

**E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.**

*(An Autonomous Institution – Affiliated to Madurai Kamaraj University)*

Re-accredited (**3<sup>rd</sup> Cycle**) with Grade **A+** & **CGPA 3.51** by NAAC

## **DEPARTMENT OF PHYSICS**



**TANSCHÉ - CBCS With OBE**

**BACHELOR OF SCIENCE**

**PROGRAMME CODE - P**

**COURSE STRUCTURE**

(w.e.f. 2023 – 2024 Batch onwards)



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## **CRITERION - I**

*1.1.3 Details of courses offered by the institution that focus on employability / entrepreneurship / skill development during the year.*

Syllabus copies with highlights of contents focusing on  
Employability / Entrepreneurship / Skill Development



**To be Noted:**

<b>HIGHLIGHTED COLORS</b>	<b>COURSES</b>
	<b>Employability</b>
	<b>Skill Development</b>
	<b>Entrepreneurship</b>
	<b>Skilled &amp; Employability</b>

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**TANSCHÉ - CBCS with OBE**

## **DEPARTMENT OF PHYSICS – UG**

**(w.e.f. 2023– 2024 Batch onwards)**

### **Vision**

To enhance the knowledge of Physics in teaching and research through holistic education

### **Mission**

- ✓ Imparting quality education both in theoretical as well as experimental physics
- ✓ Providing students with rigorous and comprehensive courses that allow them to perform at a high level
- ✓ Striving for excellence in performance based teaching and research

### **Programme Educational Objectives(PEOs): B.Sc Physics**

<b>SL.No.</b>	<b>Programme Educational Objective</b>
<b>PEO1</b>	Pursue higher education in relevant subjects, such as teaching and management, and start a career as an educator, researcher, or technical specialist.
<b>PEO2</b>	Endow the graduates to take part in extracurricular and co-curricular activities to develop the leadership skills.
<b>PEO3</b>	A successful career in academics, the public sector, business, corporations, or as an entrepreneur or self-employed person.
<b>PEO4</b>	Graduates explore physical systems using theoretical models and the scientific work's findings in a way that reflects moral responsibility, social care, and environmental awareness.
<b>PEO5</b>	Graduates will be well-versed in their fields and possess the technical aptitude to recognize, evaluate, and solve scientific problems for the society.
<b>PEO6</b>	Develop the experimental and data analysis skills by using various experiments in physics.

**Programme Outcomes for Science Graduates:**

On completion of B.Sc., Programmes students will be able to

SL.No.	Programme Outcomes
PO1	Develop necessary foundation in fundamentals, aptitude, applications of sciences and other related subjects. Able to clear competitive examinations appear and possess basic skill on the related subjects. Secure jobs in employment in Government / Private / Industry and entrepreneurship.
PO2	Receive basic experimental skills in the observation and study of nature, biological techniques, scientific research and demonstrate proficiency in critical analysis or creativity and provide scientific solutions to the problems of the society.
PO3	Enhance the digital knowledge of statistics and to understand its application in interpreting the obtained data
PO4	Obtain knowledge with emerging trends in their disciplinary and inter-disciplinary areas. Usage of modern tools and software can also be put to use.
PO5	Leadlifelong learning & contribute sustainability to environment, equip students enough to takeup higher studies upto research in various disciplines to become professionals.
PO6	Imbibe democratic, ethical, moral, social & spiritual values in the minds of the learners to become responsible citizens and build a healthy nation.

**Programme Specific Outcomes (PSOs):**

PSOs	After completion of B.Sc Physics the students will be able to	PO Addressed
PSO1	<b>Placement:</b> To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions.	PO1
PSO 2	<b>Entrepreneur:</b> To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.	PO2
PSO3	<b>Research and Development:</b> Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development.	PO3 & PO4
PSO4	<b>Contribution to Business World:</b> To produce employable, ethical and innovative professionals to sustain in the dynamic business world.	PO5 & PO6
PSO 5	<b>Contribution to the Society:</b> To contribute to the development of the society by collaborating with stakeholders for mutual benefit.	PO2 & PO6

### **Qualification for Admission**

Candidates should have passed the Higher Secondary Examination with Physics and Mathematics, conducted by the Board of Higher Education, Government of Tamilnadu, CBSE & ICSE or any other examination approved by Madurai Kamaraj University as equivalent.

### **Duration of the Course**

The students shall undergo this prescribed course of study for the period of three academic years under Choice Based Credit System(CBCS) semester pattern with Outcome Based Education (OBE).

**Medium of Instruction:** English

**System:** Choice Based Credit System with Outcome Based Education Model

### **Nature of the Course**

**Courses are classified according to the following nature**

1. Knowledge and skill oriented
2. Employability oriented
3. Entrepreneurship oriented

### **Outcome Based Education (OBE)& Assessment**

Students understanding must be built on and assessed for wide range of learning activities, which includes different approaches and are classified along several basis, such as

#### **1. Based on purpose:**

- Continuous Assessment (internal tests, Assignment, seminar, quiz, Documentation, Case lets, ICT based Assignment, Mini projects administered during the learning process)
- External Assessment (Evaluation of students' learning at the end of instructional unit)

#### **2. Based on Domain Knowledge:(for UG Upto K4 levels)**

Assessment through K1, K2, K3& K4

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Components	Marks
Test (Average of two tests) (Conducted for 100 marks and converted into 10 marks)	<b>10</b>
Assignment	<b>5</b>
Seminar	<b>5</b>
Quiz/ Documentation/ Case lets/ ICT based Assignment/ Mini Projects	<b>5</b>
Total	<b>25</b>

- ✓ **Centralized system** of Internal Assessment Tests
- ✓ There will be **Two Internal Assessment** Tests
- ✓ Duration of Internal assessment test will be **2 hours for Test I & II**
- ✓ Students shall write **retest** with the approval of HOD on genuine grounds if they are absent.

**Question Paper Pattern for Continuous Internal Assessment –Test I and II**

Section	Marks
A- Multiple Choice Question ( 7x1 mark)	7
B- Short Answer (4x2marks)	8
C- Either Or Type (3/6x5marks)	15
D- Open Choice Type (2/3x 10marks)	20
Total	50

Conducted for 100 marks and converted into 10 marks.

**Question Paper Pattern for Summative Examination**

Section	Marks
A-Multiple choice Questions without Choice (10x1 mark)	10
B-Short Answer without choice (5x2marks)	10
C-Either Or type (5/10x5marks)	25
D-Open Choice type (3/5x10 marks)	30
Total	75

In respect of Summative Examinations passing minimum is **36% for UG.**

Latest amendments and revision as per **UGC** and **TANSCH** norms is taken into consideration in curriculum preparation.

**BLUE PRINT FOR INTERNAL ASSESSMENT – I****Articulation Mapping – K Levels with Course Learning Outcomes (CLOs)**

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open choice )	
			No. of Questions	K- Level	No. of Questions	K- Level			
1	CLO 1	Upto K3	3	(K1/ K2)	3	(K1/ K2)	2 (K2) / 2 (K3) / 2 (K4) (Each set of questions must be in same level )	2 (K3) & 1 (K4)	
2	CLO 2	Upto K3	2	(K1/ K2)					
3	CLO 3	Upto K4	2	(K1/ K2)	1	(K1/ K2)			
No. of Questions to be asked			7		4		6	3	20
No. of Questions to be answered			7		4		3	2	16
Marks for each question			1		2		5	10	-
Total Marks for each section			7		8		15	20	50

**BLUE PRINT FOR INTERNAL ASSESSMENT – II****Articulation Mapping – K Levels with Course Learning Outcomes (CLOs)**

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open choice )	
			No. of Questions	K- Level	No. of Questions	K- Level			
1	CLO 3	Upto K4	2	(K1/ K2)	1	(K1/ K2)	2 (K2) / 2 (K3) / 2 (K4) (Each set of questions must be in same level )	2 (K3) & 1 (K4)	
2	CLO 4	Upto K3	2	(K1/ K2)	3	(K1/ K2)			
3	CLO 5	Upto K4	3	(K1/ K2)					
No. of Questions to be asked			7		4		6	3	20
No. of Questions to be answered			7		4		3	2	16
Marks for each question			1		2		5	10	-
Total Marks for each section			7		8		15	20	50

**Distribution of Marks with K-Levels CIA I and CIA II**

CIA	K Levels	Section -A MCQ (No choice)	Section -B Short Answer (No choice)	Section -C (Either or Type)	Section -D (Open choice)	Total Marks	% of Marks
<b>I &amp; II</b>	K1	4	4	-	-	8	10
	K2	3	4	10	-	17	23
	K3	-	-	10	20	30	40
	K4	-		10	10	20	27
	<b>Marks</b>	<b>7</b>	<b>8</b>	<b>30</b>	<b>30</b>	<b>75</b>	<b>100</b>



### Articulation Mapping - K Levels with Course Learning Outcomes (CLOs) for External Assessment

Sl. No	CLOs	K- Level	Section A		Section B		Section C (Either/or Type)	Section D (open choice)	Total
			MCQs (No choice)		Short Answers (No choice)				
			No. of Questions	K- Level	No. of Questions	K- Level			
1	CLO 1	Upto K3	2	K1/K2	1	K1/K2	2 (K3& K3)	1(K2)	
2	CLO 2	Upto K3	2	K1/K2	1	K1/K2	2(K2& K2)	1(K3)	
3	CLO 3	Upto K4	2	K1/K2	1	K1/K2	2 (K4&K4)	1(K4)	
4	CLO 4	Upto K 3	2	K1/K2	1	K1/K2	2 (K3& K3)	1(K3)	
5	CLO 5	Upto K 4	2	K1/K2	1	K1/K2	2 (K4& K4)	1(K4)	
No. of Questions to be asked			10		5		10	5	30
No. of Questions to be answered			10		5		5	3	23
Marks for each question			1		2		5	10	
Total Marks for each section			10		10		25	30	75

### Distribution of Section-wise Marks with K Levels for External Assessment

K Levels	Section A (MCQ'S) (No choice)	Section B (Short Answer) (No choice)	Section C (Either or Type)	Section D (Open Choice)	Total Marks	% of Marks
K1	9	6	-	--	15	13
K2	1	4	10	10	25	21
K3	-	-	20	20	40	33
K4	-	-	20	20	40	33
Total Marks	10	10	50	50	120	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems, Justifying the statement and deriving inferences

K4- Examining, analyzing, presentation and make inferences with evidences

**EVALUATION (THEORY)****(PART IV - SEC / DSEC)****Internal** (Formative) : 25 marks**External** (Summative) : 75 marks**Total** : 100 marks**Formative Test (CIA-Continuous Internal Assessment) : 25 Marks**

Components	Marks
Test (Average of two tests) (Conducted for 60 marks and converted into 20 marks)	<b>20</b>
Assignment / Seminar/ Quiz/ Documentation (from Unit 5)	<b>5</b>
Total	<b>25</b>

- ✓ There will be two Internal Assessment Test
  - ✓ Duration of Internal assessment test will be 1 hour for Test
- Students shall write retest with the approval of HOD on genuine grounds if they are absent.

