Medium: 2

Low: 1



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF MATHEMATICS

Allied Practical – I

(For B.Sc., PHYSICS , CHEMISTRY AND DATA SCIENCE)

Semester: I- AP-I: Algebra and Calculus with MATLAB Programming Practical

Ins. Hrs./Week: 3

Course Credit: 3

Course Code: U26AMM102P

COURSE OBJECTIVES:

- Understand the fundamental concepts of matrices and their applications in solving mathematical problems.
- Apply matrix operations, eigenvalues, eigenvectors, and rank concepts to solve systems of equations.
- Develop proficiency in differential calculus, including maxima, minima, and partial differentiation.
- Solve integration problems involving algebraic, irrational, and trigonometric functions using standard techniques.
- Analyze and solve ordinary differential equations arising in mathematical and engineering applications.

LIST OF PRACTICALS

1. Matrix Addition and Subtraction Method
2. Matrix Multiplication and Inverse Matrix Method
3. Rank and Linear Dependence Method
4. Eigenvalue and Eigenvector Method
5. Differentiation and Partial Differentiation Method
6. Maxima, Minima and Point of Inflection Method
7. Integration by Substitution and Partial Fractions Method
8. First-Order Linear Differential Equation Method

Total Lecture Hours – 45

COURSE OUTCOME

After the completion of the course, students should be able to:

1. Perform basic matrix operations and identify different types of matrices.
2. Determine rank, eigenvalues, eigenvectors, and solve systems of linear equations using matrices.
3. Apply differentiation techniques to solve problems involving maxima, minima, partial derivatives, and total differentials.
4. Evaluate definite and indefinite integrals using standard integration methods and reduction formulae.
5. Formulate and solve ordinary differential equations of first and second order.
6. Utilize MATLAB software to implement mathematical algorithms and solve problems involving matrices, calculus, and differential equations.

TEXT BOOK(S)

1. Bali N.P and Manish Goyal, 2021, A Text book of Engineering Mathematics, 10th Edition Laxmi Publications.
2. Grewal B.S, 2022, Higher Engineering Mathematics, Khanna Publications.

REFERENCE BOOK:

1. **Attaway, S.**, *MATLAB: A Practical Introduction to Programming and Problem Solving*, 7th Edition, Elsevier, 2024.
2. **Chapman, S. J.**, *MATLAB Programming for Engineers*, 7th Edition, Cengage Learning, 2023.
3. **Palm III, W. J.**, *Introduction to MATLAB for Engineers*, 4th Edition, McGraw-Hill Education, 2020.
4. **Hahn, B. D. & Valentine, D. T.**, *Essential MATLAB for Engineers and Scientists*, 8th Edition, Academic Press, 2023.
5. **Moore, H.**, *MATLAB for Engineers*, 6th Edition, Pearson Education, 2022.

E_RESOURCES

1. <https://www.google.com/amp/s/dokumen.tips/amp/documents/free-download-here-manickavasagam-pillai-volume-1pdf-free-download-here-algebra.html>
2. https://www.academia.edu/19646465/Analytical_solid_geometry_Shanti_Narayan
3. http://fhscastormath.weebly.com/uploads/1/2/4/7/12476962/chapter11_precal.pdf
4. <https://ncert.nic.in/textbook/pdf/lemh205.pdf>

Course Learning Outcome (for Mapping with POs and PSOs)

	POs										PSOs		
	1	2	3	4	5	6	7	8	9	10	1	2	3
CLO1	3	2	3	2	3	1	1	1	1	2	3	2	2
CLO2	3	2	3	2	3	1	1	1	1	2	3	2	2
CLO3	3	3	3	2	3	1	1	1	1	2	3	3	2
CLO4	3	2	2	2	3	1	1	1	1	2	3	2	2
CLO5	3	3	2	3	3	1	1	2	2	2	3	2	2
CLO6	3	3	2	3	3	1	1	1	1	2	3	3	2

Strong: 3

Medium: 2

Low: 1



SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)
SUNDARAKKOTTAI, MANNARGUDI – 614016
(For the candidate admitted from the academic year 2026 - 2027)
DEPARTMENT OF PHYSICS
B.Sc., PHYSICS

Semester I – VALUE EDUCATION

Ins. Hrs. /Week: 2

Course Credit: 2

Course Code: 26UGVED

UNIT I : PHILOSOPHY OF LIFE AND SOCIAL VALUES (6 Hours)

Human Life on Earth (Kural 629) -Purpose of Life (Kural 46) -Meaning and Philosophy of Life (Kural 131, 226) -Family (Kural 45), Peace in Family (Kural 1025) Society (Kural 446), The Law of Life (Kural 952), Brotherhood (Kural 807) Five responsibilities / duties of Man (a) to himself (b) to his family (c) to his environment (d) to his society, (e) to the Universe in his lives (Kural 43, 981).

UNIT II : HUMAN VALUES AND CITIZENSHIP (6 Hours)

Aim of education and value education: Evolution of value oriented education, Concept of Human values: types of Values- Character Formation – Components of Value education- A P J Kalam's ten points for enlightened citizenship- The role of media in value building

UNIT III: VALUE EDUCATION TOWARDS NATIONAL AND GLOBAL DEVELOPMENT: (6 Hours)

Constitutional or national values: Democracy, socialism, secularism, equality, Justice, liberty, freedom and fraternity - Social Values: Pity and probity, self-control, universal brotherhood - Professional Values - Knowledge thirst, sincerity in profession, regularity, punctuality and faith - Religious Values: Tolerance, wisdom, character - Aesthetic Values- Love and appreciation of literature and fine arts and respect for the same- National Integration and International Understanding.

UNIT IV: YOGA AND HEALTH (6 Hours)

Definition, Meaning, Scope of Yoga - Aims and objectives of Yoga - Yoga Education with modern context - Different traditions and schools of Yoga - Yoga practices: Asanas, Pranayama and Meditation.

UNIT V : HUMAN RIGHTS (6 Hours)

Concept of Human Rights: Indian and international perspectives- Evolution of Human Rights definitions under Indian and International documents -Broad classification of Human Rights and Relevant Constitutional Provisions: Right to Life, liberty and Dignity- Right to equality- Right against exploitation- Cultural and Educational Right- Economic Rights- Political Rights- Social Rights - Human Rights of Women and Children – Peace and harmony.

UNIT - VI: CURRENT CONTOURS: (for continuous internal assessment only):

COURSE OUTCOMES:

After completion of the course, the student will be able to:

1. Apply the values in Thirukkural to be peaceful, dutiful and responsible in family and society Develop character formation and sense of citizenship
2. Be secular, self-control, sincere, respectful and moral.
3. Master yoga, asana and meditation to promote mental health
4. Be attitudinal to follow the constitutional rights

BOOKS FOR REFERENCES:

- a) Thirukkural with English Translation of Rev. Dr. G.U. Pope, Uma Publication, 156, Serfoji Nagar, Medical College Road, Thanjavur 613 004
- b) jpUf;Fws; - [p.A.Nghg; - Mq;fpynkhopahf;fj;Jld; ckh E}y;>ntspaPl;lfk;>jQ;rhT+H>
- c) Leah Levin, Human Rights, NBT, 1998
- d) V.R. Krishna Iyer, Dialectics and Dynamics of Human Rights in India, Tagore Law Lectures.
- e) Yogic Thearpy - Swami Kuvalayananda and Dr.S.L.Vinekar, Government of India, Ministry of Health, New Delhi.
- f) SOUND HEALTH THROUGH YOGA - Dr.K.Chandrasekaran, PremKalyan Publications, Sedaptti, 1999.
- g) Grose. D. N – “A text book of Value Education’ New Delhi (2005)
- h) Gawande . EN – “Value Oriented Education” – Vision for better living. New Delhi (2002) Saruptsonsi)
- Brain Trust Aliyar- “Value Education for Health, Happiness and Harmony” Erode (2004) Vethathiri publications **

SEMESTER - II



SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI – 614016

(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF PHYSICS

Semester: II – CC - II: MECHANICS AND THEORY OF RELATIVITY

Ins. Hrs./Week: 4

Course Credit: 4

Course Code: U26PH203

COURSE OBJECTIVES

- To provide a better insight into the change of position of any physical object or event and their consequences.
- To study motion along curved paths and analyze the effects of centripetal force, banking of roads and tracks, and variation of gravitational acceleration with geographical factors.
- To inculcate the Newton's law of gravitation and Kepler's laws of planetary motion and their implications.
- To develop knowledge of rigid body dynamics, moment of inertia, centre of gravity, and oscillatory motion in rotating systems and compound pendulums.
- To impart the knowledge of theory of relativity and its applications.

