



**PSGR  
Krishnammal College for Women**



## **DEPARTMENT OF PHYSICS**

**LEARNING OUTCOMES- BASED CURRICULAR FRAMEWORK (LOCF)**

**BACHELOR OF PHYSICS (B. Sc Physics-Aided)**

**2024-2027 BATCH**



## PROGRAMME LEARNING OUTCOMES-UG

At the end of the programme the students will

- PLO1** : Have enhanced academic abilities, personal qualities and transferable skills which will give them an opportunity to develop as responsible citizens.
- PLO2** : Excel in the competencies and value required for leadership to serve a rapidly evolving global community
- PLO3** : Acquire sound knowledge in the concepts and significance of the various physical phenomena.
- PLO4** : Be able to apply the theories learnt and the skills acquired to solve real time problems and to develop the interest to gauge the physical properties of materials.
- PLO5** : Be able to effectively apply the core concepts through information technology
- PLO6** : Be endowed with creative and analytical skills, to equip them to become entrepreneurs and to find employability in core companies and software based industries.

## PROGRAMME SPECIFIC OUTCOMES

At the time of graduation the students will

- PSO1** : Gain a wide spectrum of skills which will enable them to solve both theoretical and experimental problems.
- PSO2** : Acquire laboratory skills as per standards, and will proficiently handle the electrical and electronic instruments.
- PSO3** : Understand the importance of energy conservation.
- PSO4** : A the skill to gauge the physical properties of materials.
- PSO5** : Be able to make effective use of information technology.

**DEPARTMENT OF PHYSICS**  
**CHOICE BASED CREDIT SYSTEM & OUTCOME BASED EDUCATION**  
**SCHEME & SYLLABUS OF EXAMINATION**  
**BACHELOR OF PHYSICS - 2024-2027 BATCH & ONWARDS**

Sem	Part	Course Code	Title of the Paper	Course Type	Instruction hours/week	Contact hours	Tutorial	Duration of Examination	Examination Marks			Credits	
									CA	ESE	Total		
I	I	TAM2301/ HIN2301/ FRE2301	Language I – Tamil Paper I/ Hindi Paper I/ French Paper I	L	6	88	2	3	25	75	100	3	
	II	ENG2301	English Paper I	E	6	88	2	3	25	75	100	3	
	III	PS23C01	Mechanics, Properties of Matter and Sound	CC	6	88	2	3	25	75	100	5	
		PS23CP1	Physics Practicals I	CC	3			-	-	-	-	-	
	CE24A03/ TH23A09	Chemistry Paper-I / Mathematics for Sciences I	GE	4	58	2	3	20	55	75	4		
			GE	7	103	2	3	25	75	100	5		
	CE23AP2	Chemistry Practicals	GE	3			-	-	-	-	-		
	IV	<b>Non Tamil Students</b>											
		NME23B1/ NME23A1/	Basic Tamil I/ Advanced Tamil I/	AEC	2	28	2	-	100	-	100	2	
				<b>Students with Tamil as Language</b>									
NME23ES		Introduction to Entrepreneurship	AEC	2	30	-	-	100	-	100			
I-V	VI	24BONL1 24BONL2 24BONL3	Online Course 1 Online Course 2 Online Course 3	ACC	-	-	-	-	-	-	-	-	
I-IV	VI	COMISSER	Community Services			30	-	-	-	-	-	-	

**CC – Core Courses**  
**GE – Generic Elective**  
**AEC – Ability Enhancement Course**

**CA – Continuous Assessment**  
**ESE - End Semester Examination**  
**ACC – Additional Credit Course**

<b>PS23C01</b>	<b>MECHANICS, PROPERTIES OF MATTER AND SOUND</b>	Category	L	T	P	Credit
		III	88	2	-	5

### Preamble

To give the students fundamental ideas on conservation laws, rotational and vibrational motion of rigid bodies, elasticity, viscosity, surface tension and basics of sound.

### Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand and define the laws involved in mechanics , properties of matter and sound	K2
CLO2	Analyze the behavior of various bodies due to kinematic and dynamic forces acting on the body.	K4
CLO3	Apply the key evidence of the classical description of the properties of matter	K3
CLO4	Recall the principles and basic equations and apply them to unseen problems	K4
CLO5	Acquire problem solving skills on par with industry	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
<b>CLO1</b>	M	M	S	S	S	S
<b>CLO2</b>	S	S	S	S	S	S
<b>CLO3</b>	S	S	S	S	S	S
<b>CLO4</b>	S	S	S	L	S	S
<b>CLO5</b>	S	M	M	M	S	S

S- Strong; M-Medium; L-Low

## Syllabus

### Unit I

18 Hrs

#### Impact of elastic bodies and Friction

Conservation Laws – Collision- Impulse of a force – Fundamental principle of impact-Direct impact of two smooth spheres- loss of K.E due to direct impact of two smooth spheres-Oblique impact of a smooth sphere on a fixed smooth plane –oblique impact of two smooth spheres and loss of K.E due to oblique impact – friction – Laws of friction – angle of friction –cone of friction – Experimental method for determining co-efficient of friction between two surfaces-Equilibrium of a body on a rough inclined plane acted upon by an External force.