**Question Paper Pattern for Continuous Internal Assessment Test I & II**

Section	Marks
A- Multiple Choice Question (4x1mark)	4
B- Short Answer (3x2marks)	6
C- Either Or type (2/4 x5marks)	10
D- Open choice type (1/2 x10marks)	10
Total	30

Conducted for 60 marks and converted into 20 marks

**Question Paper Pattern for External Examination**

Section	Marks
A- Multiple Choice Question (10x1mark)	10
B- Short Answer (5x2marks)	10
C- Either Or type (5/5 x5marks)	25
E- Open choice type (3/5 x10marks)	30
Total	75

**BLUE PRINT FOR INTERNAL ASSESSMENT –I**  
**Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)**

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open choice )	
			No. of Questions	K- Level	No. of Questions	K- Level			
1	CLO 1	Upto K3	2	K1	3	K1	1 (K2) / 1 (K3) (Each set of questions must be in same level )	1 (K2) & 1 (K3)	
2	CLO 2	Upto K3	2						
No. of Questions to be asked			4		3		4	2	13
No. of Questions to be answered			4		3		2	1	10
Marks for each question			1		2		5	10	-
Total Marks for each section			4		6		10	10	30

**BLUE PRINT FOR INTERNAL ASSESSMENT –II**  
**Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)**

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open choice )	
			No. of Questions	K- Level	No. of Questions	K- Level			
1	CLO 3	Upto K3	2	K1	3	K1	1 (K2) / 1 (K3) (Each set of questions must be in same level )	1 (K2) & 1 (K3)	
2	CLO 4	Upto K3	2						
No. of Questions to be asked			4		3		4	2	13
No. of Questions to be answered			4		3		2	1	10
Marks for each question			1		2		5	10	-
Total Marks for each section			4		6		10	10	30

**Distribution of Marks with K Levels – CIA I & II**

CIA	K Levels	Section A MCQ	Section B (Short Answers)	Section C (Either Or Type)	Section D (Open Choice)	Total Marks	% of Marks
<b>I &amp; II</b>	K1	4	6	-	-	10	20
	K2	-	-	10	10	20	40
	K3	-	-	10	10	20	40
	<b>Marks</b>	<b>4</b>	<b>6</b>	<b>20</b>	<b>20</b>	<b>50</b>	<b>100</b>

**Articulation Mapping - K Levels with Course Learning Outcomes (CLOs) for External Assessment**

Sl.No	CLOs	K-Level	Section A		Section B		Section C (Either or Type )	Section D (Open Choice)	Total
			MCQs		Short Answers				
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 1	Upto K3	2	K1	1	K1	6(K2) & 4(K3) (Each set of questions must be in same level )	2(K2) & 3(K3)	
2	CLO 2	Upto K3	2		1				
3	CLO 3	Upto K3	2		1				
4	CLO 4	Upto K 3	2		1				
5	CLO 5	Upto K 3	2		1				
No. of Questions to be asked			10		5		10	5	30
No. of Questions to be answered			10		5		5	3	23
Marks for each question			1		2		5	10	
Total Marks for each section			10		10		25	30	75

**Distribution of Section-wise Marks with K Levels for External Assessment**

K Levels	Section A (MCQ's)	Section B (Short Answer)	Section C (Either or Type)	Section D (Open Choice)	Total Marks	% of Marks
<b>K1</b>	10	10	-	--	<b>20</b>	16
<b>K2</b>	-	-	30	20	<b>50</b>	42
<b>K3</b>	-	-	20	30	<b>50</b>	42
<b>Total Marks</b>	10	10	50	50	<b>120</b>	100

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(w.e.f. 2023 – 2024 Batch onwards)

Semester	Part	Course Code	Course Title	Teaching HRS (Per Week)	Duration Of Exam (Hrs)	Marks Allotted			Credits
						CIA	SE	Total	
I	I	23OU1TA1	Tamil	6	3	25	75	100	3
	II	23OU2EN1	General English -I	6	3	25	75	100	3
	III	23OUPH11	<b>Core Course 1:</b> Properties of Matter and Acoustics	5	3	25	75	100	5
		23OUPH1P	<b>Core Course-2:</b> Practical – I: Properties of Matter	3	3	40	60	100	3
		23OUPHGEMA1	<b>GEC 1:</b> Mathematics – I	6	3	25	75	100	5
	IV	23OUPHSECN1	<b>SEC 1 (NME):</b> Physics for Everyday life	2	3	25	75	100	2
		23OUPHFC1	<b>FC:</b> Introductory physics	2	3	25	75	100	2
II	I	23OU1TA2	Tamil	6	3	25	75	100	3
	II	23OU2EN2	General English-II	6	3	25	75	100	3
	III	23OUPH21	<b>Core Course3:</b> Heat, Thermodynamics and Statistical Physics	5	3	25	75	100	5
		23OUPH2P	<b>Core Course4:</b> Practical – II: Heat, oscillations, waves & Sound	3	3	40	60	100	3
		23OUPHGEMA2	<b>GEC 2:</b> Mathematics – II	6	3	25	75	100	5
	IV	23OUPHSECN2	<b>SEC 2 (NME):</b> Astrophysics	2	3	25	75	100	2
		23OUPHSEC3	<b>DSEC:</b> Electricity	2	3	25	75	100	2
	<b>TOTAL</b>								<b>46</b>

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Semester	Part	Course Code	Course Title	Teaching Hrs (Per Week)	Duration Of Exam (Hrs)	Marks Allotted			Credits
						CIA	SE	Total	
I	III	23OUMAGEPH1	Allied 1: Allied Physics – I	4	3	25	75	100	3
		23OUMAGEPH1P	Allied Practical 1: Allied Physics Practical-I	2	3	40	60	100	2
23OUMAGEPH2		Allied 2: Allied Physics – II	4	3	25	75	100	3	
23OUMAGEPH2P		Allied Practical 2: Allied Physics Practical-II	2	3	40	60	100	2	

Department of Physics					Class: I B.Sc			
Sem	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
I	Core Course I	23OUPH11	Properties of Matter and Acoustics	5	5	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

### Course Objectives:

1. To Understand the concepts of Elasticity of the materials.
2. To Acquire the basic Knowledge of Bending of beams.
3. To Understand the concepts of Fluid dynamics.
4. To Study the basic properties of Waves and Oscillations.
5. To Acquire the knowledge about the Acoustics and Ultrasonic.

### Course Content:

**Unit I: ELASTICITY:** Hooke's law – stress-strain diagram – elastic constants –Poisson's ratio – relation between elastic constants and Poisson's ratio – work done in twisting a wire - twisting couple on a cylinder – rigidity modulus by static torsion–torsional pendulum (with and without masses)

**Unit II: BENDING OF BEAMS:** cantilever– expression for Bending moment – expression for depression at the loaded end of the cantilever– oscillations of a cantilever – expression for time period –experiment to find Young's modulus – non-uniform bending– experiment to determine Young's modulus by Koenig's method – uniform bending – expression for elevation – experiment to determine Young's modulus using microscope.

**Unit III: FLUID DYNAMICS:** *Surface tension:* definition – molecular forces– excess pressure inside a curved liquid surface – application to spherical and cylindrical drops and bubbles – determination of surface tension by Jaegar's method–variation of surface tension with temperature. *Viscosity:* definition – streamline and turbulent flow – rate of flow of liquid in a capillary tube – Poiseuille's formula –corrections – terminal velocity and Stoke's formula– variation of viscosity with temperature

**Unit IV: WAVES AND OSCILLATIONS:** Simple Harmonic Motion (SHM) – differential equation of SHM – graphical representation of SHM – composition of two SHM in a straight line and at right angles – Lissajous's figures- free, damped, forced vibrations - resonance and

sharpness of resonance-Laws of transverse vibration of strings – *sonometer* : determination of

AC frequency using sonometer –determination of frequency using Melde’s string apparatus.

### **Unit V: ACOUSTICS OF BUILDINGS AND ULTRASONICS**

Intensity of sound – decibel – loudness of sound–reverberation–Sabine’s reverberation

formula – acoustic intensity – factors affecting the acoustics of buildings. **Ultrasonic**

**waves:** production of ultrasonic waves – Piezoelectric crystal method – magnetostriction

effect – application of ultrasonic waves

#### **Books for Study:**

1. D.S.Mathur, 2010, Elements of Properties of Matter, S.Chand & Co.
2. BrijLal & N. Subrahmanyam, 2003, Properties of Matter, S.Chand & Co
3. D.R.Khanna & R.S.Bedi, 1969, Textbook of Sound, AtmaRam & sons
4. BrijLal and N.Subrahmanyam, 1995, A Text Book of Sound, Second revised edition, Vikas Publishing House.
5. R.Murugesan, 2012, Properties of Matter, S.Chand & Co.

#### **Books for Reference:**

1. C.J. Smith, 1960, General Properties of Matter, Orient Longman Publishers
2. H.R. Gulati, 1977, Fundamental of General Properties of Matter, Fifth edition, R. Chand & Co.
3. A.P French, 1973, Vibration and Waves, MIT Introductory Physics, Arnold-Heinmann India.

#### **Web resources/ E-Books:**

1. <https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work>
2. <http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html>
3. <https://www.youtube.com/watch?v=gT8Nth9NWPM>
4. <https://www.youtube.com/watch?v=m4u-SuaSu1s&t=3s>
5. <https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work>
6. <https://learningtechnologyofficial.com/category/fluid-mechanics-lab/>
7. <http://www.sound-physics.com/>
8. <http://nptel.ac.in/courses/112104026/>

#### **Pedagogy:**

Chalk and Talk, PPT, group discussion , quiz, on the spot test.



### Rationale for nature of Course

**Knowledge and Skill:** Study of the properties of matter leads to information which is of practical value to the physicist. It gives us information about the internal forces which act between the constituent parts of the substance. Students who undergo this course are successfully bound to get a better insight and understanding of the subject.

### Activities to be given:

1. Enhancing the quality of students to understand the properties of matter.
2. Train the students to understand the theory by conducting the experiments.