UNIT – I PROJECTILE, IMPULSE AND IMPACT:

(12 Hours)

Projectile – Particle projected in any direction – Path of a projectile is a parabola - Range of a projectile on plane inclined to the horizontal - Maximum range on the inclined plane - Impulse of a force - Laws of impact - Direct impact between two smooth spheres – oblique impact between two smooth spheres - Loss of KE due to direct impact - Oblique impact.

UNIT – II MOTION ON A PLANE CURVE:

(11 Hours)

Centripetal and centrifugal forces - Hodograph - Expression for normal acceleration – Motion of a cyclist along a curved path - Motion of a railway carriage round a curved track- Motion of a carriage on a banked-up curve - Effect of earth's rotation on the value of the acceleration due to gravity - Variation of 'g' with altitude, latitude and depth.

UNIT – III GRAVITATION:

(12 Hours)

Newton's law of gravitation - Mass and density of earth - Inertial and Gravitation mass - Determination of G- Boy's experiment - Kepler's Laws of planetary motion - Deduction of Newton's law of gravitation from Kepler's Law - Gravitation - Field - potential - Intensity of Gravitational field - gravitational potential due to a point mass - Equipotential surface - Gravitational potential and field due to a spherical shell and solid sphere.

UNIT – IV DYNAMICS OF RIGID BODY AND CENTRE OF GRAVITY:

(14 Hours)

Moment of Inertia - Kinetic energy and angular momentum of rotating body – Perpendicular and parallel axes theorems - Acceleration of a body rolling down on inclined plane without slipping - Compound pendulum - Centre of suspension and centre of oscillation – Minimum period of a compound pendulum. - Centre of gravity of a body - C.G. of a solid hemisphere - C.G. of a solid cone – Centre of pressure – Centre of pressure of a triangular lamina immersed in a liquid.

UNIT – V THEORY OF RELATIVITY:

(11 Hours)

Galilean – Newtonian relativity - Galilean transformations – Michelson Morley experiment and its importance – Basic ideas of general theory of relativity - Lorentz transformations and its interpretation –

consequence of Lorentz transformation – Length contraction, time dilation – relativistic addition of velocities – Mass energy equivalence.

UNIT – VI: CURRENT CONTOURS (For Continuous Internal Assessment only – Self Study)

Applied mechanics and growing utilization of theoretical mechanics - Structural Engineering– Hydraulics - External fluid dynamics.

Total Lecture Hours - 60

COURSE OUTCOMES:

Upon completion of this course, the students would be able to

1. Use the principles of projectiles to explain the manner in which gravity affects a projectile motion.
2. Gain a deeper knowledge of mechanics and its fundamental concepts.
3. Acquire the knowledge of gravitational force between objects and the centre of mass of objects.
4. Learn rigid body dynamics in terms of moment of inertia and also analyze the center of gravity of different bodies.
5. Analyze the special theory of relativity and its applications.
6. Understand the principles and applications of Structural Engineering in the design and stability of structures.

TEXT BOOK(S)

1. M. Narayanamurthi and N. Nagarathinam, Dynamics, The National Publishing Company 2022, Chennai.
2. M. Narayanamurthi and N. Nagarathinam, Statics, Hydrostatics and Hydrodynamics -The National Publishing Company 2022, Chennai.
3. R. Murugesan and KiruthigaSivaprasath - Modern physics, 18th Revised edition November -2024, S.Chand& Company Ltd., New Delhi.
4. D.S. Mathur, Mechanics, S. Chand & Company Ltd., New Delhi, 2007.
5. Venkataraman, M K, Dynamics, Trichy: Agasthiar Book Depot, 2011
6. R. Murugesan, Mechanics and Mathematical Physics, S. Chand & Company Ltd., New Delhi, 2008.
7. I. H. Shames, Introduction to Solid Mechanics, 2009.

REFERENCE BOOK(S)

1. David Tong, Dynamics and Relativity, University of Cambridge, 2012.
2. M. Ray and G. C. Sharma, A text book of Dynamics, Chand & Company Ltd., New Delhi. 13th revised edition, 2018.
3. D. Rajan Babu, E. James Jebaseelan Samuel, P. Ramesh Babu, V. Ramasubramanian and C. AnuRadha, Modern Physics, Anuradha Publisher, 2020.
4. P. Duraipandian, LaxmiDuraiPandiyan and MuthamizhJayapragasam, Mechanics Chand & Company Ltd., New Delhi. 2019.
5. Agarwal, J P, Elements of Mechanics, India: PragatiPrakashan, 2021.

E - RESOURCES

1. <https://www.mooc-list.com/tags/gravitation>
2. <https://archive.org/details/NPTEL-Physics>
3. https://www.academia.edu/8233163/Basics_of_Mechanics_notes
4. <https://shorturl.at/kQSWV>
5. <https://youtu.be/y1ILE-eEsT8?si=ycTJPGYSMJ4ltluw>

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	2	3	3	3	3	3	3	3	3	2	2
CO2	2	2	3	3	2	2	3	2	3	3	3	3	3	3	2	3
CO3	3	2	3	3	2	2	3	2	2	3	3	3	3	3	2	1
CO4	3	3	2	3	2	2	3	2	3	3	3	3	3	3	3	3
CO5	3	3	2	3	2	2	3	3	3	3	3	3	3	3	3	2
CO6	2	2	3	1	2	2	3	3	2	3	2	2	1	2	2	2

S-Strong (3) M-Medium (2) L-Low (1)



SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)
SUNDARAKKOTTAI, MANNARGUDI – 614016
(For the Candidates admitted in the academic year 2026 – 2027)
DEPARTMENT OF PHYSICS

Semester: II-CP- II: Physics Practical II

Ins. Hrs. /Week: 4

Course Credit: 4

Course Code: U26PH204P

COURSE OBJECTIVES

- To determine the elastic properties of materials using bending and torsional methods.
- To study oscillatory motion and evaluate physical constants using pendulum experiments.
- To investigate the principles of sound and electrical measurements through laboratory experiments.
- To determine the optical properties of lenses, mirrors, and refractive media.
- To develop experimental skills in precision measurement, observation, and data analysis.

List of Experiments (Any Eight Experiments):

1. Determination of Young's modulus – Uniform bending by Koenig's method.
2. Determination of Rigidity modulus- Static Torsion method.
3. Determination of Rigidity modulus and moment of inertia using Torsional pendulum.
4. Sonometer - AC frequency.
5. Determination of 'g' and 'k' using a compound pendulum.
6. The figure of merit of a mirror Galvanometer.
7. Concave lens – Determination of focal length.
8. Determination of focal length, radius of curvature and refractive index of a long focus convex lens.
9. Air wedge- Determination of thickness of a thin wire.
10. Spectrometer – Determination of Refractive index of a hollow prism
11. Spectrometer– Determination of Refractive index of a liquid using a prism.
12. Spectrometer – Small-angle prism.

COURSE OUTCOMES:

Upon completion of this course, the students would be able to

1. Know the techniques of handling laboratory instruments.
2. Evaluate a process based on the results obtained from the experiments quantitatively and qualitatively.
3. Use the results of an experiment to describe a phenomenon.
4. Develop the capacity of experimenting collaboratively and ethically.
5. Acquire the skill of analyzing the properties of materials.
6. Understand the experimental skills in precision measurement, observation, and data analysis.