### Unit II

18Hrs

#### Rigid Body Dynamics

Rigid body – rotational and vibrational motion – Torque – angular momentum–Angular impulse–moment of inertia – radius of gyration– dimensions and units of moment of inertia– Analogous parameters in translational and Rotational motion.

#### Simple Harmonic Motion

Composition of two simple harmonic motions in a straight line– Composition of two simple harmonic motions of equal time periods at right angles–Lissajous Figures – Experimental methods –Uses of Lissajous Figures

### Unit III

17 hrs

#### Elasticity

Elasticity – Three types of elastic moduli and relation between them – Poisson's ratio – Bending of beams – Expression for bending moment – Depression of the loaded end of a Cantilever – uniform – non uniform bending – theory – experiment – pin and microscope method – work done in uniform bending – Koenig's method – non-uniform bending – theory – expression for couple per unit twist – determination of rigidity modulus – Static torsion method with scale and telescope – Rigidity modulus by torsion pendulum with mass – I section girders.

### Unit IV

17 hrs

#### Viscosity and Surface tension

Viscosity – Poiseuille's formula for the flow of a liquid through a capillary tube– corrections– Poiseuille's method to determine the coefficient of viscosity of liquid – Ostwald's viscometer – variation of viscosity with temperature and pressure – Searle's viscometer (rotating cylinder method). Effect of temperature on brake oils in cars.

**Surface tension**– work done in increasing the area of the surface – work done in blowing a bubble- experimental determination of surface tension – Jaeger's method- Quincke's method– variation of surface tension with temperature – drop weight method- experimental determination of interfacial tension between water and kerosene.

### Unit V

18 hrs

#### Sound

Velocity of transverse waves along stretched string – Laws of transverse vibration of strings – Melde's experiment– Siren – Determinations of frequency of a tuning fork by revolving drum method and phonic stroboscopic method – Means of Lissajous method

**Acoustics**– Reverberation– Sabine’s reverberation formula – Determination of absorption coefficient. **Ultrasonics**– properties – production– Galton whistle – Magnetostriction oscillator – Piezo-electric oscillator- detection and application.Importance of Industry 4.0 in Physics.

### Text Books

S.No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	Murugesan. R	Mechanics and Mathematical Methods	S.Chand& Co Ltd, New Delhi	2006	Reprint
2	Mathur D.S	Mechanics	S. Chand &Co Ltd, New Delhi	2012	2 <sup>nd</sup> Edition
3	R.Murugesan	Properties of Matter	S.Chand and Company Pvt Ltd	2013	11 <sup>th</sup> edition
4	Saighal.R.L	Textbook of Sound	S.Chand&C o Ltd	1998	2 <sup>nd</sup> Edition
5	P. Kaliraj,& T. Devi	Higher Education for Industry 4.0 and Transformation to Education 5.0	CRC Press	2022	ebook ISBN:9781000683219, 1000683214

### Reference Books

S.No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	Bhargava& Sharma	A Text Book of Mechanics	RatanPrakashan Mandir	1990	7 <sup>th</sup> Edition
2	Brijlal Subramanyam	Properties of Matter	S. Chand and Company Pvt Ltd	1995	3 <sup>rd</sup> Edition
3	Murugesan. R	Properties of matter, Sound and thermal physics	S. Chand & Co Ltd	2011	1 <sup>st</sup> Edition

## **Pedagogy**

Chalk and Talk lectures, Group Discussion, Seminar, Interaction, power point presentation, Weblinks, NPTEL Lectures.

## **Course Designers**

1. Dr.M.Lavanya



<b>PS23CP1</b>	<b>PHYSICS PRACTICALS I</b>	Category	L	T	P	Credit
		III	-	-	3hrs/week	-

### Preamble

This course introduces students to the methods of experimental physics. Emphasis will be given on laboratory techniques such as accuracy of measurements and data analysis. The concepts that are learnt in the lecture sessions will be translated to the laboratory sessions thus providing a hands-on learning experience such as in measuring the basic concepts in properties of matter, Sound, Heat, Optics, Electricity and Magnetism.

### Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1.	Apply knowledge of mathematics and physics fundamentals and an instrumentation to arrive solution for various problems.	K2
CLO2.	Understand the usage of basic laws and theories to determine various properties of the materials given.	K2
CLO3.	Understand the application side of the experiments	K2
CLO4.	Use standard methods to calibrate the given low range voltmeter and ammeter and to measure resistance of the given coil and various physical quantities.	K3
CLO5.	Use of basic laws to study the spectral properties and optical properties of the given prism.	K3

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	L	L	L	L
CLO2	S	S	S	S	M	M
CLO3	S	S	S	S	M	M
CLO4	S	S	S	S	M	M
CLO5	S	S	S	S	M	M

S- Strong; M-Medium; L-Low

## Syllabus

### List of Experiments

1. Determination of Young's Modulus of the given rectangular beam by Non Uniform bending using Optic lever.
2. Determination of Young's Modulus of the given rectangular beam by Uniform bending using pin and microscope.
3. Determination of Rigidity modulus of the material of the given rod by using Static torsion apparatus.
4. Determination of Rigidity modulus of the material of the suspension wire using Torsion pendulum.
5. Determination of Moment of Inertia of the given disc by torsional oscillations.
6. Determination of frequency of AC mains using Sonometer.
7. Determination of Acceleration due to gravity using Compound pendulum.
8. Determination of thermal conductivity of the given bad conductor using Lee's disc method.
9. Determination of Refractive index of the given solid prism using Spectrometer
10. Determination of Refractive index of a liquid using hollow prism - Spectrometer
11. Determination of wavelength of prominent lines of mercury spectrum using grating by minimum deviation method using Spectrometer
12. Calibration of a low range voltmeter using Potentiometer
13. Calibration of a low range ammeter using Potentiometer
14. Determination of unknown resistance of the given coil of wire using potentiometer.
15. Determination of Moment of a magnet using deflection magnetometer by Tan C method.
16. Determination of  $B_H$  by measuring the field along the axis using deflection magnetometer.
17. Determination of Temperature co-efficient of resistance of a Thermistor using Wheatstone's bridge.
18. Determination of Spring Constant of different metals.
19. Determination of frequency of tuning fork using Melde's apparatus.
20. Determination of Planck's constant using different LEDs.

### Pedagogy:

Demonstration and practical sessions

### Course Designers:

1. Dr. G. Praveena

PS24A01	<b>ALLIED PHYSICS PAPER- I</b> (For Chemistry)	Category	L	T	P	Credit
		III	58	2	-	4

### Preamble

This paper introduces the students to the basic concepts of Elasticity, Rotational motion, Heat and thermodynamics, Sound, Optics, Atomic and Nuclear Physics

### Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Define the fundamental concepts of material properties, heat, sound, optics, atomic and nuclear physics	K1
CLO2	Demonstrate the practical concepts behind the optics, heat and sound through experimental setup	K2
CLO3	Apply the fundamental properties and the associated laws to understand physical systems	K2
CLO4	Analyze the thermo dynamical, optical properties of matter and to find its applications in various fields	K3

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	M	S	M	S	L
CLO3	S	M	S	L	M	S
CLO4	S	M	S	S	S	S
CLO5	S	M	S	M	S	M

S- Strong; M-Medium; L-Low

## Syllabus

### Unit – I

11 Hrs

#### Properties of Matter

Elasticity: Moduli of elasticity– bending moment-expression – Young’s modulus by uniform and non-uniform bending–theory and experiment Torsion pendulum–couple per unit twist–work done in twisting –determination of the rigidity modulus of the material of the wire.

### Unit - II

12Hrs

#### Transmission of Heat

**Conduction process:** Thermal conductivity– Rectilinear field along a bar–Measurement of Thermal conductivity of a bad conductor by Lee’s disc method

Convection process:Lapse rate –stability of atmosphere –Green house effect

Radiation process:Solar constant–Pyreheliometer–solar energy and its applications (flat plate collector & solar cooker) – concentration solar collector, Fresnel Lenses method.

### Unit - III

11 Hrs

#### Thermodynamics, Sound:

Thermodynamics:Thermodynamic variables – Extensive and Intensive variables– Maxwell's Thermodynamic relation–Thermodynamic potential – Significance– relation of thermodynamics potentials with their variables

**Ultrasonics:** Piezo electric & Magnetostriction method – Principle–Construction – Working and Applications.

### Unit - IV

12Hrs

#### Optics:

Dispersion: Dispersive power-combination of prisms to produce (i) deviation without dispersion (ii) dispersion without deviation – direct vision spectroscope.

Interference: Air wedge – determination of diameter of a wire– Newton’s rings-determination of refractive of a liquid

Polarization:Production, detection and analysis of different types of polarized light –quarter and half wave plates

### Unit - V

12Hrs

Atomic Physics:Vector atom model– Quantum numbers associated with vector atom model – Pauli’s exclusion principle –excitation and ionization potential–experimental determination–**Franck and Hertz method.**

Particle Physics: Elementary particles – classification– particles and antiparticles –conservation laws and symmetry– Quark model.