### Course Learning Outcomes (CLOs):

At the end of the course, the student will be able to:

CLO	Course Learning Outcomes	Knowledge According to Bloom's Taxonomy(upto K level )
CLO1	Relate elastic behavior in terms of three moduli of elasticity and working of torsion pendulum.	K1 to K3
CLO2	Able to appreciate concept of bending of beams and analyze the expression, quantify and understand nature of materials.	K1 to K3
CLO3	Explain the surface tension and viscosity of fluid and support the interesting phenomena associated with liquid surface, soapfilms provide an analogue solution to many engineering problems.	K1 to K4
CLO4	Analyze simple harmonic motions mathematically and apply them. Understand the concept of resonance and use it to evaluate the frequency of vibration. Set up experiment to evaluate frequency of ac mains	K1 to K3
CLO5	Understand the concept of acoustics, importance of constructing buildings with good acoustics. Able to apply their now ledge of ultrasonics in real life, especially in medical field and assimilate different methods of production of ultrasonic waves	K1 to K4

### Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	3	2	3	3	3
CLO2	3	3	2	3	3	3
CLO3	3	3	3	3	3	3
CLO4	3	3	2	3	3	3
CLO5	3	3	3	3	3	3

1-Basic Level    2- Intermediate Level    3- Advanced Level

**LESSON PLAN : TOTAL HOURS(60HRS)**

UNIT	DESCRIPTION	HRS	MODE
I	<b>Unit :I ELASTICITY:</b> Hooke's law – stress-strain diagram – elastic constants –Poisson's ratio – relation between elastic constants and Poisson's ratio – work done in twisting a wire - twisting couple on a cylinder – rigidity modulus by static torsion–torsional pendulum (with and without masses)	12	Chalk and Talk, PPT, group discussion
II	<b>Unit :II BENDING OF BEAMS:</b> cantilever– expression for Bending moment – expression for depression at the loaded end of the cantilever– oscillations of a cantilever – expression for time period –experiment to find Young's modulus – non-uniform bending– experiment to determine Young's modulus by Koenig's method – uniform bending – expression for elevation – experiment to determine Young's modulus using microscope.	12	Chalk and Talk, PPT, group discussion
III	<b>Unit:III FLUID DYNAMICS:</b> <i>Surface tension</i> : definition – molecular forces– excess pressure inside a curved liquid surface – application to spherical and cylindrical drops and bubbles – determination of surface tension by Jaegar's method–variation of surface tension with temperature. <i>Viscosity</i> : definition – streamline and turbulent flow – rate of flow of liquid in a capillary tube – Poiseuille's formula –corrections – terminal velocity and Stoke's formula– variation of viscosity with temperature	12	Chalk and Talk, PPT, group discussion
IV	<b>Unit :IV WAVES AND OSCILLATIONS:</b> Simple Harmonic Motion (SHM) – differential equation of SHM – graphical representation of SHM – composition of two SHM in a straight line and at right angles – Lissajous's figures- free, damped, forced vibrations - resonance and sharpness of resonance-Laws of transverse vibration of strings – <i>sonometer</i> : determination of AC frequency using sonometer –determination of frequency using Melde's string apparatus.	12	Chalk and Talk, PPT, group discussion.
V	<b>Unit :V ACOUSTICS OF BUILDINGS AND ULTRASONICS</b> Intensity of sound – decibel – loudness of sound–reverberation–Sabine's reverberation formula – acoustic intensity – factors affecting the acoustics of buildings. <i>Ultrasonic waves</i> : production of ultrasonic waves – Piezoelectric crystal method – magnetostriction effect – application of ultrasonic waves.	12	Chalk and Talk, PPT, group discussion ,

**Course Designer: Ms. E.Chris Monica**  
**Mrs. M.Hemalatha**

Department of Physics					Class: I B.Sc			
Sem	Category	Course Code	Course Title	Credits	Contact Hours/ Week	CIA	SE	Total
I	Core Course-2	23OUPH1P	Practical-I Properties of Matter	3	3	40	60	100

**List of experiments: (Any Eight)**

1. Determination of rigidity modulus without mass using Torsional pendulum.
2. Determination of rigidity modulus with masses using Torsional pendulum.
3. Determination of moment of inertia of an irregular body.
4. Verification of parallel axes theorem on moment of inertia.
5. Verification of perpendicular axes theorem on moment of inertia.
6. Determination of moment of inertia and g using Bifilar pendulum.
7. Determination of Young's modulus by stretching of wire with known masses.
8. Verification of Hook's law by stretching of wire method.
9. Determination of Young's modulus by uniform bending – load depression graph.
10. Determination of Young's modulus by non-uniform bending – scale & telescope.
11. Determination of Young's modulus by cantilever – load depression graph.
12. Determination of Young's modulus by cantilever – oscillation method
13. Determination of Young's modulus by Koenig's method – ( or unknown load)
14. Determination of rigidity modulus by static torsion.
15. Determination of Y, n and K by Searle's double bar method.
16. Determination of surface tension & interfacial surface tension by drop weight method.
17. Determination of co-efficient of viscosity by Stokes' method – terminal velocity.
18. Determination of critical pressure for streamline flow.
19. Determination of Poisson's ratio of rubber tube.
20. Determination of viscosity by Poiseuille's flow method.
21. Determination of radius of capillary tube by mercury pellet method.
22. Determination of g using compound pendulum.

**Books for Reference:**

1. M.N.Srinivasan, S.Balasubramanian, R.Ranganathan(2007), *A Text Book of Practical Physics*, Sultan Chand & Sons.
2. Indu Prakash & Ramakrishna(2008), *A Text Book of Practical Physics*, Kitab Mahal Agencies.

3. S.R. GovindaRajan, T. Murugaiyan, S. SundaraRajan (2006), *Practical Physics*, Rochouse& Sons.

**Web Resources/ E.Books:**

1.<http://www.tndte.gov.in/site/wp-content/uploads/2016/08/Engineering-physics.pdf>

2.[https://www.ugc.ac.in/pdfnews/5512002\\_B.SC.-PHYSICAL-SCIENCE-PHYSICS.pdf](https://www.ugc.ac.in/pdfnews/5512002_B.SC.-PHYSICAL-SCIENCE-PHYSICS.pdf)

3.[https://www.academia.edu/34783511/Practical\\_Physics\\_for\\_Degree\\_Students\\_Gias\\_Uddin\\_and\\_Shahabuddin](https://www.academia.edu/34783511/Practical_Physics_for_Degree_Students_Gias_Uddin_and_Shahabuddin)

4.[https://www.academia.edu/35371782/PHYSICS\\_LABORATORY\\_MANUAL\\_UG\\_Courses\\_I\\_and\\_II\\_Semester1.UG\\_course\\_OBE.docx](https://www.academia.edu/35371782/PHYSICS_LABORATORY_MANUAL_UG_Courses_I_and_II_Semester1.UG_course_OBE.docx)

**Pedagogy:** Demonstration and Practical sessions.

**LESSON PLAN : TOTAL HOURS(45 HRS)**

UNIT	Topics to be Covered	Hours	Mode
I	1. Determination of rigidity modulus without mass using Torsional pendulum. 2. Determination of rigidity modulus with masses using Torsional pendulum. 3. Determination of moment of inertia of an irregular body. 4. Verification of parallel axes theorem on moment of inertia.	9	Demo & Practical Session
II	5. Verification of perpendicular axes theorem on moment of inertia. 6. Determination of moment of inertia and g using Bifilar pendulum. 7. Determination of Young's modulus by stretching of wire with known masses. 8. Verification of Hook's law by stretching of wire method.	9	Demo & Practical Session
III	9. Determination of Young's modulus by uniform bending – load depression graph. 10. Determination of Young's modulus by non-uniform bending – scale & telescope. 11. Determination of Young's modulus by cantilever – load depression graph. 12. Determination of Young's modulus by cantilever – oscillation method.	9	Demo & Practical Session
IV	13. Determination of Young's modulus by Koenig's method – ( or unknown load) 14. Determination of rigidity modulus by static torsion. 15. Determination of Y, n and K by Searle's double bar method. 16. Determination of surface tension & interfacial surface tension by drop weight method.	9	Demo & Practical Session
V	17. Determination of viscosity by Poiseuille's flow method. 18. Determination radius of capillary tube by mercury pellet method. 19. Determination of g using compound pendulum.	9	Demo & Practical Session

**Course Designer: Mrs. P.Revathi**  
**Mrs. M.R.Gurulakshmi**

Department of Physics						Class: I B.Sc		
Sem	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
I	Skill Enhancement Course SEC 1 (NME)	23OUPHSECN1	Physics For Everyday Life	2	2	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

### Course Objectives:

1. To Understand the concepts of mechanical objects.
2. To Acquire the basic Knowledge of optical instruments and laser.
3. To Understand the concepts behind the physics of home appliances.
4. To Study the basic properties of solar energy.
5. To Acquire the knowledge about the Indian physicist and their contributions.

### Course Content:

**Unit I: MECHANICAL OBJECTS:** spring scales – bouncing balls – roller coasters – bicycles – rockets and space travel.

**Unit II: OPTICAL INSTRUMENTS AND LASER:** vision corrective lenses – polaroid glasses – UV protective glass – polaroid camera – color photography – holography and laser.

**Unit III: PHYSICS OF HOME APPLIANCES:** bulb – fan – hair drier – television – air conditioners – microwave ovens – vacuum cleaners

**Unit IV: SOLAR ENERGY:** 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:** C.V.Raman, Homi Jahangir Bhabha, Vikram Sarabhai, Subrahmanyam Chandrasekhar, Venkatraman Ramakrishnan, Dr. APJ Abdul Kalam and their contribution to science and technology.

### Books for Study:

1. The Physics in our Daily Lives, Umme Ammara, Gugucool Publishing, Hyderabad, 2019.
2. For the love of physics, Walter Lawin, Free Press, New York, 2011.

### Books for Reference:

1. Physics in Daily Life, Jo Hermans, EDP Science, 2003 – 2011.

2. Physics in Our Lives, Dr. Hameed A. Khan Prof. Dr. M. M. Qurashi Engr. Tajammul Hussain Mr. Irfan Hayee, Commission on Science and Technology for Sustainable Development in the South, Islamabad, 2005.

**Web resources/ E-Books:**

1. <https://www.ukessays.com/essays/sciences/the-role-of-physics-in-our-daily-lives.php>
2. [https://en.wikipedia.org/wiki/Physics\\_of\\_the\\_Future](https://en.wikipedia.org/wiki/Physics_of_the_Future)
3. <https://excerpts.numilog.com/books/9782759807055.pdf>

**Pedagogy:**

Chalk and Talk, PPT, Group discussion, OHP presentations, Quiz, On the spot test, youtube Links, Open book test and Virtual Labs.

**Rationale for nature of Course**

**Knowledge and Skill:** Study of the Physics for everyday life leads to information which is of practical value to the physicist. It gives us information about the physics concepts how useful in every day in our life. Students who undergo this course are successfully bound to get a better insight and understanding of the subject.

**Activities to be given:**

1. Enhancing the quality of students to understand the basic physics concepts behind in everyday life.
2. Train the students to understand the applications of the basic physics concepts behind in everyday life.

