

Sadakathullah Appa College

(Autonomous)

(Reaccredited by NAAC at an 'A' Grade. An ISO 9001:2015 Certified Institution)

Rahmath Nagar, Tirunelveli- 11.

Tamil Nadu.

DEPARTMENT OF PHYSICS



Draft CBCS SYLLABUS

For

B.Sc PHYSICS

(Applicable for students admitted in June 2021 and onwards)

**(Submitted before the Physics BOS Meeting
to be held on 15th March,2021)**

COURSE STRUCTURE

CBCS SYLLABUS FOR B.Sc. Physics

(Applicable for students admitted in June 2021 and onwards)

Department of PHYSICS
Programme : B.Sc.
Programme Learning Outcomes

PLO	Upon completion of B.Sc. Degree Programmes, the graduates will be able to:
PLO 1	Disciplinary Knowledge Acquire scientific knowledge and the understanding of major concepts and theoretical principles.
PLO 2	Creative Thinking and Practical Skills / Problem Solving Skills Enrich skills of observation / research related skills to draw logical inferences from scientific experiments/ programming and skills of creative thinking to develop novel ideas. Hone problem solving skills in theoretical, experimental and computational areas and to apply them in real life situations.
PLO 3	Sense of inquiry and Skilled Communicator Develop the capability for raising appropriate questions relating to the current/emerging issues encountered in the scientific field and to plan, execute and express the results of experiments / investigations through technical writings as well as through oral presentations.
PLO 4	Ethical Awareness / Team Work / Environmental Conservation and Sustainability Equip them for conducting work as an individual / as a member, or as a leader in diverse teams upholding values such as honesty and precision and thus preventing unethical behaviours such as fabrication, falsification, misrepresentation of data, plagiarism etc. to ensure academic integrity. Realise that environment and humans are dependent on one another and to know about the responsible management of our ecosystem for survival, and for the well-being of the future generation as well.
PLO 5	Usage of ICT/ Lifelong Learning / Self-Directed Learning Inculcate the habit of learning continuously through the effective adoption of ICT to update knowledge in the emerging areas in Sciences for inventions/discoveries and also to engage in remote / independent learning.

Programme Specific Outcomes

PSO No.	Upon completion of B.Sc. Physics Degree Programme, the students will be able to:	Mapping
PSO-1	Associate themselves to enhance their academic abilities, personal qualities and transferable skills to become responsible citizens by attracting opportunities.	2 , 4 & 5
PSO-2	Understand the basic laws of Physics and apply the concepts in various physical phenomena.	1 & 3
PSO-3	Apply their knowledge to perform experiments in laboratories to understand the laws and concepts of Physics.	2, 3 & 4
PSO-4	Develop analytical and logical skills required for higher education with profound knowledge of the various fields of Physics.	1 & 2
PSO-5	Choose their area of interest in academic and competitive fields pertaining to the subject to lead a successful career through self-directed learning.	3 & 5

CBCS Syllabus - B.Sc. Physics (2021-22 onwards)

SEM	Part	P	Title of the paper	S. Code	H/W	L*	T*	P*	C	Marks		
										I	E	T
I	I	I L-I	இக்காலத்தமிழ்	21ULTA11	6				3	25	75	100
			Grammar and Translation - I	21ULAR11								
	II	II L-I	Communicative English -I	21ULEN11	6				3	25	75	100
	III	DSC-I	Mechanics and Properties of Matter	21UCPH11	4				4	25	75	100
	III	DSC-II	Optics and Acoustics	21UCPH12	4				4	25	75	100
	III	P-I	Physics Practical-I	21UCPH1P1	2				1	40 /2	60 /2	100 /2
	III	A-I/1	Statistics & Calculus	21UAMA11	4				3	25	75	100
IV	AECC-I		Value Education-I	21USVE1A	2				2	25	75	100
			Value Education-II	21USVE1B								

SEMESTER-I

Course Title	MECHANICS AND PROPERTIES OF MATTER
Total Hrs.	60
Hrs./Week	4
Sub.Code	21UCPH11
Course Type	Core
Credits	4
Marks	100

General Objective:

To study the basic principles and applications of Mechanics and Properties of Matter.

Course Objectives: The learners will be able to:

CO	Course Objectives
CO-1	Define the basic concepts of linear and angular momentum.
CO-2	Derive expressions for Moment of Inertia of bodies with different shapes.
CO-3	Explain the concepts and theories related to modulus of elasticity.
CO-4	Analyze the excess pressure of different surfaces using the concepts of molecular forces and surface tension.
CO-5	Illustrate the motion of viscous fluids using Poiseuille's formula.

Unit I Laws of Motion

Laws of conservation of energy, linear momentum and angular momentum - work energy theorem - work done by gravitational force - potential energy - conservative and non conservative forces - Collision – Elastic and inelastic collision – (Fundamental laws of impact) – Newton's law of impact – coefficient of restitution – Impact of a smooth sphere on a fixed plane – Direct impact between two smooth spheres .

Unit II Dynamics of Rigid body

Moment of inertia – Theorems of perpendicular and parallel axes – M.I of a circular ring, disc, solid sphere, hollow sphere , Rectangular lamina , uniform elliptic lamina and cylinder about all axes – Compound pendulum – theory – equivalent

simple – reversibility of centers of oscillation and suspension – determination of g and k .

Unit III Elasticity

Elasticity -- Hooke's law – Elastic moduli – Poisson's ratio – Beams – bending of beams – Expression for bending moment –Cantilever- Theory of uniform and non – uniform bending - Determination of young's modulus - Torsion of a body – Expression for couple per unit twist – Rigidity modulus of a wire (Torsional Pendulum)

Unit IV Surface Tension

Surface tension – definition – Molecular forces – Explanation of surface tension on kinetic theory – Surface energy – work done in increasing the area of a surface – Excess pressure inside a curved liquid surface – Excess pressure inside a spherical and cylindrical drops and bubbles-drop weight method- angle of contact- Quincke's method-variation of surface tension with temperature- Jager's method.