Total Lecture Hours – 60

TEXT BOOK(S)

1. Dr. S. Somasundaram, Practical Physics, Apsara Publications, Tiruchirappalli, 2023.
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi 2022.
3. C. L. Arora, *B.Sc. Practical Physics*, S. Chand & Company Pvt. Ltd., New Delhi, 2023.
4. S. L. Gupta and V. Kumar, *Practical Physics*, Pragati Prakashan, Meerut, 2022.
5. Indu Prakash and Ramakrishna, *A Text Book of Practical Physics*, Kitab Mahal Publishers, Allahabad, 2021.
6. Sanjay Sharma, *Basic Electronics and Linear Circuits Laboratory Manual*, Katson Books, New Delhi, 2021.

REFERENCE BOOK(S)

1. S. Srinivasan, A Text Book of Practical Physics, S.Sultan Chand Publications. 2022.
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2022.
3. M. N. Avadhanulu and P. G. Kshirsagar, *A Textbook of Engineering Physics*, S. Chand & Company Pvt. Ltd., New Delhi, 2023.
4. A. P. Malvino and D. P. Leach, *Digital Principles and Applications*, McGraw-Hill Education, New York, 2024.
5. David J. Griffiths, *Introduction to Electrodynamics*, Pearson Education, New Delhi, 2015.

E-RESOURCES

1. <https://shorturl.at/DnTqz>
2. <https://shorturl.at/Ht4g0>
3. <https://shorturl.at/vp9cP>
4. <https://www.scribd.com/>
5. <https://www.youtube.com/>

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	1	2	3	2	2	3	3	3	3	3	3	3	3	2	2
CO2	2	2	3	3	2	2	3	2	3	3	3	2	2	3	2	2
CO3	3	2	3	1	2	2	3	2	2	3	3	3	3	3	2	1
CO4	3	3	2	3	2	2	3	2	3	3	3	2	3	2	2	3
CO5	2	1	2	1	2	2	3	3	3	3	3	3	3	3	3	2
CO6	3	2	2	3	2	2	1	3	1	2	2	3	3	2	3	2

S-Strong (3) M-Medium (2) L-Low (1)

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)



SUNDARAKKOTTAI, MANNARGUDI- 614016
(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF MATHEMATICS

Allied Course

(For B. Sc., Physics & Chemistry)

Semester: II – AC – II: Trigonometry and Fourier series

Ins.Hrs./Week: 3

Course Credit: 3

Course Code: U26AMM203

COURSE OBJECTIVES

- To understand the fundamental concepts of complex numbers, De Moivre's theorem, and their applications in trigonometric expansions and related problems.
- To study hyperbolic functions, their properties, relationships with circular functions, inverse hyperbolic functions, and the separation of real and imaginary parts of complex expressions.
- To develop knowledge of logarithms of complex numbers and apply various techniques such as summation of series, difference methods, and arithmetic progression methods in problem solving.
- To learn the theory of Fourier series and apply Fourier series expansions to periodic functions, including the analysis of odd and even functions.
- To understand and construct half-range sine and cosine series for representing functions over finite intervals and solve related mathematical problem.

UNIT-I : Demovier's Theorem for Rational Number (9 Hours)

Introduction on Number System - Expansion of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ (n being a positive integer)
– Related Problems–Expansion of $\sin^n\theta$, $\cos^n\theta$ – Related Problems – Expansion of $\sin\theta$, $\cos\theta$
and $\tan \theta$ in terms of powers of θ – Related Problems.

UNIT –II : Hyperbolic Functions (9 Hours)

Introduction on Hyperbolic functions – Results – Related Problems – Relation between Hyperbolic and Circular functions–Related Problems–Expansion of Inverse Hyperbolic functions–Related Problems–Separation of real and imaginary parts–Related Problems.

UNIT –III : Logarithm of a Complex Number (9 Hours)

Introduction - Logarithm of a complex number – Related Problems – Summation of a series – Related Problems – Difference Method – Related Problems – Angles in Arithmetic Progression method – Related Problems.

UNIT- IV : Fourier series (9 Hours)

Fourier Series – Definition – Related Problems – Fourier Series Expansion of Periodic Functions with period 2π – Definition – Related Problems – Odd and Even Functions – Definition– Properties of Odd and Even Functions – Related Problems.

UNIT –V : Half Range Fourier series (9 Hours)

Half range sine series – Definition – Related Problems - Half range cosine series – Definition – Related Problems.

Total Lecture Hours-45

UNIT-VI: CURRENT CONTOUR (For Continuous Internal Assessment Only):

Problems on Demoivre's theorem-Arithmetic Progression-Sine Series and Cosine Series.

COURSE OUTCOME

After the Completion of the Course, the students should be able to

1. Examine the expansion of $\sin n\theta$ and $\cos n\theta$ and its related problems.
2. Analyze the hyperbolic functions and its relation between hyperbolic and circular functions.
3. Describe the summation of series and its methods.
4. Apply the concept of Fourier series and familiarizes with odd, even Fourier series with their periodic functions.
5. Analyze the half range sine and cosine functions and its change of interval.
6. Analyze the Sine Series and Cosine Series for odd functions and even functions.

TEXT BOOKS

1. Arumugam S, Thangapandi Issac A and Somasundaram A. 1999. Trigonometry and Fourier Series. New Gamma Publications, Palayamkkottai.
2. Narayanan S and Manicavachagam Pillay. T.K 2014. Calculus Volume III. Viswanathan Publishing Company, Chennai.

UNIT-I	Chapter 1 : Sec. 1.2 to 1.3 of [1]
UNIT-II	Chapter 2 : Sec. 2.1 and 2.2 of [1]
UNIT-III	Chapter 3 : Sec 3.1 of [1] Chapter 4 : Sec. 4.1 & 4.2, 4.3 of [1]
UNIT- IV	Chapter 6 : Sec. 1 to 3 of [2]
UNIT- V	Chapter 6 : Sec. 4 & 5 of [2]

REFERENCE BOOK(S)

1. Dyke P.G 2001. An Introduction to Laplace Transforms and Fourier Series. Springer – Verlag, London.
2. Gelfand I.F. and Saul M. 2012. Trigonometry. Springer – Verlag, London.
3. Jain S.K. 2001. Fourier Series and Fourier Transforms. Sarup and Sons, New Delhi.
4. Rawat K.S. 2005. Trigonometry. Sarup and Sons, New Delhi.
5. Robert T Seeley. 2006. An Introduction to Fourier Series and Integrals. Dover Publications, New York.

E-RESOURCES

1. https://orion.math.iastate.edu/butler/PDF/trig_notes.pdf
2. <http://users.auth.gr/~siskakis/GelfandSaul-Trigonometry.pdf>
3. <https://lib.alfaisal.edu/pdf/AlgebraAndTrigonometry-LR.pdf>
4. <https://math.mit.edu/~gs/cse/websections/cse41.pdf>
5. <https://fenedebiyat.siirt.edu.tr/dosya/personel/uygulamali-matematik-siirt-201935221347541.pdf>

Course Learning Outcome (for Mapping with POs and PSOs)

	Pos										PSOs		
	1	2	3	4	5	6	7	8	9	10	1	2	3
CLO1	3	3	2	3	1	3	1	2	2	2	3	2	1
CLO2	3	2	1	2	3	2	2	2	2	2	3	2	1
CLO3	3	2	2	1	2	1	2	1	3	2	3	2	1
CLO4	2	1	2	2	3	2	2	3	1	2	3	2	1
CLO5	3	2	2	2	3	3	2	2	2	1	3	2	1
CL06	3	2	2	1	1	3	2	2	2	1	1	2	1

Strong: 3 Medium: 2 Low: 1



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF MATHEMATICS

Allied Practical – II

(For B.Sc., Physics & Chemistry)

Semester: II- AP-II: Trigonometry and Fourier Series with SCILAB Practical

Ins. Hrs./Week: 3

Course Credit: 3

Course Code: U26AMM204P

COURSE OBJECTIVES:

- Apply De Moivre's theorem to obtain expansions of trigonometric functions and solve related problems.
- Evaluate hyperbolic and inverse hyperbolic functions, and establish relationships between circular and hyperbolic functions.
- Compute the logarithm of complex numbers, separate real and imaginary parts, and solve problems involving series summation.
- Determine Fourier series expansions of periodic functions and identify the properties of odd and even functions.
- Obtain half-range sine and cosine series expansions for functions defined on a finite interval and apply them in mathematical analysis.