**Course Learning Outcomes (CLOs):**

CLO	Course Learning Outcomes	Knowledge According to Bloom's Taxonomy (upto K level)
CLO1	Understand the concepts of mechanical objects.	K1 to K3
CLO2	Acquire the basic Knowledge of optical instruments and laser.	K1 to K3
CLO3	Understand the concepts behind the physics of home appliances.	K1 to K3
CLO4	Study the basic properties of solar energy.	K1 to K3
CLO5	Acquire the knowledge about the Indian physicist and their contributions	K1 to K3

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)**  
**(SCIENCE)**

	PO1	PO2	PO3	PO4	PO5	PO6
<b>CLO1</b>	3	3	2	3	3	3
<b>CLO2</b>	3	3	2	3	3	3
<b>CLO3</b>	3	3	3	3	3	3
<b>CLO4</b>	3	3	2	3	3	3
<b>CLO5</b>	3	3	3	3	3	3

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)**  
**(ARTS)**

	PO1	PO2	PO3	PO4	PO5	PO6
<b>CLO1</b>	2	3	3	2	3	3
<b>CLO2</b>	3	3	3	3	3	3
<b>CLO3</b>	3	3	3	3	3	3
<b>CLO4</b>	3	3	3	2	3	3
<b>CLO5</b>	3	3	3	2	3	3

**1-Basic Level      2- Intermediate Level      3- Advanced Level**

**LESSON PLAN: TOTAL HOURS (30 Hrs)**

UNIT	DESCRIPTION	Hrs	MODE
I	<b>MECHANICAL OBJECTS:</b> spring scales – bouncing balls –roller coasters – bicycles –rockets and space travel.	6	Chalk and Talk, PPT, quiz, on the spot test
II	<b>OPTICAL INSTRUMENTS AND LASER:</b> vision corrective lenses– polaroid glasses – UV protective glass – polaroid camera – color photography – holography and laser.	6	Chalk and Talk, PPT, quiz, on the spot test
III	<b>PHYSICS OF HOME APPLIANCES:</b> bulb – fan – hair drier – television – air onditioners – microwave ovens – vacuum cleaners	6	Chalk and Talk, PPT, quiz, on the spot test
IV	<b>SOLAR ENERGY:</b> Solar constant – General applications of solar energy – Solar water heaters – Solar Photo – voltaic cells – General applications of solar cells.	6	Chalk and Talk, PPT, quiz on the spot test
V	<b>INDIAN PHYSICIST AND THEIR CONTRIBUTIONS:</b> C.V.Raman, Homi Jehangi rBhabha, Vikram Sarabhai, SubrahmanyamChandrasekhar, Venkatraman Ramakrishnan, Dr. APJ Abdul Kalam and their contribution to science and technology.	6	Seminar, PPT presentation, Quiz on the Spot test

**Course Designer: Mrs.B.Subha**  
**Mrs. S.Manimozhi**

Department of Physics						Class: I B.Sc		
Sem	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
I	Foundation Course	23OUPHFC1	Introductory Physics	2	2	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

**Course Objectives:**

1. To Understand the concepts vectors.
2. To Acquire the basic Knowledge of different forces, present in Nature
3. To Understand the concepts of Quantify energy in different process.
4. To Study the basics of different types of motions.
5. To Acquire the knowledge about the properties of matter.

**Course Content:**

**UNIT I:** Vectors, scalars –examples for scalars and vectors from physical quantities – addition, subtraction of vectors – resolution and resultant of vectors – units and dimensions– standard physics constants.

**UNIT II:** Different types of forces–gravitational, electrostatic, magnetic, electromagnetic, nuclear –mechanical forces like, centripetal, centrifugal, friction, tension, cohesive, adhesive forces.

**UNIT III:** Different forms of energy– conservation laws of momentum, energy –types of collisions –angular momentum– alternate energy sources–real life examples.

**UNIT IV:** Types of motion– linear, projectile, circular, angular, simple harmonic motions – satellite motion – banking of a curved road –stream line and turbulent motions – wave motion – comparison of light and sound waves – free, forced, damped oscillations.

**UNIT V:** Surface tension – shape of liquid drop – angle of contact – viscosity–lubricants – capillary flow – diffusion – real life examples– properties and types of materials in daily use– conductors, insulators– thermal and electric.

**Books for Study:**

1. D.S.Mathur, 2010, Elements of Properties of Matter, S.Chand & Co
2. BrijLal & N. Subrahmanyam, 2003, Properties of Matter, S.Chand & Co.

**Books for Reference:**

1. H.R. Gulati, 1977, Fundamental of General Properties of Matter, Fifth edition, S.Chand & Co.



**Web resources/ E-Books:**

1. <http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html><https://science.nasa.gov/ems/>
2. [https://eesc.columbia.edu/courses/ees/climate/lectures/radiation\\_hays/](https://eesc.columbia.edu/courses/ees/climate/lectures/radiation_hays/)

**Pedagogy:**

Chalk and Talk, PPT, group discussion , quiz, on the spot test.

**Rationale for nature of Course**

**Knowledge and Skill:** To help students get an overview of Physics before learning their core courses. To serve as a bridge between the school curriculum and the degree programme.

**Activities to be given:**

1. Enhancing the quality of students to solve the problems related to Physics.
2. Train the students to apply concept of properties of matter.

**LESSON PLAN: TOTAL HOURS (30HRS)**

UNIT	Details	Hours	Mode
I	Vectors, scalars –examples for scalars and vectors from physical quantities – addition, subtraction of vectors – resolution and resultant of vectors – units and dimensions– standard physics constants.	6	Chalk and Talk, PPT, quiz, on the spot test
II	Different types of forces–gravitational, electrostatic, magnetic, electromagnetic, nuclear –mechanical forces like, centripetal, centrifugal, friction, tension, cohesive, adhesive forces.	6	Chalk and Talk, PPT, quiz, on the spot test
III	Different forms of energy– conservation laws of momentum, energy –types of collisions –angular momentum– alternate energy sources–real life examples.	6	Chalk and Talk, PPT, quiz, on the spot test
IV	Types of motion– linear, projectile, circular, angular, simple harmonic motions – satellite motion – banking of a curved roads – stream line and turbulent motions – wave motion – comparison of light and sound waves – free, forced, damped oscillations.	6	Chalk and Talk, PPT, quiz on the spot test
V	Surface tension – shape of liquid drop – angle of contact – viscosity–lubricants – capillary flow – diffusion – real life examples– properties and types of materials in daily use– conductors, insulators– thermal and electric.	6	Seminar, PPT presentation, Quiz on the Spot test

**Course Designer: Ms. E.Chris Monica  
Mrs. M.Hemalatha**

Department of Physics						Class: I B.Sc		
Sem	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
II	Core Course -3	23OUPH21	Heat, Thermodynamics and Statistical Physics	5	5	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

### Course Objectives:

1. To Understand the fundamentals of Heat capacities.
2. To Acquire the basic Knowledge of Thermodynamic laws.
3. To Understand the concept of entropy in reversible & irreversible process.
4. To Study the concepts of heat transfer.
5. To Acquire the knowledge about different types of statistics.

### Course Content:

**UNIT I: CALORIMETRY:** specific heat capacity – specific heat capacity of gases  $C_P$  &  $C_V$  – Meyer's relation – Joly's method for determination of  $C_V$  – Regnault's method for determination of  $C_P$

**LOW TEMPERATURE PHYSICS:** Joule-Kelvin effect – porous plug experiment – Joule-Thomson effect – Boyle temperature – temperature of inversion – liquefaction of gas by Linde's Process – adiabatic demagnetisation.

**UNIT II: THERMODYNAMICS-I:** zeroth law and first law of thermodynamics – P-V diagram – heat engine – efficiency of heat engine – Carnot's engine, construction, working and efficiency of petrol engine and diesel engines – comparison of engines.

**UNIT III: THERMODYNAMICS-II:** second law of thermodynamics – entropy of an ideal gas – entropy change in reversible and irreversible processes – T-S diagram – thermodynamical scale of temperature – Maxwell's thermodynamical relations – Clausius-Clapeyron's equation (first latent heat equation) – third law of thermodynamics – unattainability of absolute zero – heat death.

**UNIT IV: HEAT TRANSFER:** modes of heat transfer: conduction, convection and radiation. *Conduction:* thermal conductivity – determination of thermal conductivity of a good conductor by Forbes's method – determination of thermal conductivity of a bad conductor by Lee's disc method.

**Radiation:** black body radiation (Ferry's method) – distribution of energy in black body radiation – Wien's law and Rayleigh Jean's law – Planck's law of radiation – Stefan's law – deduction of Newton's law of cooling from Stefan's law.

**UNIT V: STATISTICAL MECHANICS:** definition of phase-space – micro and macro states – ensembles – different types of ensembles – classical and quantum Statistics – Maxwell-Boltzmann statistics – expression for distribution function – Bose-Einstein statistics – expression for distribution function – Fermi-Dirac statistics – expression for distribution function – comparison of three statistics.

**Book for study:**

1. Brijlal & N. Subramaniam, 2000, Heat and Thermodynamics, S.Chand & Co.
2. Narayanamoorthy & Krishna Rao, 1969, Heat, Triveni Publishers, Chennai.
3. V.R.Khanna & R.S.Bedi, 1998 1<sup>st</sup> Edition, Text book of Sound, Kedharnaath Publish & Co, Meerut
4. Brijlal and N. Subramanyam, 2001, Waves and Oscillations, Vikas Publishing House, New Delhi.
5. Ghosh, 1996, Text Book of Sound, S.Chand & Co.
6. R.Murugesan & Kiruthiga Sivaprasath, Thermal Physics, S.Chand & Co.

**Books for References:**

1. J.B.Rajam & C.L.Arora, 1976, Heat and Thermodynamics, 8<sup>th</sup> edition, S.Chand & Co. Ltd.
2. D.S.Mathur, Heat and Thermodynamics, Sultan Chand & Sons.
3. Gupta, Kumar, Sharma, 2013, Statistical Mechanics, 26<sup>th</sup> Edition, S. Chand & Co.
4. Resnick, Halliday & Walker, 2010, Fundamentals of Physics, 6<sup>th</sup> Edition.
5. Sears, Zemansky, Hugh D. Young, Roger A. Freedman, 2021 University Physics with Modern Physics 15<sup>th</sup> Edition, Pearson.

**Web resources/E-Books:**

1. [https://youtu.be/M\\_5KYncYNyc](https://youtu.be/M_5KYncYNyc)
2. <https://www.youtube.com/watch?v=4M72kQulGKk&vl=en>
3. <https://www.khanacademy.org/science/physics/thermodynamics>
4. <https://data-flair.training/blogs/heat-sources-classification-thermodynamics/>
5. <https://www.britannica.com/science/thermodynamics>

**Pedagogy:**

Chalk and Talk, PPT, group discussion, quiz, on the spot test.

**Rationale for nature of Course**

**Knowledge and Skill:** The course is the learning and understanding the phenomena connected with measurement of temperature, concepts of specific heat capacities of matter and applications of thermodynamics.

**Activities to be given:**

1. Enhancing the quality of students to understand the theory of gases.
2. Train the students to solve more thermodynamically related problems.