### Books for Study:

S. No	Authors	Title of the Book	Publishers	Year of Publication
1	Brijlal Subramaniam	Heat and thermodynamics	S.Chand and Co, 16 <sup>th</sup> Edition.	2012
2	Brijlal Subramaniam &Hemne.P.S,	Heat thermodynamics and Statistical Physics	S.Chand and Co, 12 <sup>th</sup> edition	2011
3	Brijlal Subramaniam	Optics	S.Chand and Co, 21 <sup>st</sup> Edition	2012
4	Murugesan R	Allied Physics	S.Chand and Co, 1 <sup>st</sup> Edition	1998

### Books for Reference:

S. No	Authors	Title of the Book	Publishers	Year of Publication
1	Jayaprakash. N	Heat and thermodynamics	S Chand and Co, 16 <sup>th</sup> Edition.	2012
2	Mathur D.S	Properties of Matter	S Chand and Co, 2 <sup>nd</sup> Edition	1970
3	Murugesan R	Modern Physics	SChand and Co , 9 <sup>th</sup> edition	2013

### Pedagogy

Chalk and talk, PPT, Seminar, Group discussion, Interaction

## Course Designers:

1. Dr. B.Punithaveni

## ReferencesFor E-Content:

1. <https://youtu.be/qQhOYbztNIQ>
2. <https://youtu.be/gcI-bkr7ilg>
3. <https://youtu.be/7tr4qWPgP40>
4. [https://youtu.be/N5GAHntU\\_nQ](https://youtu.be/N5GAHntU_nQ)
5. <https://youtu.be/hDP6egLrsdM>
6. <https://youtu.be/nmsPcTzIkrrw>
7. <https://youtu.be/rAhvvyQBUt0>
8. <https://youtu.be/TUaTNzZ00oM>
9. <https://youtu.be/tDB3zP9MEZc>
10. <https://youtu.be/wvl0QAQCJyc>
11. <https://youtu.be/4nbBAG-848c>
12. [https://youtu.be/nJXB0yD\\_wEw](https://youtu.be/nJXB0yD_wEw)
13. [https://youtu.be/K4Do\\_yWJt2k](https://youtu.be/K4Do_yWJt2k)
14. <https://youtu.be/HH58VmUbOKM>
15. <https://youtu.be/DjnDX28l4xA>
16. <https://youtu.be/iVYGOWAtZCQ>
17. <https://youtu.be/SQtOYCeI-Pc>
18. <https://youtu.be/kykp-S8S5dU>

<b>PS23AP1</b>	<b>ALLIED PHYSICS PRACTICALS</b> (For I BSc Chemistry Sem I and II and II BSc Mathematics Sem III and IV)	Category	L	T	P	Credit
		III	-	-	3 Hrs / week	3

### Preamble

To enable the student to gain practical knowledge

### Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Gain knowledge in the scientific methods and learn the process of measuring different Physical variables	K1
CLO2	Educate The Basics Of Instrumentation, Data Acquisition And Interpretation of Results	K2
CLO3	Enhance The Students Understand The Concepts In Materials Properties	K2
CLO4	Have a deep knowledge of fundamentals of optics, electric circuits, magnetism and sound	K3

### Mapping with Programme Learning Outcomes

CLO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	S	M	S
CLO2	S	S	S	S	S	S
CLO3	S	M	S	M	M	M
CLO4	S	M	M	S	M	S

S- Strong; M-Medium;

## Syllabus

### List of Experiments

#### Any Eighteen

1. Young's Modulus –Non- Uniform bending –Pin and Microscope
2. Young's Modulus – Uniform bending – Optic lever
3. Rigidity modulus - Static torsion
4. Rigidity Modulus - torsional pendulum
5. Moment of inertia - torsional pendulum
6. Acceleration due to gravity - compound pendulum
7. Thermal conductivity of a bad conductor – Lee's disc method
8. AC frequency - Sonometer
9. Refractive index of solid prism - spectrometer
10. Refractive index of liquid-Hollow prism - spectrometer
11. Wave length- Grating - Minimum deviation method - Spectrometer
12. Low range Ammeter Calibration - Potentiometer
13. Low range Voltmeter Calibration - Potentiometer
14. Moment of a magnet in the Tan C position
15. Volt-Ampere characteristic of a p-n junction diode in the forward and reverse directions
16. Logic gates - Verification of the truth table
17. Characteristics of Zener diode
18. Closed loop gain of Operational Amplifier in Inverting mode
19. Closed loop gain of Operational Amplifier in Non Inverting mode.

## Pedagogy

Demonstration and Practical Sessions

## Course Designers:

1. Mrs. T. Poongodi