LIST OF PRACTICALS

1. Expansions of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$.
2. Evaluate Hyperbolic Functions.
3. Evaluate Inverse Hyperbolic Functions.
4. Separate Real and Imaginary Parts of a Complex Number.
5. Logarithm of a Complex Number.
6. Half-range sine and cosine series for a given function.
7. Program for Fourier Series Coefficients.
8. Determine Fourier coefficients of simple periodic functions.

Total Lecture Hours – 45

COURSE OUTCOME

After successful completion of the course, the students will be able to:

1. Apply De Moivre's theorem to expand trigonometric functions and solve problems involving complex numbers.
2. Analyze hyperbolic functions, inverse hyperbolic functions, and their relationships with circular functions.
3. Evaluate logarithms of complex numbers and apply methods for summation of series.
4. Determine Fourier series expansions of periodic functions and identify the properties of odd and even functions.
5. Construct half-range sine and cosine series and apply them to solve problems arising in Physics and Chemistry.
6. Interpret and apply mathematical concepts to analyze periodic phenomena, wave motions, heat transfer, and other scientific problems encountered in Physics and Chemistry.

TEXT BOOK(S)

1. Arumugam S, Thangapandi Issac A and Somasundaram A. 1999. Trigonometry and Fourier Series. New Gamma Publications, Palayamkottai.
2. Narayanan S and Manicavachagam Pillay. T.K 2014. Calculus Volume III. Viswanathan Publishing Company, Chennai.

REFERENCE(S)

1. Dyke P.G 2001. An Introduction to Laplace Transforms and Fourier Series. Springer – Verlag, London.
2. Gelfand I.F. and Saul M. 2012. Trigonometry. Springer – Verlag, London.
3. Jain S.K. 2001. Fourier Series and Fourier Transforms. Sarup and Sons, New Delhi.
4. Rawat K.S. 2005. Trigonometry. Sarup and Sons, New Delhi. Robert T Seeley. 2006.
5. An Introduction to Fourier Series and Integrals. Dover Publications, New York.

E_RESOURCES

1. <https://www.siirt.edu.tr/dosya/personel/E-Numerical-siirt-2019217142654486.pdf>
2. https://sde.uoc.ac.in/sites/default/files/sde_videos/BSc_maths_numerical_methods.pdf
3. <https://www.scribd.com/document/815954921/Introductory-Methods-of-Numerical-Analys>
4. www.sultanchandandsons.com/Book/61/Fundamentals-of-Mathematical
5. [Logarithmic valsu?utm_source=chatgpt.com](https://www.logarithmicvalsu.com/?utm_source=chatgpt.com)

Course Learning Outcome (for Mapping with POs and PSOs)

	POs										PSOs				
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5
CLO1	3	2	3	1	1	2	2	2	1	1	3	2	2	3	2
CLO2	3	3	3	2	2	1	2	2	3	1	3	3	2	3	2
CLO3	3	2	3	2	1	2	2	2	1	1	3	3	3	3	2
CLO4	3	3	3	2	1	2	2	2	1	1	3	3	3	3	3
CLO5	3	2	2	1	2	1	2	2	1	1	3	3	3	3	3
CLO6	3	3	2	1	2	1	2	2	1	1	3	2	3	2	2

Strong: 3

Medium: 2

Low: 1



SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
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SUNDARAKKOTTAI, MANNARGUDI – 614 016.
(For the candidates admitted from the academic year 2026 -2027)
DEPARTMENT OF PHYSICS

Semester: II - SEC- I: Lasers and Fiber Optics

Ins. Hrs. /Week: 2

Course Credit: 2

Course Code: U26SEPH21

COURSE OBJECTIVES

- To understand the fundamental principles of laser operation.
- To study the construction, working principles, and characteristics of lasers.
- To explore the diverse applications of lasers.
- To acquire knowledge of optical fiber communication systems and different types of optical fibers.
- To understand the characteristics and practical applications of optical fibers and photonic devices.

UNIT – I Fundamentals of Laser

(6 Hours)

Basic principles: Spontaneous and Stimulated emission – Einstein's coefficient – Pumping mechanism: Optical, Electrical and laser pumping – Population inversion – two and three level laser system – Resonator configuration – quality factor – Threshold condition – concept of Q switching – Theory of mode locking – cavity dumping.

UNIT – II Types of Laser

(7 Hours)

Solid state laser: Ruby laser, Nd:YAG laser, Nd:Glass laser – Semiconductor laser: Intrinsic semiconductor laser, Doped semiconductor laser, Injection laser – Dye laser – Chemical laser: HCL laser, DF- CO₂, CO chemical laser. Gas laser: Neutral atom gas laser (He-Ne laser), CO₂ laser, Copper vapour laser.

UNIT – III Applications of Laser

(5 Hours)

Application of laser in metrology – Optical communication – Material processing: Laser instrumentation of material processing, Powder feeder, Laser heating, Laser welding, Laser melting – Medical application – Laser instrumentation for surgeries – Laser in astronomy.

UNIT – IV Fiber optics

(6 Hours)

Basic components of optical fiber communication – Principles of light propagation through fiber – Total Internal reflection – Optical fiber – Coherent bundle – Numerical aperture and skew mode – Phase shift and attenuation during total internal reflection.

Types of fiber: Single mode and multi-mode fiber – Step index and Graded index fiber – Fiber optic sensors – Application of fiber optics.

UNIT – V Characteristics and fabrication of optical fiber

(6 Hours)

Fiber characteristics: Mechanical and Transmission characteristics – Absorption loss and Scattering loss measurements – Dispersion – Connectors and splicers – Fiber termination – Optical time domain reflectometer (OTDR) and its uses – Fiber material – Fiber fabrication – Fiber optic cables design.

UNIT – VI : CURRENT CONTOURS (For Continuous Internal Assessment only – Self Study)

Seminar on recent laser technologies - Assignment on modern fiber optic communication systems - Mini project on laser applications in industry or medicine - Case study on photonics-based devices - Group discussion on future trends in optical communication systems Photonic crystal fibers

Total Lecture Hours – 30

COURSE OUTCOMES

Upon successful completion of the course, students will be able to:

1. Explain the fundamental concepts and operational principles of laser systems and optical resonators.
2. Differentiate between various types of lasers and describe their construction, characteristics, and applications.
3. Analyze the role of lasers in industrial, medical, communication, and scientific applications.
4. Describe the principles of optical fiber communication, including total internal reflection, numerical aperture, and fiber transmission.
5. Classify optical fibers based on mode and refractive index profiles and evaluate their applications in sensing and communication systems.
6. Demonstrate an understanding of fiber characteristics, fabrication methods, loss mechanisms, dispersion effects, and modern developments in photonics and optical communication.

TEXT BOOK(S)

1. B.B. Laud - Laser and Non-linear Optics, New Age International Publications Third Edition, New Delhi, 2019.
2. An Introduction to laser, theory and applications by Avadhunulu, M.N.S., Chand and Co, New Delhi, 2018
3. J. Wilson and J.F.B. Hawkes. 'Introduction to Opto Electronics', Pearson Education, 2018.
4. Gerd Keiser, *Optical Fiber Communications*, McGraw Hill Education, 5th Edition, 2021.
5. Ajoy Ghatak, Optics, Mc Graw-Hill Education (India) Pvt, Ltd, 6th Edn., 2023.

REFERENCE BOOK(S)

1. A.Sennaroglu, "Photonics and Laser Engineering: Principles, Devices and Applications" McGraw-Hill Education, 2010.
2. K.R.Nambiar, "Lasers: Principles, Types and Applications", New Age International, 2004.
3. William T. Silfvast, *Laser Fundamentals*, Cambridge University Press, 2nd Edition, 2004.
4. Joseph C. Palais, *Fiber Optic Communications*, Pearson Education, 5th Edition, 2005.
5. Orazio Svelto, *Principles of Lasers*, Springer Publications, 5th Edition, 2010.