**Course Learning Outcomes (CLOs):**

At the end of the course, the student will be able to:

CLO	Course Learning Outcomes	Knowledge According to Bloom's Taxonomy (upto K level )
CLO1	Acquires knowledge on how to distinguish between temperature and heat. Introduce him/her to the field of thermometry and explain practical measurements of high temperature as well as low temperature physics. Student identifies the relationship between heat capacity, specific heat capacity. The study of Low Temperature Physics sets the basis for the students to understand cryogenics, superconductivity, super fluidity and Condensed Matter Physics.	K1 to K3
CLO2	Derive the efficiency of Carnot's engine. Discuss the implications of the laws of Thermodynamics in diesel and petrol engines.	K1 to K3
CLO3	Able to analyze performance of thermodynamic systems viz efficiency by problems. Gets an insight into thermodynamic properties like enthalpy, entropy.	K1 to K3
CLO4	Study the process of thermal conductivity and apply it to good and bad conductors. Quantify different parameters related to heat, relate them with various physical parameters and analyse them.	K1 to K4
CLO5	Interpret classical statistics concepts such as phase space, ensemble, Maxwell-Boltzmann distribution law. Develop the statistical interpretation of Bose-Einstein and Fermi-Dirac . Apply to quantum particles such as photon and electron.	K1 to K4

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)**

	PO1	PO2	PO3	PO4	PO5	PO6
<b>CLO1</b>	3	3	2	3	3	3
<b>CLO2</b>	3	3	2	3	3	3
<b>CLO3</b>	3	3	3	3	3	3
<b>CLO4</b>	3	3	2	3	3	3
<b>CLO5</b>	3	3	3	3	3	3

**1-Basic Level    2- Intermediate Level    3- Advanced Level**

**LESSON PLAN: TOTAL HOURS(60HRS)**

UNIT	Details	Hours	Mode
I	<b>CALORIMETRY:</b> specific heat capacity – specific heat capacity of gases CP& CV– Meyer’s relation – Joly’s method for determination of CV – Regnault’s method for determination of CP <b>LOW TEMPERATURE PHYSICS:</b> Joule-Kelvin effect – porous plug experiment – Joule- Thomson effect –Boyle temperature – temperature of inversion – liquefaction of gas by Linde’s Process – adiabatic demagnetisation.	12	Chalk and Talk, PPT, quiz, on the spot test
II	<b>THERMODYNAMICS-I:</b> zeroth law and first law of thermodynamics – P-V diagram – heat engine –efficiency of heatengine – Carnot’s engine, construction, working and efficiency of petrol engine and diesel engines – comparison of engines.	12	Chalk and Talk, PPT, quiz, on the spot test
III	<b>THERMODYNAMICS-II:</b> second law of thermodynamics – entropy of an ideal gas – entropy change in reversible and irreversible processes – T-S diagram –thermodynamical scale of temperature – Maxwell’s thermodynamical relations –Clasius- Clapeyron’s equation (first latent heat equation) – third law of thermodynamics – unattainability of absolute zero – heat death.	12	Chalk and Talk, PPT, quiz, on the spot test
IV	<b>HEAT TRANSFER:</b> modes of heat transfer: conduction, convection and radiation. <i>Conduction:</i> thermal conductivity – determination of thermal conductivity of a good conductor by Forbe’s method – determination of thermal conductivity of a bad conductor by Lee’s disc method. <i>Radiation:</i> black body radiation (Ferry’s method) – distribution of energy in black body radiation – Wien’s law and Rayleigh Jean’s law –Planck’s law of radiation – Stefan’s law – deduction of Newton’s law of cooling from Stefan’s law.	12	Chalk and Talk, PPT, quiz on the spot test
V	<b>STATISTICAL MECHANICS:</b> definition of phase-space – micro and macro states – ensembles –different types of ensembles – classical and quantum Statistics – Maxwell-Boltzmann statistics – expression for distribution function – Bose-Einstein statistics – expression for distribution function – Fermi-Dirac statistics –expression for distribution function – comparison of three statistics.	12	Seminar, PPT presentation, Quiz on the Spot test

**Course Designer: Mrs. P.Revathi  
Mrs. M.R.Gurulakshmi**

Department of Physics						Class: I B.Sc		
Sem	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
II	Core Course -4	23OUPH2P	Practical – II: Heat, oscillations, waves & Sound	3	3	40	60	100

### List of experiments: (Any Eight)

1. Determination of specific heat by cooling – graphical method.
2. Determination of thermal conductivity of good conductor by Searle's method.
3. Determination of thermal conductivity of bad conductor by Lee's disc method.
4. Determination of thermal conductivity of bad conductor by Charlton's method.
5. Determination of specific heat capacity of solid.
6. Determination of specific heat of liquid by Joule's electrical heating method (applying radiation correction by Barton's correction/graphical method).
7. Determination of Latent heat of a vaporization of a liquid.
8. Determination of Stefan's constant for Black body radiation.
9. Verification of Stefan's-Boltzmann's law.
10. Determination of thermal conductivity of rubber tube.
11. Helmholtz resonator.
12. Velocity of sound through a wire using Sonometer.
13. Determination of velocity of sound using Kunds tube.
14. Determination of frequency of an electrically maintained tuning fork
15. To verify the laws of transverse vibration using sonometer.
16. To verify the laws of transverse vibration using Melde's apparatus.
17. To compare the mass per unit length of two strings using Melde's apparatus.
18. Frequency of AC by using sonometer.

### Books for References:

1. M.N.Srinivasan, S.Balasubramanian, R.Ranganathan(2007), *A Text Book of Practical Physics*, Sultan Chand & Sons.
2. Indu Prakash & Ramakrishna(2008), *A Text Book of Practical Physics*, Kitab Mahal Agencies.
3. S.R. GovindaRajan, T. Murugaiyan, S. SundaraRajan (2006), *Practical Physics*, Rochouse & Sons.

**Web Resources/ E-Books:**

1. <http://www.tndte.gov.in/site/wp-content/uploads/2016/08/Engineering-physics.pdf>
2. [https://www.ugc.ac.in/pdfnews/5512002\\_B.SC.-PHYSICAL-SCIENCE-PHYSICS.pdf](https://www.ugc.ac.in/pdfnews/5512002_B.SC.-PHYSICAL-SCIENCE-PHYSICS.pdf)
3. [https://www.academia.edu/34783511/Practical\\_Physics\\_for\\_Degree\\_Students\\_Gias\\_Uddin\\_and\\_Shahabuddin](https://www.academia.edu/34783511/Practical_Physics_for_Degree_Students_Gias_Uddin_and_Shahabuddin)
4. [https://www.academia.edu/35371782/PHYSICS\\_LABORATORY\\_MANUAL\\_UG\\_Courses\\_I\\_and\\_II\\_Semester1.UG\\_course\\_OBE.docx](https://www.academia.edu/35371782/PHYSICS_LABORATORY_MANUAL_UG_Courses_I_and_II_Semester1.UG_course_OBE.docx)

**Pedagogy**

Demonstration and Practical sessions.

**LESSON PLAN: TOTAL HOURS(45 HRS)**

UNIT	Topics to be Covered	Hours	Mode
I	1. Determination of specific heat by cooling – graphical method. 2. Determination of thermal conductivity of good conductor by Searle's method. 3. Determination of thermal conductivity of bad conductor by Lee's disc method. 4. Determination of thermal conductivity of bad conductor by Charlaton's method.	9	Demo & Practical Session
II	5. Determination of specific heat capacity of solid. 6. Determination of specific heat of liquid by Joule's electrical heating method (applying radiation correction by Barton's correction/graphical method), 7. Determination of Latent heat of a vaporization of a liquid. 8. Determination of Stefan's constant for Black body radiation.	9	Demo & Practical Session
III	9. Verification of Stefan's-Boltzmann's law. 10. Determination of thermal conductivity of rubber tube. 11. Helmholtz resonator. 12. Velocity of sound through a wire using Sonometer.	9	Demo & Practical Session
IV	13. Determination of velocity of sound using Kunds tube. 14. Determination of frequency of an electrically maintained tuning fork. 15. To verify the laws of transverse vibration using sonometer. 16. To verify the laws of transverse vibration using Melde's apparatus.	9	Demo & Practical Session
V	17. To compare the mass per unit length of two strings using Melde's apparatus. 18. Frequency of AC by using sonometer.	9	Demo & Practical Session

**Course Designer: Ms. E.Chris Monica  
Mrs. M.Hemalatha**

Department of Physics						Class: I B.Sc		
Sem	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
II	Skill Enhancement Course -2 (NME)	23OUPHSECN2	Astrophysics	2	2	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

### Course Objectives:

1. To Understand the concepts of telescope.
2. To Acquire the basic Knowledge of solar system.
3. To Understand the concepts of eclipses.
4. To Study about the classification of galaxies.
5. To Acquire the knowledge about the activities in astro physics.

### Course Content :

**UNIT I: TELESCOPES:** Optical telescopes – magnifying power, brightness, resolving power and f/a ratio – types of reflecting and refracting telescopes – detectors and image processing – radio telescopes –Hubble space telescope.

**UNIT II:SOLAR SYSTEM:** Bode's law of planetary distances – meteors,meteorites, comets, asteroids – Kuiper belt – Oort cloud – detection of gravitational waves – recent advances in astrophysics

**UNIT III:ECLIPSES:** types of eclipses – solar eclipse – total and partial solareclipse – lunar eclipse – total and partial lunar eclipse – transits. **THE SUN:** physical and orbital data – solar atmosphere – photosphere– chromosphere – solar corona – prominences – sunspots – 11yearsolar cycle – solar flares

**UNIT IV:STELLAR EVOLUTION:** H-R diagram – birth & death of low mass, intermediate mass and massive stars – Chandrasekar limit – whitedwarfs – neutron stars – pulsars – black holes – supernovae.

**GALAXIES:** classification of galaxies – galaxy clusters –interactionsof galaxies, dark matter and super clusters – evolving universe.

### UNIT V:ACTIVITIES IN ASTROPHYSICS:

- (i) Basic construction of telescope
- (ii) Develop models to demonstrate eclipses/planetary motion



(iii) Night sky observation

(iv) Conduct case study pertaining to any topic in this paper

Visit to any one of the National Observatories Any three activities to be done compulsorily.

#### **Book for study:**

1. Kumaravelu, Susheela Kumaravelu, (2014) Astronomy, 10<sup>th</sup> Edition;
2. Michael Zeilik, Stephen Gregory Astronomy And Astrophysics, 4<sup>TH</sup> Edition.

#### **Books for References:**

1. Baidyanath Basu, (2001). An introduction to Astrophysics, Second printing, Prentice – Hall of India (P) Ltd, New Delhi
2. K.S. Krishnaswamy, (2002), Astrophysics – a modern perspective, New Age International (P) Ltd, New Delhi.
3. Shylaja, B.S. & Madhusudan, H.R., (1999), Eclipse: A Celestial Shadow Play, Orient Black Swan,

#### **Web resources/ E-Books:**

1. <https://letstalkscience.ca/educational-resources/backgrounders/optical-telescopes>
2. <https://www.txstate-epdc.net/types-of-eclipses-and-how-they-work>

#### **Pedagogy:**

Chalk and Talk, PPT, group discussion, quiz, on the spot test.

#### **Rationale for nature of Course:**

**Knowledge and Skill:** Study of the astrophysics leads to information which is of practical value to the physicist. It gives us information about the sun and eclipses. Students who undergo this course are successfully bound to get a better insight and understanding of the subject.

#### **Activities to be given:**

1. Enhancing the quality of students to understand the eclipses.
2. Train the students to understand about the astrophysics.

**Course Learning Outcomes (CLOs):**

At the end of the course, the student will be able to:

<b>CLO</b>	<b>Course Learning Outcomes</b>	<b>Knowledge According to Bloom's Taxonomy(upto K level )</b>
CLO1	Explain about the types of telescopes	K1 to K3
CLO2	Explain their knowledge of understanding about solar system	K1 to K3
CLO3	Explain the basic concept of sun and eclipses	K1 to K3
CLO4	Describe about the galaxies and stellar evolution	K1 to K3
CLO5	Gain knowledge about the activities in astrophysics	K1 to K3

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)  
(SCIENCE)**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>
<b>CLO1</b>	3	3	2	3	3	3
<b>CLO2</b>	3	3	2	3	3	3
<b>CLO3</b>	3	3	3	3	3	3
<b>CLO4</b>	3	3	2	3	3	3
<b>CLO5</b>	3	3	3	3	3	3

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)  
(ARTS)**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>
<b>CLO1</b>	2	3	3	2	3	3
<b>CLO2</b>	3	3	3	3	3	3
<b>CLO3</b>	3	3	3	3	3	3
<b>CLO4</b>	3	3	3	2	3	3
<b>CLO5</b>	3	3	3	2	3	3

**1-Basic Level      2- Intermediate Level      3- Advanced Level**

**LESSON PLAN: TOTAL HOURS(30HRS)**

UNIT	Details	Hours	Mode
I	<b>TELESCOPES:</b> Optical telescopes – magnifying power, brightness, resolving power and f/a ratio – types of reflecting and refracting telescopes – detectors and image processing – radio telescopes – Hubble space telescope.	6	Chalk and Talk, PPT, quiz, on the spot test
II	<b>SOLAR SYSTEM:</b> Bode's law of planetary distances – meteors, meteorites, comets, asteroids – Kuiper belt – Oort cloud – detection of gravitational waves – recent advances in astrophysics	6	Chalk and Talk, PPT, quiz, on the spot test
III	<b>ECLIPSES:</b> types of eclipses – solar eclipse – total and partial solareclipse – lunar eclipse – total and partial lunar eclipse – transits. <b>THE SUN:</b> physical and orbital data – solar atmosphere – photosphere– chromosphere – solar corona – prominences – sunspots – 11yearsolar cycle – solar flares	6	Chalk and Talk, PPT, quiz, on the spot test
IV	<b>STELLAR EVOLUTION:</b> H-R diagram – birth & death of low mass, intermediate mass and massive stars – Chandrasekhar limit – whitedwarfs – neutron stars – pulsars – black holes – supernovae. <b>GALAXIES:</b> classification of galaxies – galaxy clusters – interactionsof galaxies, dark matter and super clusters – evolving universe.	6	Chalk and Talk, PPT, quiz on the spot test
V	<b>ACTIVITIES IN ASTROPHYSICS:</b> (i) Basic construction of telescope (ii) Develop models to demonstrate eclipses/planetary motion (iii) Night sky observation (iv) Conduct case study pertaining to any topic in this paper Visit to any one of the National ObservatoriesAny three activities to be done compulsorily.	6	Seminar, PPT presentation, Quiz on the Spot test

**Course Designer: Ms. S.Priyanka**  
**Mrs. S.Ameer Nisha Bibi**

Department of Physics						Class: I B.Sc		
Sem	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
II	DSEC 3	23OUPHSEC3	Electricity	2	2	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
	✓	

### Course Objectives

1. To Understand the fundamentals of Electrostatics.
2. To get the basic Knowledge about current electricity.
3. To Understand the concept of Capacitors.
4. To Acquire the knowledge about AC.
5. To study the Thermo Electric Effects.

### Course Content:

**UNIT I: Electrostatics:** Electric field and flux – Gauss law-Derivation of Coulomb's law from Gauss law-Differential form(Maxwell equation)-Field due to a uniformly charged sphere – Coloumb's theorem –Mechanical force on the surface of a charged conductors –Potential-Electric potential –Potential due to a point charge-equipotential surface-relation between field and potential-electric potential energy.

**UNIT II: Current electricity :**Current –Current density- Expression for current density – Resistance and resistivity-Kirchhoff's laws –Application to Wheat stone's network –Carey foster's bridge –Determination of resistivity and temperature coefficient of resistance - Potentiometer –measurement of potential and calibration of voltmeter and Ammeter.

**UNIT III: Capacitors:** Introduction –Concept of capacitance –capacitance of an isolated spherical conductor –parallel plate capacitor with a dielectric- Dielectric strength.

**UNIT IV: Alternating currents :**Introduction –Impedance ,Reactance and Admittance- Alternating voltage applied across a resistance –Alternating voltage applied across an inductance- Alternating voltage applied across a capacitance.

**UNIT V: Thermo electricity:** Introduction –Seebeck effect- variation of thermo - emf with temperature –Peltier effect –Explanation of Seebeck and Peltier effect-Peltier coefficient – Thomson effect and its prediction -EMF in a thermocouple.

**Book for Study:**

1. Palaniappan.M, *Electricity and electromagnetism*, L.M.N Publication, Madurai, First Edition , 2002.
2. Satyaprakash, *Electricity and magnetism*, Pragati Prakashan, meetur, Twenty Sixth Edition 2011.

**Books for Reference:**

1. Basudev Ghosh, *Foundations of Electricity and Magnetism*, Books and Allied (p) Ltd, Kolkata, Third Edition, 2012.
2. Chattopadhyay. D, Rakshit.P.C , *Electricity and Magnetism*, New Central Book Agency (P) Ltd, Kolkata, Fifth Edition, 2004.
3. Murugesan .R , *Electricity & Magnetism*, S. Chand & Company Ltd ,New Delhi, Sixth Edition, 2004.
4. Tayal.D. C., *Electricity and Magnetism*, Himalaya Publishing House, Mumbai, Second Edition, 1989.
5. Vasudeva.D.N., *Fundamentals of Magnetism and Electricity* ,S. Chand & Company Ltd , New Delhi,Fifth Edition, 2011.

**Web resources/ E-Books:**

1. <https://pressbooks.bccampus.ca/basiclectricity/>
2. <https://ncert.nic.in/ncerts/l/jesc112.pdf>
3. <https://library.honolulu.hawaii.edu/c.php?g=288263&p=1922022>
4. [https://ess.inflibnet.ac.in/subject\\_list.php?subject=Electrical+and+Electronic+Engineering](https://ess.inflibnet.ac.in/subject_list.php?subject=Electrical+and+Electronic+Engineering)
5. <https://nios.ac.in/media/documents/SrSecLibrary/LCh-008.pdf>

**Pedagogy:**

Chalk and Talk, PPT, group discussion , quiz, on the spot test.

**Rationale for nature of Course**

**Knowledge and Skill:** The course is the learning and understanding the fundamentals of electrostatics, current electricity and various types of Thermo electric effects.

**Activities to be given:**

1. Enhancing the quality of students to understand the theory of current electricity.
2. Train the students to do the experiments related to electrostatics.

**Course Learning Outcomes (CLOs):**

At the end of the course, the student will be able to:

CLO	Course Learning Outcomes	Knowledge According to Bloom's Taxonomy (upto K level )
CLO1	Understand the fundamentals of Electrostatics	K1 to K3
CLO2	Get the basic Knowledge about current electricity	K1 to K3
CLO3	Understand the concept of Capacitors.	K1 to K3
CLO4	Acquire the knowledge about AC.	K1 to K3
CLO5	Study the Thermo Electric Effects.	K1 to K3

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)**

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	3	2	3	3	3
CLO2	3	3	2	3	3	3
CLO3	3	3	3	3	3	3
CLO4	3	3	2	3	3	3
CLO5	3	3	3	3	3	3

1-Basic Level    2- Intermediate Level    3- Advanced Level

**LESSON PLAN: TOTAL HOURS(30HRS)**

UNIT	Details	Hours	Mode
I	<b>Electrostatics:</b> Electric field and flux – Gauss law-Derivation of Coulomb's law from Gauss law-Differential form(Maxwell equation)-Field due to a uniformly charged sphere –Coloumb's theorem –Mechanical force on the surface of a charged conductors –Potential-Electric potential –Potential due to a point charge-equipotential surface-relation between field and potential-electric potential energy.	6	Chalk and Talk, PPT, quiz, on the spot test
II	<b>Current electricity :</b> Current –Current density- Expression for current density –Resistance and resistivity-Kirchhoff's laws – Application to Wheat stone's network –Carey foster's bridge – Determination of resistivity and temperature coefficient of resistance - Potentiometer –measurement of potential and calibration of voltmeter and Ammeter.	6	Chalk and Talk, PPT, quiz, on the spot test

III	<b>Capacitors:</b> Introduction –Concept of capacitance –capacitance of an isolated spherical conductor –parallel plate capacitor with a dielectric- Dielectric strength.	6	Chalk and Talk, PPT, quiz, on the spot test
IV	<b>Alternating currents :</b> Introduction –Impedance ,Reactance and Admittance-Alternating voltage applied across a resistance – Alternating voltage applied across an inductance- Alternating voltage applied across a capacitance.	6	Chalk and Talk, PPT, quiz on the spot test
V	<b>Thermo electricity:</b> Introduction –Seebeck effect- variation of thermo - emf with temperature –Peltier effect –Explanation of Seebeck and Peltier effect-Peltier coefficient –Thomson effect and its prediction -EMF in a thermocouple.	6	Seminar, PPT presentation, Quiz on the Spot test

**Course Designer: Mrs. P.Revathi**  
**Mrs. M.R.Gurulakshmi**

**EVALUATION (PRACTICAL)**  
**For core and Generic Elective course**

**Internal** (Formative) : 40 marks  
**External** (Summative) : 60 marks  
**Total** : 100 marks

**Question Paper Pattern for Internal Practical Examination: 40 Marks**

<b>S.No</b>	<b>Components</b>	<b>Marks</b>
<b>1</b>	Model test - I	10
<b>2</b>	Model test - II	10
<b>3</b>	Observation note	10
<b>4</b>	Record book	10
	<b>Total</b>	<b>40</b>

**Question Paper Pattern for External Practical Examination (Major): 60 Marks**

<b>S.No</b>	<b>Components</b>	<b>Marks</b>
<b>1</b>	Experimental Procedure	20
<b>2</b>	Readings	20
<b>3</b>	Calculation	15
<b>4</b>	Result	5
	<b>Total</b>	<b>60</b>

**Question Paper Pattern for External Practical Examination (Major): 60 Marks**

In respect of external examinations passing minimum is **35% for Under Graduate Courses** and in total, **aggregate of 40%.**

Latest amendments and revisions as per **UGC** and **TANSCH** norm is taken into consideration to suit the changing trends in the curriculum.



Department of Physics						Class: I B.Sc Maths		
Sem	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
I	Allied 1:	23OUMAGEPH1	Allied Physics – I	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

### Course Objectives:

1. To Understand the concepts of Waves and Ultrasonics.
2. To Acquire the basic Knowledge of Elasticity and viscosity.
3. To Understand the concepts of heat and thermodynamics.
4. To Study the basic contents of electricity and magnetism.
5. To Acquire the knowledge about the digital electronics.

### Course Content :

**Unit I: WAVES, OSCILLATIONS AND ULTRASONICS:** simple harmonic motion (SHM) – composition of two SHMs at right angles (periods in the ratio 1:1) – Lissajous figures – uses – laws of transverse vibrations of strings – determination of AC frequency using sonometer (steel and brass wires) – ultrasound – production – piezoelectric method – application of ultrasonics: medical field – lithotripsy, ultrasonography–ultrasonoimaging–ultrasonics in dentistry – physiotherapy, ophthalmology – advantages of noninvasive surgery – ultrasonics in green chemistry.

**Unit II: PROPERTIES OF MATTER: *Elasticity*:** elastic constants – bending of beam – theory of non- uniform bending – determination of Young's modulus by non-uniform bending – energy stored in a stretched wire –torsion of a wire – determination of rigidity modulus by torsional pendulum. ***Viscosity*:** streamline and turbulent motion – critical velocity – coefficient of viscosity – Poiseuille's formula – comparison of viscosities – burette method.