E- RESOURCES

1. https://www.youtube.com/results?search_query=ruby+laser+working
2. https://www.youtube.com/results?search_query=dye+laser+working
3. https://www.youtube.com/results?search_query=chemical+laser+hcl+df+co2
4. https://www.youtube.com/results?search_query=laser+applications+in+metrology
5. https://www.youtube.com/results?search_query=total+internal+reflection+fiber+optics

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	2	3	3	3	3	3	3	3	3	2	2
CO2	2	2	3	3	2	2	3	2	3	3	3	3	3	3	2	3
CO3	3	2	3	3	2	2	3	2	2	3	3	3	3	3	2	1
CO4	3	3	2	3	2	2	3	2	3	3	3	3	3	3	3	3
CO5	3	3	2	3	2	2	3	3	3	3	3	3	3	3	3	2
CO6	2	2	3	1	2	1	3	1	2	2	2	3	2	3	3	2

S-Strong (3)

M-Medium (2)

L-Low (1)

**INTERDISCIPLINARY COURSE (IDC)
OFFERED BY THE DEPARTMENT**



SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)
SUNDARAKKOTTAI, MANNARGUDI – 614 016.
(For the candidates admitted from the academic year 2026 -2027)
DEPARTMENT OF PHYSICS

Semester: I IDC – I - Physics for Everyday Life

Ins. Hrs. /Week: 2

Course Credit: 2

Course Code: U26IDPH11

COURSE OBJECTIVES

- To understand the basic principles and applications of mechanical objects used in everyday life.
- To learn the working and applications of optical instruments and laser technology.
- To study the physics behind common household appliances.
- To gain knowledge about solar energy and its practical applications.
- To know the contributions of famous Indian physicists to science and technology.

UNIT – I Mechanical Objects

(6 Hours)

Spring scales – Bouncing balls – Roller coasters – Bicycles – Rockets and Space travel.

UNIT – II Optical Instruments and Laser

(7 Hours)

Vision corrective lenses – Polaroid glasses – UV protective glass – Polaroid camera – Colour photography – Holography and Laser.

UNIT – III Physics of Home Appliances

(5 Hours)

Bulb – Fan – Hair drier – Television – Air Conditioners – Microwave ovens – Vacuum cleaner.

UNIT – IV Solar Energy

(6 Hours)

Solar constant – General applications of solar energy – Solar water heaters – Solar Photo – Voltaic cells – General applications of solar cells.

UNIT - V Indian Physicist and their Contributions

(6 Hours)

C.V.Raman, Homi Jehangir Bhabha, Vikram Sarabhai, Subrahmanyan Chandrasekhar, Venkatraman Ramakrishnan, Dr. APJ Abdul Kalam and their contribution to science and technology.

UNIT – VI : CURRENT CONTOURS (For Continuous Internal Assessment only – Self Study)

Smart materials and smart appliances - Electric vehicles and battery technologies - Renewable and sustainable energy systems - Artificial intelligence in household devices - Internet of Things (IoT) and smart homes - Seminar on smart home technologies - Assignment on renewable energy applications.

Total Lecture Hours - 30

COURSE OUTCOMES

After successful completion of this course, the students will be able to:

1. Explain the physics principles involved in common mechanical objects and everyday phenomena.
2. Describe the working of optical instruments, lasers, and their practical applications.
3. Understand the operating principles of household electrical appliances and energy-based devices.
4. Discuss the importance, functioning, and applications of solar energy systems and solar cells.
5. Recognize the contributions of eminent Indian physicists to science and technology.
6. Analyze recent developments and modern technological applications of physics in daily life.

TEXT BOOK(S)

1. David J. Griffiths, *The Physics of Everyday Phenomena: A Conceptual Introduction to Physics*, 6th Edition, McGraw Hill Education, 2023.
2. Louis A. Bloomfield, *How Things Work: The Physics of Everyday Life*, 6th Edition, Wiley Publications, 2024.
3. C. V. Raman, *Lectures on Physics and Scientific Contributions*, Universities Press, 2022.
4. S. O. Pillai, *Solid State Physics*, 8th Edition, New Age International Publishers, 2024.
5. G. D. Rai, *Non-Conventional Energy Sources*, 6th Edition, Khanna Publishers, 2023.

REFERENCE BOOK(S)

1. Ajoy Ghatak, *Optics*, 6th Edition, McGraw Hill Education, 2023.
2. Umme Ammara, *The Physics in our Daily Lives*, Gugucol Publishing, Hyderabad, 2019.
3. Walter Lawin, *For the love of physics*, Free Press, New York, 2011.
4. S. P. Sukhatme and J. K. Nayak, *Solar Energy: Principles of Thermal Collection and Storage*, McGraw-Hill Education India Pvt. Ltd., New Delhi, 2024.
5. Arthur Beiser, *Concepts of Modern Physics*, McGraw-Hill Education, New York, 2023.

E - RESOURCES

1. <https://shorturl.at/Iy2RG>
2. <https://shorturl.at/WNnJh>
3. <https://shorturl.at/OTpLL>
4. https://www.youtube.com/watch?v=bHmxN2D8Q5s&utm_source=chatgpt.com
5. <https://youtu.be/9cNmUNHSBac?si=r0eAsPMDqf5bliXw>

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2	3	3	3	3	3	3	3	3	2	2
CO2	2	2	1	3	-	2	-	2	-	3	1	3	3	3	2	2
CO3	3	2	3	2	3	2	3	2	2	1	3	3	3	3	2	1
CO4	3	3	2	1	3	-	3	-	3	3	3	1	3	3	3	3
CO5	3	3	2	3	-	2	3	3	3	1	3	3	3	3	3	2
CO6	2	2	3	3	2	1	3	2	2	2	2	3	2	2	2	2

S-Strong (3) M-Medium (2) L-Low (1)



SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)
SUNDARAKKOTTAI, MANNARGUDI – 614 016.
(For the candidates admitted from the academic year 2026 - 2027)
DEPARTMENT OF PHYSICS

Semester: II IDC – II - Home Electrical Installation

Ins. Hrs. /Week: 2

Course Credit: 2

Course Code: U26IDPH22

COURSE OBJECTIVES

- To understand the fundamental concepts of electricity, electrical circuits, and the operation of basic electrical measuring instruments.
- To acquire knowledge of electrical power generation, transmission, distribution systems, and the role of transformers in minimizing transmission losses.
- To develop an understanding of domestic and industrial electrical wiring, components, and installation procedures.
- To learn the principles of electrical energy consumption, power rating, energy efficiency, and energy auditing.
- To promote awareness of electrical safety practices, protective devices, and first-aid measures for electrical hazards.

UNIT – I SIMPLE ELECTRICAL CIRCUITS

(6 Hours)

Charge, current, potential difference, resistance – Simple electrical circuits – DC ammeter, voltmeter, ohmmeter – Ohm's law – difference between DC and AC – Advantages of AC over DC – Electromagnetic induction - Transformers – Inductors/Chokes – Capacitors/Condensers – impedance – AC ammeter, Voltmeter – Symbols and Nomenclature.

UNIT – II TRANSMISSION OF ELECTRICITY

(7 Hours)

Production and transmission of electricity – Concept of power grid – Series and Parallel connections – Technicalities of junctions and loops in circuits – Transmission losses (qualitative) – roles of step-up and step-Down transformers – Quality of connecting wires – Characteristics of single and multicore wires

UNIT – III ELECTRICAL WIRING

(5 Hours)

Different types of switches – Installation of two way switch – Role of sockets, Plugs, Sockets - Installation of meters – Basic switch board – Electrical bell – Indicator – Fixing of tube lights and fans – Heavy equipment like AC, Fridge, Washing machine, Oven, Geyser, Jet pumps – Provisions for inverter – Gauge specifications of wires for various needs.

UNIT – IV POWER RATING AND POWER DELIVERED

(6 Hours)

Conversion of electrical energy in to different forms – Work done by electrical energy – Power rating of electrical appliances – Energy consumption – Electrical energy unit in kWh – Calculation of EB bill – Joule's heating – Useful energy and Energy loss – Single and three phase connections – Measures to save electrical energy – Energy audit.