***Surface tension*:** definition – molecular theory – droplets formation– shape, size and lifetime – COVID transmission through droplets, saliva– drop weight method – interfacial surface tension.

**Unit III: HEAT AND THERMODYNAMICS:** Joule-Kelvin effect – Joule- Thomson porous plug experiment – theory – temperature of inversion- liquefaction of Oxygen– Linde's process of liquefaction of air– liquid Oxygen for medical purpose– importance of cryocoolers – thermodynamic system – thermodynamic equilibrium – laws of thermodynamics – heat engine – Carnot's cycle – efficiency – entropy change of entropy in reversible and irreversible process.

**Unit IV: ELECTRICITY AND MAGNETISM:** potentiometer – principle – measurement of thermo emf using potentiometer – magnetic field due to a current carrying conductor – Biot-Savart's law – field along the axis of the coil carrying current – peak, average and RMS values of ac current and voltage – power factor and current values in an AC circuit – types of switches in household and factories– Smart wifi switches- fuses and circuit breakers in houses

**Unit V: DIGITAL ELECTRONICS AND DIGITAL INDIA:** logic gates, OR, AND, NOT, NAND, NOR, EXOR logic gates – universal building blocks – Boolean algebra – De Morgan's theorem – verification – overview of Government initiatives: software technological parks under MeitY, NIELIT- semiconductor laboratories under Dept. of Space – an introduction to Digital India

#### Books for Study:

1. R.Murugesan (2018), AlliedPhysics,S. Chand&Co,NewDelhi.

#### Books for Reference:

1. Resnick Halliday and Walker(2018).Fundamentals of Physics(11<sup>th</sup>edition),John Willey and Sons, Asia Pvt. Ltd., Singapore.
2. V.R.Khannaand R.S.Bedi (1998), TextbookofSound1<sup>st</sup>Edn.Kedharnaath Publish &Co, Meerut.
3. N.S.Khareand S.S.Srivastava (1983),Electricity and Magnetism10<sup>th</sup>Edn.,AtmaRam&Sons, New Delhi.
4. D.R.Khannaand H.R.Gulati (1979).Optics,S. Chand&Co.Ltd. ,New Delhi.
5. V.K.Metha (2004). Principles of electronics 6<sup>th</sup>Edn. S.Chand and compa

#### Web Resources/ E-Books:

1. [https://youtu.be/M\\_5KYncYNyc](https://youtu.be/M_5KYncYNyc)
2. <https://youtu.be/ljJLJgIvaHY>
3. [https://youtu.be/7mGqd9HQ\\_AU](https://youtu.be/7mGqd9HQ_AU)
4. <https://youtu.be/h5jOAw57OXM>
5. <https://learningtechnologyofficial.com/category/fluid-mechanics-lab/>
6. <http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html>
7. <https://www.youtube.com/watch?v=gT8Nth9NWPM>
8. [https://www.youtube.com/watch?v=9mX\\_OMzUruMQ&t=1s](https://www.youtube.com/watch?v=9mX_OMzUruMQ&t=1s)
9. <https://www.youtube.com/watch?v=m4u-SuaSu1s&t=3s>
10. <https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work>

**Pedagogy:**

Chalk and Talk, PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs.

**Rationale for nature of Course**

**Knowledge and Skill:** Study of the properties of matter leads to information which is of practical value to the physicist. It gives us information about the thermal properties and digital electronics.

**Activities to be given:**

- 1.Enhancing the quality of students to understand the wave oscillation and heat and thermodynamics.
- 2.Train the students to understand the properties of matter and digital electronics.

**Course Learning Outcomes (CLOs):**

At the end of the course, the student will be able to:

CLO	Course Learning Outcomes	Knowledge According to Bloom's Taxonomy(upto K level )
CLO1	Understand the concepts of Waves and Ultrasonics	K1 to K3
CLO2	Acquire the basic Knowledge of Elasticity and viscosity	K1 to K3
CLO3	Understand the concepts of heat and thermodynamics.	K1 to K4
CLO4	Study the basic contents of electricity and magnetism	K1 to K3
CLO5	Acquire the knowledge about the digital electronics	K1 to K4

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)**

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	3	2	3	3	3
CLO2	3	3	2	3	3	3
CLO3	3	3	3	3	3	3
CLO4	3	3	2	3	3	3
CLO5	3	3	3	3	3	3

**1-Basic Level    2- Intermediate Level    3- Advanced Level**

**LESSON PLAN : TOTAL HOURS(60HRS)**

UNIT	DESCRIPTION	Hrs	MODE
I	<b>ELASTICITY:</b> Hooke's law – stress-strain diagram – elastic constants –Poisson's ratio – relation between elastic constants and Poisson's ratio – work done in twisting a wire - twisting couple on a cylinder – rigidity modulus by static torsion–torsional pendulum (with and without masses)	12	Chalk and Talk, PPT, quiz, on the spot test
II	<b>BENDING OF BEAMS:</b> cantilever– expression for Bending moment – expression for depression at the loaded end of the cantilever– oscillations of a cantilever – expression for time period – experiment to find Young's modulus – non-uniform bending– experiment to determine Young's modulus by Koenig's method – uniform bending – expression for elevation – experiment to determine Young's modulus using microscope	12	Chalk and Talk, PPT, quiz, on the spot test
III	<b>FLUID DYNAMICS:</b> <i>Surface tension:</i> definition – molecular forces– excess pressure inside a curved liquid surface – application to spherical and cylindrical drops and bubbles -determination of surface tension by Jaegar's method–variation of surface tension with temperature. <i>Viscosity:</i> definition – streamline and turbulent flow – rate of flow of liquid in a capillary tube – Poiseuille's formula – corrections – terminal velocity and Stoke's formula– variation of viscosity with temperature	12	Chalk and Talk, PPT, quiz, on the spot test
IV	<b>WAVES AND OSCILLATIONS:</b> Simple Harmonic Motion (SHM) – differential equation of SHM – graphical representation of SHM – composition of two SHM in a straight line and at right angles – Lissajous's figures- free, damped, forced vibrations – resonance and sharpness of resonance. Laws of transverse vibration of strings – <i>sonometer</i> : determination of AC frequency using sonometer – determination of frequency using Melde's string apparatus.	12	Chalk and Talk, PPT, quiz on the spot test
V	<b>ACOUSTICS OF BUILDINGS AND ULTRASONICS:</b> Intensity of sound – decibel – loudness of sound–reverberation– Sabine's reverberation formula – acoustic intensity – factors affecting the acoustics of buildings. <i>Ultrasonic waves:</i> production of ultrasonic waves – Piezoelectric crystal method – magnetostriction effect – application of ultrasonic waves	12	Seminar, PPT presentation, Quiz on the Spot test

**Course Designer: Mrs.B.Subha**  
**Mrs. S.Manimozhi**

Sem	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
I	Allied Practical 1:	23OUMAGEPH1P	Allied Physics Practical-I	2	2	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

### List of Experiments: (Any Seven)

1. Young's modulus by non-uniform bending using pin and microscope
2. Young's modulus by non-uniform bending using optic lever, scale and telescope
3. Rigidity modulus by static torsion method.
4. Rigidity modulus by torsional oscillations without mass
6. Surface tension and interfacial Surface tension – drop weight method
7. Comparison of viscosities of two liquids – burette method
8. Specific heat capacity of a liquid – half time correction
9. Verification of laws of transverse vibrations using sonometer
10. Calibration of low range voltmeter using potentiometer
11. Determination of thermo emf using potentiometer
12. Verification of truth tables of basic logic gates using ICs
13. Verification of De Morgan's theorems using logic gate ICs.
14. Use of NAND as universal building block.

### Books for Reference:

1. M.N.Srinivasan, S.Balasubramanian, R.Ranganathan(2007), A Text Book of Practical Physics, , Sultan Chand & Sons.
2. Indu Prakash & Ramakrishna(2008), A Text Book of Practical Physics, Kitab Mahal Agencies
3. S.R. GovindaRajan, T. Murugaiyan, S. SundaraRajan(, 2006), Practical Physics, Rochouse& Sons.

### Web resources/ E-Books:

1. <http://www.tndte.gov.in/site/wp-content/uploads/2016/08/Engineering-physics.pdf>
2. [https://www.ugc.ac.in/pdfnews/5512002\\_B.SC.-PHYSICAL-SCIENCE- PHYSICS,-CHEMISTRY,-MATHEMATICS -CB.pdf](https://www.ugc.ac.in/pdfnews/5512002_B.SC.-PHYSICAL-SCIENCE- PHYSICS,-CHEMISTRY,-MATHEMATICS -CB.pdf)

3. [https://www.academia.edu/34783511/Practical\\_Physics\\_for\\_Degree\\_Students\\_Gias\\_Uddin\\_and\\_Shahabuddin](https://www.academia.edu/34783511/Practical_Physics_for_Degree_Students_Gias_Uddin_and_Shahabuddin)
4. [https://www.academia.edu/35371782/PHYSICS\\_LABORATORY\\_MANUAL\\_UG\\_Courses\\_I\\_and\\_II\\_Semester1.UG\\_course\\_OBE.docx](https://www.academia.edu/35371782/PHYSICS_LABORATORY_MANUAL_UG_Courses_I_and_II_Semester1.UG_course_OBE.docx)

**Pedagogy:**

Demonstration and Practical sessions.

**LESSON PLAN: TOTAL HOURS(30HRS)**

UNIT	Details	No. of Hours	Mode of Teaching
I	1. Young's modulus by non-uniform bending using pin and microscope. 2. Young's modulus by non-uniform bending using optic lever, scale and telescope. 3. Rigidity modulus by static torsion method.	6	Demo & Practical Session
II	4. Rigidity modulus by torsional oscillations without mass 5. Surface tension and interfacial Surface tension – drop weight method. 6. Comparison of viscosities of two liquids – burette method.	6	Demo & Practical Session
III	7. Specific heat capacity of a liquid – half time correction 8. Verification of laws of transverse vibrations using sonometer. 9. Calibration of low range voltmeter using potentiometer	6	Demo & Practical Session
IV	10. Determination of thermo emf using potentiometer 11. Verification of truth tables of basic logic gates using ICs	6	Demo & Practical Session
V	12. Verification of De Morgan's theorems using logic gate ICs. 13. Use of NAND as universal building block.	6	Demo & Practical Session

**Course Designer: Mrs.B.Subha  
Mrs. S.Manimozhi**

Department of Physics						Class: I B.Sc Maths		
Sem	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
II	Allied II	23OUMAGEPH2	Allied Physics – II	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

### Course Objectives:

1. To Understand the concepts of interference.
2. To Acquire the basic Knowledge of atom models.
3. To Understand the concepts of nuclear models.
4. To Study about the special theory of relativity.
5. To Acquire the knowledge about the semiconductor physics.