UNIT – V SAFETY MEASURES

(6 Hours)

Insulation for wires – Colour specification for mains, Return and Earth – Understanding of fuse and circuit breakers – Types of fuse: kit-kat, HRC, Cartridge, MCB, ELCB – Purpose of earth line – Lighting arrestors – Short circuiting and Over loading – Electrical safety – Tips to avoid electrical shock – First aid for electrical shock – Fire safety for electric current.

UNIT – VI : CURRENT CONTOURS (For Continuous Internal Assessment only – Self Study)

Identification of electrical symbols, switches, plugs, sockets and wiring accessories, Demonstration of series and parallel electrical connections, Measurement of voltage, current and resistance using multimeter, Verification of Ohm's law in simple electrical circuits, Study of domestic electrical wiring and switchboard layout.

Total Lecture Hours - 30

COURSE OUTCOMES

After successful completion of the course, students will be able to:

1. Explain the basic concepts of electricity and electrical circuits.
2. Identify and use common electrical measuring instruments.
3. Understand domestic wiring systems and electrical installations.
4. Calculate electrical power consumption and energy usage.
5. Apply safety measures to prevent electrical hazards and accidents.
6. Demonstrate awareness of electrical safety and energy conservation practices.

TEXT BOOK(S)

1. Rex Cauldwell, Wiring a House, 5th Edition 2024.
2. Editors of Cool Springs Press Black & Decker Advanced Home Wiring, 5th Edition: Backup Power - Panel Upgrades - AFCI Protection - "Smart" Thermostats, 2025.
3. Kevin Ryan Complete Beginners Guide to Rough in Electrical Wiring, 2022.
4. B.L. Theraja and A.K. Theraja, *A Textbook of Electrical Technology – Volume I*, S. Chand Publications, 2023.
5. D.P. Kothari and I.J. Nagrath, *Basic Electrical Engineering*, McGraw Hill Education, 2024.

REFERENCE BOOK(S)

1. V. K. Mehta and Rohit Mehta, Basic Electrical Engineering, S. Chand Publications, 2023.
2. S. L. Uppal, Electrical Wiring Estimating and Costing, Khanna Publishers, 2023.
3. Trevor Linsley, Basic Electrical Installation Work, Routledge Publications. 2024.
4. V.K. Mehta and Rohit Mehta, *Principles of Power Systems*, S. Chand Publications, 2023.
5. S.L. Uppal and G.C. Garg, *Electrical Wiring, Estimating and Costing*, Khanna Publishers, 2022.

E-RESOURCES

1. <https://shorturl.at/legwQ>
2. <https://shorturl.at/Sv5t8>
3. <https://shorturl.at/tqlQA>
4. <https://shorturl.at/s5NnB>
5. https://www.youtube.com/results?search_query=short+circuit+and+overloading

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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CO2	2	2	3	3	2	2	3	2	3	3	3	3	3	3	2	3
CO3	3	2	3	2	3	2	3	2	2	3	3	3	3	3	2	2
CO4	3	3	2	3	3	2	3	2	3	3	3	3	3	3	3	3
CO5	3	3	2	3	2	2	3	3	3	3	3	3	3	3	3	2
CO6	2	2	3	3	2	1	3	2	2	2	2	3	2	2	2	2

S-Strong (3) M-Medium (2) L-Low (1)

**ALLIED COURSES
OFFERED BY THE DEPARTMENT**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)



SUNDARAKKOTTAI, MANNARGUDI – 614016
(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF PHYSICS
(For the students of I B.Sc. Mathematics)

Semester: I - AC- I: Physics - I

Ins. Hrs. /Week: 3

Course Credit: 3

Course Code: U26APY101

COURSE OBJECTIVES:

- To know the elastic nature of materials, analyze the expression for Young's modulus and comprehend about viscosity and surface tension of fluids.
- To acquire knowledge of the centre of gravity, states of equilibrium of rigid bodies and stability of floating bodies.
- To understand the laws of thermodynamics, thermal conductivity and blackbody radiation.
- To familiarize the concepts of interference and diffraction.
- To know the formation, characteristics and applications of diodes and transistors.

UNIT -I: Properties of Matter

(14 Hours)

Elasticity: Stress–Strain–Young's modulus–stress-strain Diagram–Bending of beams–Expression for the bending moment–Measurement of Young's modulus by bending of a beam–Non-uniform bending and uniform bending.

Viscosity: Streamline flow and Turbulent Flow–Critical velocity–Poiseuille's formula –Determination of Coefficient of Viscosity of a liquid (Variable Pressure head)

Surface Tension: Definition–Drop Weight method of determining the surface tension of a Liquid–Experiment to determine the interfacial tension

UNIT-II: Mechanics

(10 Hours)

Centre of Gravity – Introduction- Centre of Gravity of a Solid Hemisphere–Hollow Hemisphere–Centre of Gravity of a Solid Cone

States of Equilibrium: Equilibrium of a rigid body – Stable, unstable and neutral equilibrium – Example.

Stability of Floating bodies – Metacentre – Determination of Metacentric height of a ship.

UNIT-III: Thermal Physics

(12 Hours)

Thermodynamics: Laws of thermodynamics – Reversible and irreversible process – Heat engine – Carnot's theorem.

Radiation: Black body – Stefan's law – Newton's law of cooling – Newton's law of cooling from Stefan's law – Experimental determination of Stefan's constant –Wien's displacement law –Rayleigh - Jean's law – Planck's law.

Heat Conduction: Coefficient of Thermal Conductivity –Determination of Thermal Conductivity of a bad Conductor by Lee's disc method.

UNIT-IV: Optics

(12 Hours)

Interference: Superposition of waves –Principle of interference – Air wedge – Newton's rings.

Diffraction: Introduction –Plane diffraction Grating – Theory of plane transmission Grating.

Fiber Optic communication: Introduction – Optic Fiber – Numerical Aperture – Coherent bundle – Fiber optic communication System and its advantages.

UNIT-V: Electronics**(12 Hours)**

Intrinsic and extrinsic semiconductor – PN Junction diode – Biasing of PN junction – V-I characteristics of junction diode – Rectifiers – Half wave – Full wave and Bridge rectifiers – Zener diode – Characteristics of Zener diode – Voltage regulator – Transistor – Characteristics of transistor – CB and CE mode – Transistor as an amplifier.

UNIT – VI: CURRENT CONTOURS (For Continuous Internal Assessment only – Self Study)

Reinforced concrete–Advanced Nano photonics–Surface tension of thermal fluids–Nano fluids–Low Viscous silicon liquid immersed transformers – Bio diesel – fueled diesel engines –Electronic transformers.

Total Lecture Hours - 45**COURSE OUTCOME**

Upon successful completion of this course the students would be able:

1. Apply the concepts of elasticity, viscosity and surface tension to solve problems encountered in everyday life.
2. Understand the centre of gravity, states of equilibrium of rigid bodies and also stability of floating bodies.
3. Understand the laws of thermodynamics, thermal conductivity and black body radiation.
4. Understand the theories and experiments on interference and diffraction using air wedge, Newton's ring and grating.
5. Know the formation, characteristics and applications of diodes and transistor.
6. Understand the principles and applications of semiconductor devices.

TEXT BOOK(S)

1. R. Murugesan, Properties of matter, Chand & Co. Pvt.Ltd., Revised edition, 2023.
2. Narayanamoorthy and N. Nagarathinam, Mechanics-Part II, The National Publishing Company, Chennai, 2022.
3. Dr.N.Subramaniam,Brijlal and Dr.M.N.Avathanulu, Optics, S. Chand&Co. Pvt.Ltd.- 25th revised edition, New Delhi, 2024.
4. V.Vijayendran,S.Viswanathan,.DigitalFundamentals, Printers & Publishers Private Ltd, Chennai, 2021.
5. A.B.Gupta and H.P.Roy Thermal physics,Books&Allied (P) Ltd.,kolkatta, 2022.