### Course Content

**UNIT I :OPTICS:** interference – interference in thin films –colors of thin films – air wedge – determination of diameter of a thin wire by air wedge – diffraction – diffraction of light vs sound – normal incidence – experimental determination of wavelength using diffraction grating (no theory) – polarization – polarization by double reflection – Brewster's law – optical activity – application

in sugar industries

**UNIT II :ATOMIC PHYSICS:** atom models – Bohr atom model – mass number – atomic number – nucleons – vector atom model – various quantum numbers – Pauli's exclusion principle – electronic configuration – periodic classification of elements – Bohr magneton – Stark effect –Zeeman effect (elementary ideas only) – photo electric effect – Einstein's photoelectric equation – applications of photoelectric effect: solar cells, solar panels, optoelectric devices

**UNIT III :NUCLEAR PHYSICS:** nuclear models – liquid drop model – magic numbers – shell model – nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and uses –controlled and uncontrolled chain reaction – nuclear fission – energy released in fission – chain reaction – critical reaction – critical size- atom bomb – nuclear reactor –breeder reactor – importance of commissioning PFBR in our country – heavy water disposal, safety of reactors: seismic and floods –introduction to DAE, IAEA – nuclear fusion –thermonuclear reactions – differences between fission and fusion.

**UNIT IV : INTRODUCTION TO RELATIVITY AND GRAVITATIONAL WAVES:**

Frame of reference – Postulates of special theory of relativity – Galilean transformation equations – Lorentz transformation equations – Derivation – length contraction – time dilation – twin paradox – mass-energy equivalence – introduction on gravitational waves, LIGO, ICTS opportunities at International Centre for Theoretical Sciences.

**UNIT V : SEMICONDUCTOR PHYSICS: p-n junction diode – forward and reverse biasing**

– characteristic of diode – zener diode – characteristic of zener diode – voltage regulator – full wave bridge rectifier – construction and working – advantages (no mathematical treatment) – USB cell phone charger – introduction to e-vehicles and EV charging stations

**Books for Study:**

1. R. Murugesan (2005), Allied Physics, S.Chand & Co, New Delhi.
2. K. Thangaraj and D. Jayaraman (2004), Allied Physics, Popular Book Depot, Chennai.
3. Brijlal and N. Subramanyam (2002), Text book of Optics, S.Chand & Co, New Delhi.
4. R. Murugesan (2005), Modern Physics, S.Chand & Co, New Delhi.
5. A. Subramaniyam Applied Electronics, 2<sup>nd</sup> Edn., National Publishing Co., Chennai.
6. Subramaniyam Applied Electronics, 2<sup>nd</sup> Edn., National Publishing Co., Chennai.

**Books for References:**

1. Resnick Halliday and Walker (2018), Fundamentals of Physics, 11<sup>th</sup> Edn., John Wiley and Sons, Asia Pvt. Ltd., Singapore.
2. D.R. Khanna and H.R. Gulati (1979), Optics, S.Chand & Co. Ltd., New Delhi.
3. A. Beiser (1997), Concepts of Modern Physics, Tata Mc Graw Hill Publication, New Delhi.
4. Thomas L. Floyd (2017), Digital Fundamentals, 11<sup>th</sup> Edn., Universal Book Stall, New Delhi.
5. V.K. Metha (2004), Principles of electronics, 6<sup>th</sup> Edn. S.Chand and Company, New Delhi.

**Web resources/E-Books:**

1. <https://www.berkshire.com/learning-center/delta-p-facemask/>
2. <https://www.youtube.com/watch?v=QrhxU47gtj4htt>
3. [https://www.youtube.com/watch?time\\_continue=318&v=D38BjgUdL5U&feature=emb\\_logo](https://www.youtube.com/watch?time_continue=318&v=D38BjgUdL5U&feature=emb_logo)
4. <https://www.youtube.com/watch?v=JrRrp5F-Qu4>



5. <https://www.validyne.com/blog/leak-test-using-pressure-transducers/>

6. <https://www.atoptics.co.uk/atoptics/blsky.htm> -

7. <https://www.metoffice.gov.uk/weather/learn-about/weather/optical-effects>

**Pedagogy:** Chalk and Talk, PPT, group discussion , quiz, on the spot test.

**Rationale for nature of Course:**

**Knowledge and Skill:** Study of the allied physics-II leads to information which is of practical value to the physicist. It gives us information about the nuclear models ,atom models. Students who undergo this course are successfully bound to get a better insight and understanding of the subject.

**Activities to be given:**

1. Enhancing the quality of students to understand about the semiconductor device.
2. Train the students to understand the theory by conducting the experiments.

**Course Learning Outcomes (CLOs):**

At the end of the course, the student will be able to:

CLO	Course Learning Outcomes	Knowledge According to Bloom's Taxonomy(upto K level )
CLO1	Explain the concepts of interference diffraction using principles of Superposition of waves and rephrase the concept of polarizationbased on wave patterns	K1 to K3
CLO2	Outline the basic foundation of different atom models andvarious experiments establishing quantum concepts. Relate theimportance of interpreting improving theoretical models based on observation. Appreciate interdisciplinary nature of science and in solar energy related applications.	K1 to K3
CLO3	Summarize the properties of nuclei, nuclear forces structure of atomic nucleus and nuclear models.Solve problems on delay rate half-life and mean-life. Interpretnuclear processes like fission and fusion. Understand theimportance of nuclear energy, safety measures carried and getour Govt. agencies like DAE guiding the country in the nuclear field.	K1 to K4
CLO4	To describe the basic concepts of relativity like equivalence principle, inertial frames and Lorentz transformation. Extend their knowledge on concepts of relativity and vice versa. Relate this with current research in this field and get an overview ofresearch projects of National and International importance, like LIGO, ICTS, and opportunities available.	K1 to K3
CLO5	Summarize the working of semiconductor devices like junction diode, Zener diode, transistors and practical devices we daily use like USB chargers and EV charging stations	K1 to K4

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)**

	PO1	PO2	PO3	PO4	PO5	PO6
<b>CLO1</b>	3	3	2	3	3	3
<b>CLO2</b>	3	3	2	3	3	3
<b>CLO3</b>	3	3	3	3	3	3
<b>CLO4</b>	3	3	2	3	3	3
<b>CLO5</b>	3	3	3	3	3	3

**1-Basic Level    2- Intermediate Level    3- Advanced Level**

**LESSON PLAN: TOTAL HOURS(60 HRS)**

UNIT	Details	Hours	Mode
I	<b>OPTICS:</b> interference – interference in thin films – colors of thin films – air wedge – determination of diameter of a thin wire by air wedge – diffraction – diffraction of light vs sound – normal incidence – experimental determination of wavelength using diffraction grating (no theory) – polarization – polarization by double reflection – Brewster's law – optical activity – application in sugar industries	12	Chalk and Talk, PPT, quiz, on the spot test
II	<b>ATOMIC PHYSICS:</b> atom models – Bohr atom model – mass number – atomic number – nucleons – vector atom model – various quantum numbers – Pauli's exclusion principle – electronic configuration – periodic classification of elements – Bohr magneton – Stark effect – Zeeman effect (elementary ideas only) – photo electric effect – Einstein's photoelectric equation – applications of photoelectric effect: solar cells, solar panels, optoelectric devices	12	Chalk and Talk, PPT, quiz, on the spot test
III	<b>NUCLEAR PHYSICS:</b> nuclear models – liquid drop model – magic numbers – shell model – nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and uses – controlled and uncontrolled chain reaction – nuclear fission – energy released in fission – chain reaction – critical reaction – critical size- atom bomb – nuclear reactor – breeder reactor – importance of commissioning PFBR in our country – heavy water disposal, safety of reactors: seismic and floods – introduction to DAE, IAEA – nuclear fusion – thermonuclear reactions – differences between fission and fusion.	12	Chalk and Talk, PPT, quiz, on the spot test
IV	<b>INTRODUCTION TO RELATIVITY AND GRAVITATIONAL WAVES:</b> Frame of reference – Postulates of special theory of relativity – Galilean transformation equations – Lorentz transformation equations – Derivation – length contraction – time dilation – twin paradox – mass-energy equivalence – introduction	12	Chalk and Talk, PPT, quiz on the

	on gravitational waves, LIGO, ICTS opportunities at International Centre for Theoretical Sciences.		spot test
V	<b>SEMICONDUCTOR PHYSICS:</b> p-n junction diode – forward and reverse biasing – characteristic of diode – zener diode – characteristic of zener diode – voltage regulator – full wave bridge rectifier – construction and working – advantages (no mathematical treatment) – USB cell phone charger – introduction to e-vehicles and EV charging stations	12	Seminar, PPT presentation, Quiz on the Spot test

**Course Designer: Ms. S.Priyanka**  
**Mrs. S.Ameer Nisha Bibi**

Department of Physics						Class: I B.Sc		
Sem	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
II	Allied Practical II	23OUMAGEPH2P	Allied Practical-II	2	2	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

### LIST OF EXPERIMENTS : (Any Seven)

1. Radius of curvature of lens by forming Newton's rings
2. Thickness of a wire using air wedge
3. Wavelength of mercury lines using spectrometer and grating
4. Refractive index of material of the lens by minimum deviation
5. Refractive index of liquid using liquid prism
6. Determination of AC frequency using sonometer
7. Specific resistance of a wire using PO box
8. Thermal conductivity of poor conductor using Lee's disc
9. Determination of figure of merit table galvanometer
10. Determination of Earth's magnetic field using field along the axis of a coil
11. Characterisation of Zener diode
12. Construction of Zener/IC regulated power supply
13. Construction of AND, OR, NOT gates using diodes and transistor
14. NOR gate as a universal building block

### Books for References:

1. M.N.Srinivasan, S.Balasubramanian, R.Ranganathan(2007), *A Text Book of Practical Physics*, Sultan Chand & Sons.
2. Indu Prakash & Ramakrishna(2008), *A Text Book of Practical Physics*, Kitab Mahal Agencies.

### Web resources/E-Books:

1. <https://www.youtube.com/watch?v=jcpnOJHS3TE>
2. <https://www.youtube.com/watch?v=-0etuKdDu2g>
3. <https://www.youtube.com/watch?v=9lqwSaIDm2g>
4. <https://www.youtube.com/watch?v=Z6Nds10n7rs>
5. <https://www.youtube.com/watch?v=mQM-5o3pBaU>

**Pedagogy:**

Demonstration and Practical sessions.

**LESSON PLAN: TOTAL HOURS(30HRS)**

UNIT	Details	Hours	Mode
I	1. Radius of curvature of lens by forming Newton's rings 2. Thickness of a wire using air wedge 3. Wavelength of mercury lines using spectrometer and grating	6	Demo & Practical Session
II	4. Refractive index of material of the lens by minimum deviation 5. Refractive index of liquid using liquid prism 6. Determination of AC frequency using sonometer	6	Demo & Practical Session
III	7. Specific resistance of a wire using PO box 8. Thermal conductivity of poor conductor using Lee's disc 9. Determination of figure of merit table galvanometer	6	Demo & Practical Session
IV	10. Determination of Earth's magnetic field using field along the axis of a coil 11. Characterisation of Zener diode 12. Construction of Zener/IC regulated power supply	6	Demo & Practical Session
V	13. Construction of AND, OR, NOT gates using diodes and transistor 14. NOR gate as a universal building block	6	Demo & Practical Session

**Course Designer: Ms. S.Priyanka**  
**Mrs. S.Ameer Nisha Bibi**