REFERENCE BOOK (S)

1. R.L. Saihgal, A Text Book of Sound, S. Chand & Co. Pvt. Ltd, New Delhi, 2022.
2. D.S. Mathur, Mechanics, S. Chand & Company Ltd., New Delhi ,2018.
3. K.Mehta and Rohit Mehta, 2017.Principles of Electronics, Chand & Co. Pvt.Ltd., Revised edition
4. Brijlaland Subramaniam,.Heat and Thermodynamics & Statistical physics, S. Chand & Co, 2023.
5. P.Duraipandian & Muthamizh Jayapragasam, Chand&Co. Pvt.Ltd., Revised edition,2022.

E- RESOURCES

- 1._<https://cutt.ly/Vhlco3J>
- 2.<https://youtu.be/amGa5RRrC5s>
- 3.<http://shorturl.at/dkux4>
- 4.<http://shorturl.at/lmBFL>
- 5.<https://youtu.be/G0iSEDyJKDo>

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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CO2	2	2	3	3	2	2	3	2	3	3	3	3	3	3	2	3
CO3	3	2	3	3	2	2	3	2	2	3	3	3	3	3	2	2
CO4	3	3	2	3	2	2	3	2	3	3	3	3	3	3	3	3
CO5	3	3	2	3	2	2	3	3	3	3	3	3	3	3	3	2
CO6	2	2	3	3	2	1	3	2	2	2	2	3	2	2	2	2

S-Strong (3) M-Medium (2) L-Low (1)



SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI – 614016

(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF PHYSICS

(For the students of I B.Sc. Mathematics)

Semester: I - AP- I: PHYSICS – I PRACTICAL

Ins. Hrs. /Week: 3

Course Credit: 3

Course Code: U26APY102P

COURSE OBJECTIVES

1. To develop practical skills in measuring the elastic properties of materials, including Young's modulus and rigidity modulus, using standard experimental techniques.
2. To understand and determine the physical properties of liquids and solids such as surface tension, viscosity, specific heat capacity, and thermal conductivity through laboratory experiments.
3. To study the principles of oscillations, vibrations, and wave phenomena using experiments involving torsional oscillations and the sonometer.
4. To investigate optical phenomena and determine optical constants such as refractive index, wavelength of light, radius of curvature, and thickness of thin objects using optical instruments.
5. To enhance experimental competence in data collection, error analysis, observation, and interpretation of results using precision laboratory equipment.

List of Experiments (Any Seven Experiments):

1. Determination of Young's modulus by Non-Uniform bending using Pin and Microscope.
2. Determination of Young's modulus by Uniform bending using Scale and Telescope.
3. Surface tension and Interfacial Surface tension by Drop weight Method.
4. Coefficient of viscosity of a liquid –Variable Pressure head Method.
5. Rigidity modulus by torsional oscillations without mass
6. Verification of laws of transverse vibrations using sonometer.
7. Specific heat capacity of a liquid by Newton's law of cooling Method.
8. Thermal conductivity of a bad conductor by Lee's disc Method.
9. Spectrometer–Refractive index of a solid prism.
10. Spectrometer–Finding the wavelength of spectral lines using Grating–Normal incidence method.
11. Newton's Rings–Determination of radius of curvature of a long focus lens.
12. Air wedge –Thickness of the given thin wire.

Total Lecture Hours - 45

COURSE OUTCOMES

Upon successful completion of this course the students would be able:

1. Understand the Laboratory techniques.
2. Evaluate a process based on the results obtained from the experiments quantitatively and qualitatively.
3. Extend the scope of investigation as expected.
4. Communicate a process with help of the outcomes of an experiment.
5. Develop the skill of conducting an experiment collaboratively and ethically.
6. Understand the experimental skills in precision measurement, observation, and data analysis.

TEXT BOOK(S)

1. Dr. S. Somasundaram, Practical Physics, Apsara Publications, Tiruchirappalli, 2023.
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi 2022.
3. C. L. Arora, *B.Sc. Practical Physics*, S. Chand & Company Pvt. Ltd., New Delhi, 2023.
4. S. L. Gupta and V. Kumar, *Practical Physics*, Pragati Prakashan, Meerut, 2022.
5. Indu Prakash and Ramakrishna, *A Text Book of Practical Physics*, Kitab Mahal Publishers, Allahabad, 2021.
6. Sanjay Sharma, *Basic Electronics and Linear Circuits Laboratory Manual*, Katson Books, New Delhi, 2021.

REFERENCE BOOK(S)

1. S. Srinivasan, A Text Book of Practical Physics., Sultan Chand Publications, 2022.
2. P. R. Sasi Kumar, *Practical Physics*, PHI Learning Pvt. Ltd., New Delhi, 2022.
3. N. Subrahmanyam and Brij Lal, *A Textbook of Optics*, S. Chand & Company Pvt. Ltd., New Delhi, 2023.
4. M. N. Avadhanulu and P. G. Kshirsagar, *A Textbook of Engineering Physics*, S. Chand & Company Pvt. Ltd., New Delhi, 2023.
5. A. P. Malvino and D. P. Leach, *Digital Principles and Applications*, McGraw-Hill Education, New York, 2024.
2. David J. Griffiths, *Introduction to Electrodynamics*, Pearson Education, New Delhi, 2015.

E - RESOURCES

1. <https://youtu.be/Q8Otf6k3uGk>
2. <https://youtu.be/8DhfUz0idwM>
3. https://youtu.be/TZWk5-8R5tc?si=ZFPUBa-FyFzH3z_R
4. <https://youtu.be/PlrpxROzgVg?si=lgZfsbiViyBPDcbV>
5. https://youtu.be/jPU_UzPYeCA?si=n_5VhjL-S5irHvFJ

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	2	3	3	3	3	3	3	3		2	3
CO2	2	2	3	3	2	2	3	2	3	3	3	3	3	3	2	3
CO3	3	2	3	3	2	2	3	2	2	3	3	3	3		2	2
CO4	3	3	2	3	2	2	3	2	3	3	3	3	3	3	3	3
CO5	3	3	2	3	2	2	3	3	3	3	3	3	3		3	2
CO6	2	2	3	3	2	1	3	2	2	2	2	3	2	2	2	2

S-Strong (3) M-Medium (2) L-Low (1)



SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI – 614016

(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF PHYSICS

(For the students of I B.Sc. Mathematics)

Semester: II - AC- II: Physics - II

Ins. Hrs. /Week: 3

Course Credit: 3

Course Code: U26APY203

COURSE OBJECTIVES:

- To understand the Coulomb's law and Gauss theorem and to gain a brief knowledge of capacitors.
- To acquire the knowledge on properties, types of magnetic materials and hysteresis of ferromagnetic material.
- To know atom models and understand the properties, types of x-rays and Crystal structure.
- To study the basics of nucleus and their properties, nuclear reaction, nuclear models and elementary particles.
- To learn the binary number system, binary arithmetic operations, logic gates and De-Morgan's theorem.

UNIT - I ELECTROSTATICS:

(12 Hours)

Coulomb's inverse square law – Gauss theorem and its applications - Intensity at a point due to a charged sphere and cylinder – Principle of a capacitor – Capacity of a spherical and cylindrical capacitors–Energy stored in a capacitor–Loss of energy due to sharing of charges – Capacitors in series and parallel–Types of capacitors.

UNIT – II MAGNETISM:

(11 Hours)

Intensity of magnetization – Susceptibility – Types of magnetic materials – Properties of para, dia and ferromagnetic materials–Cycle of magnetization – Hysteresis – B-H curve –Applications of B-Hcurve–Magnetic energy per unit volume–Ferro magnets and their applications.

UNIT - III ATOMIC PHYSICS:

(13 Hours)

Atom Models: Summerfield's and Vector atom Models – Pauli's exclusion principle –Various quantum number sand quantization of orbits.

X-rays: Continuous and Characteristic X-rays – Mosley's Law and its importance –Bragg's law – Miller indices – Determination of Crystal Structure by Laue's Powder photo graph method.

UNIT - IV NUCLEAR PHYSICS:

(11 Hours)

Introduction–Nucleus–Classification of Nuclei – Nuclear Size – Charge – Mass and Spin – Liquid drop model – Nuclear Radiations and their properties-Particle accelerators – Betatron – Proton Synchrotron – Four types of reactions –Elementary particles and their classifications.

UNIT - V DIGITAL ELECTRONICS:

(13 Hours)

Decimal–Binary Octal and Hexa Decimal number systems and their Mutual Conversions – 1's and 2's complement of a Binary number and Binary arithmetic (Addition, Subtraction, Multiplication and Division) – Binary Subtraction by 1's and 2's complement method – Basic logic gates –AND, OR, NOT – NAND, NOR and EX-OR gates – NAND and NOR as universal gates –De-Morgan's Theorems.

UNIT – VI: CURRENT CONTOURS (For Continuous Internal Assessment only – Self Study)

Magnetic and electromagnetic components- Atom interferometer- Nuclear reactor simulations – Cold fusion – Artificial intelligence – Electronic School books.

Total Lecture Hours - 45

COURSE OUTCOMES:

Upon completion of this course, the student would be able to

1. Understand Coulomb's law, Gauss theorem and gain a brief knowledge of capacitors.
2. Understand the properties, types of magnetic materials and hysteresis of ferromagnetic material.
3. Acquire the knowledge of atom models and X rays.

4. Know the basics of nucleus and their properties, nuclear reaction, nuclear models and elementary particles.
5. Learn the binary number system, binary arithmetic operations, logic gates and De-Morgan's Theorem.
6. Understand the knowledge of functions of logic gates.

TEXT BOOK(S)

1. R.Murugesan, Er.Kiruthiga Sivaprasath, *Modern Physics*, S.Chand & Co, New Delhi, First edition, 2024.
2. R.Murugesan, *Electricity and Magnetism*, S.Chand & Co, New Delhi, Third Revised Edition, 2022.
3. Brijlal & Subramanian, *Electricity and Magnetism*, Ratan Prakashan Mandir, 2023.
4. R.S.Sedha, *A text book of Digital Electronics*, S.Chand & Co, New Delhi, First Edition, 2021.
5. R.Murugesan, *Allied Physics Paper I and II*, S.Chand & Co, New Delhi, Revised Edition, 2022.
6. Arthur Beiser, Mahajan, Choudhury, *Concepts of Modern Physics*, Pustakkosh Publications, India, 2023.

REFERENCE BOOK(S)

1. Gurbinder Kaur, Gary R Pickrell, *Modern Physics*, Tata Mcgraw Hill Educational (P) Ltd, India, 2018.
2. Narayanamurthi, *Electricity and Magnetism*, The National Publishing Co, First Edition, 2021.
3. J.B.Rajam, *Atomic Physics*, S.Chand & Company Limited, New Delhi, First Edition, 2019.
4. B.N.Srivastava, *Basic Nuclear Physic*, Pragati Prakashan, Meerut, 2020.
5. Donald P.Leach, Albert Paul Malvino, Goutam Saha, *Digital principle and Applications*, Mc Graw-Hill Publishing Company, 6th Editions, New York, 2024.

E - RESOURCES

1. <https://wepdf.com/al/allied-physics>
2. <https://youtu.be/ufPSAYbyLhg?si=xBN6DXE8sAw8rBg4>
3. <https://nptel.ac.in/courses>
4. https://youtu.be/OzTUa4r0_M8?si=x-L1WJXw6V1cOUGR
5. <https://www.atoptics.co.uk/atoptics/blsky.htm>

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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CO3	3	2	3	3	2	2	3	2	2	3	3	3	3	3	2	2
CO4	3	3	2	3	2	2	3	2	3	3	3	3	3	3	3	3
CO5	3	3	2	3	2	2	3	3	3	3	3	3	3	3	3	2
CO6	2	2	3	2	1	2	2	1	3	2	2	3	3	3	2	2

S-Strong (3) M-Medium (2) L-Low (1)

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAL, MANNARGUDI – 614016

(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF PHYSICS

(For the students of I B.Sc. Mathematics)



Semester: II - AP- II: PHYSICS - II PRACTICAL

Ins. Hrs. /Week: 3

Course Credit: 3

Course Code: U26APY204P

COURSE OBJECTIVES

1. To understand the principles of electrical measurements and determine the specific resistance of materials using bridge circuits such as Meter Bridge and Carey Foster's Bridge.
2. To develop skills in the use of potentiometers for precision measurements, calibration of instruments, and determination of thermoelectric emf.
3. To study the characteristics and applications of semiconductor devices such as PN junction diodes and Zener diodes.
4. To design, construct, and analyze regulated power supply circuits using Zener diodes and integrated circuits.
5. To understand and verify the fundamental concepts of digital electronics through logic gates, universal gates, and Boolean algebra theorems.

List of Experiments (Any Seven Experiments):

1. Meter bridge–Determination specific resistance of a coil.
2. Carry Foster's Bridge – Determination of specific resistance of a coil.
3. Potentiometer – Calibration of a Low range voltmeter.
4. Construction of Zener/IC regulated power supply.
5. Determination of thermo emf using potentiometer
6. Characteristics of a Junction diode–Forward resistance and knee voltage.
7. Characteristics of a Zener diode – Break down voltage.
8. Basic logic gates – AND, OR and NOT gates using discrete components.
9. Basic logic gates – AND, OR and NOT gates using ICs.
10. Realizing NAND as a Universal gate.
11. Realizing NOR as a Universal gate.
12. Verification of De-Morgan's theorem.

Total Lecture Hours - 45

COURSE OUTCOMES

Upon successful completion of this course the students would be able:

1. Understand the Laboratory techniques.
2. Evaluate a process based on the results obtained from the experiments quantitatively and qualitatively.
3. Extend the scope of investigation as expected.
4. Communicate a process with help of the outcomes of an experiment.
5. Develop the skill of conducting an experiment collaboratively and ethically.
6. Understand the experimental skills in precision measurement, observation, and data analysis.

TEXT BOOK(S)

1. Dr. S. Somasundaram, Practical Physics, Apsara Publications, Tiruchirappalli, 2023.
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi 2022.
3. C. L. Arora, *B.Sc. Practical Physics*, S. Chand & Company Pvt. Ltd., New Delhi, 2023.
4. S. L. Gupta and V. Kumar, *Practical Physics*, Pragati Prakashan, Meerut, 2022.
5. Indu Prakash and Ramakrishna, *A Text Book of Practical Physics*, Kitab Mahal Publishers, Allahabad, 2021.
6. Sanjay Sharma, *Basic Electronics and Linear Circuits Laboratory Manual*, Katson Books, New Delhi, 2021.

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1. S. Srinivasan, A Text Book of Practical Physics., Sultan Chand Publications, 2022.
2. P. R. Sasi Kumar, *Practical Physics*, PHI Learning Pvt. Ltd., New Delhi, 2022.
3. N. Subrahmanyam and Brij Lal, *A Textbook of Optics*, S. Chand & Company Pvt. Ltd., New Delhi, 2023.
4. M. N. Avadhanulu and P. G. Kshirsagar, *A Textbook of Engineering Physics*, S. Chand & Company Pvt. Ltd., New Delhi, 2023.
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E - RESOURCES

1. <https://youtu.be/Q8Otf6k3uGk>
2. <https://youtu.be/8DhfUz0idwM>
3. https://youtu.be/TZWk5-8R5tc?si=ZFPUBa-FyFzH3z_R
4. <https://youtu.be/PlrpxROzgVg?si=lgZfsbiViyBPDcbV>
5. https://youtu.be/jPU_UzPYeCA?si=n_5VhjL-S5irHvFJ

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	2	3	3	3	3	3	3	3	1	2	3
CO2	2	2	3	3	2	2	3	2	3	3	3	3	3	3	2	3
CO3	3	2	3	3	2	2	3	2	2	3	3	3	3	1	2	2
CO4	3	3	2	3	2	2	3	2	3	3	3	3	3	3	3	3
CO5	3	3	2	3	2	2	3	3	3	3	3	3	3	1	3	2
CO6	2	2	3	3	2	1	3	2	2	2	2	3	2	2	2	2

S-Strong (3) M-Medium (2) L-Low (1)