Unit V Viscosity

Viscosity – Coefficient of viscosity – Streamlined and turbulent motion – critical velocity – Rate of flow of liquid in a capillary tube – Poiseuille's formula –viscosity of highly viscous liquid-terminal velocity-Stoke's method-Ostwald Viscometer- viscosity of gas-Mayer's formula-Applications of viscosity- Pitots tube –Mercury venturimeter.

Textbooks:

1. Properties of matter – R. Murugesan – S. Chand & Co., 2004.
3. Properties of matter – Brijlal and Subramanian S. Chand & Co., 2006.
4. Dynamics – Dr.M.K.Venkatraman- Agasthiar publications , 2006
5. Mechanics by D.S.Mathur, S.Chand& Co., 2ndEdition (2001).
6. Dynamics – M.Narayanamurti & Nagarathinam (2008).

Reference Books:

1. Fundamentals of General Properties of Matter by H.R.Gulati, S. Chand & Co., NewDelhi (1982).
2. Fundamental of Physics, D. Halliday , Resnick and J Walker, 6th Edition, Wiley, New York 2001.

Course Outcomes

CO	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Understand the impacts of elastic and inelastic collisions between objects.	2, 4	Understanding
CO-2	Apply the concepts of Moment of Inertia to determine g and k values.	3,4	Applying
CO-3	Determine Young's and Rigidity modulus of various materials.	1,2	Applying
CO-4	Calculate the surface tension of liquids using various methods.	2,4	Analyzing
CO-5	Estimate the viscosity of liquids using Stoke's and Poiseuille's method.	3,4	Analyzing

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credit		
I	21UCPH11	MECHANICS AND PROPERTIES OF MATTER					4	4		
Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓	✓	✓		✓		✓	
CO-2	✓	✓	✓				✓		✓	
CO-3	✓	✓	✓	✓				✓	✓	
CO-4	✓	✓	✓				✓		✓	
CO-5	✓	✓	✓	✓				✓	✓	
Number of matches (✓) = 29										
Relationship = Medium										

Prepared by

Checked by

Name :Dr.S.Nazarath Begum

Head of the Department

Signature :

SEMESTER-I

Course Title	OPTICS AND ACOUSTICS
Total Hrs.	60
Hrs./Week	4
Sub.Code	21UCPH12
Course Type	Theory
Credits	4
Marks	100

General Objective:

To understand the concepts of Physical Optics through interference, diffraction and polarization with their applications besides learning the basics of Acoustics.

Course Objectives: The learners will be able to:

CO	Course Objectives
CO-1	Understand the basic concepts of interference and its related experiments.
CO-2	Discuss Fresnel and Fraunhofer Diffractions, and the principle of plane transmission grating.
CO-3	Discover how light is polarised using doubly refracting crystals and the functions of different devices.
CO-4	Explain the laws of transverse vibrations of a string.
CO-5	Focus on the methods of production and properties of ultrasonic waves, besides understanding the applications of acoustics.

UNIT I: INTERFERENCE

Analytical treatment of interference - Expression for intensity - Condition for maxima and minima in terms of phase and path difference - Coherent sources, Interference in thin films – transmitted and reflected - Colour of thin films -Air wedge - Determination of diameter of thin wire - Test for optical flatness - Determination of wavelength of light using Newton's rings - Michelson's Interferometer – Theory - Applications - Determination of wavelength.

UNIT II: DIFFRACTION

Fresnel diffraction - diffraction at a narrow wire – Fraunhofer diffraction - Single slit - Double slit - (Simple theory) - Plane diffraction grating – Plane transmission grating element –Overlapping spectra - Maximum number of orders - Determination of wavelengths using grating - Normal incidence - Dispersive power of a grating - Rayleigh's criterion for resolution - Resolving power of prism and grating - Difference between resolving power and dispersive power.

UNIT III: POLARISATION

Double refraction - Nicol prism - Polarizer and analyser - Huygens explanation of double refraction in uni-axial crystals - Polaroids and their uses - Quarter wave plate and Half wave plate - Plane, elliptically and circularly polarized light - Production and detection - Optical Activity - Fresnel's explanation of optical activity - Specific rotatory power - Determination using Laurent's half shade polarimeter.

UNIT IV: SOUND

Simple Harmonic Motion –Composition of two S.H.M in a straight line-at right angles-Lissajous's figures- Free, Damped, Forced vibrations - Resonance - Fourier theorem-application-Laws of transverse vibration of strings - Sonometer-Determination of AC frequency using sonometer - Determination of frequency using Melde's apparatus-Decibels.

UNIT V: ULTRASONICS AND ACOUSTICS

Ultrasonics –Production – Piezoelectric crystal method – Magnetostriction method – Properties and Applications Acoustics of building – Reverberation- Sabine's Reverberation formula (No derivation) - Factors affecting acoustics of building- Sound distribution in an auditorium- Requisites for good acoustics.

BOOKS FOR STUDY:

1. Optics, AjayGhatak, Tata McGraw-Hill publishing Co. Ltd., New Delhi (1998).
2. A Text book of Optics, Subrahmanyam N., BrijLal and M. N. Avadhanulu, S. Chand & Co., New Delhi (2006).
3. Optics and Spectroscopy, R. Murugesan and KiruthigaSivaprasath, S. Chand & Co., New Delhi (2006).
4. A Text Book of Sound- Brijlal and Subrahmanyam, Vikas Publishing Pvt. Ltd, New Delhi (2nd edition, 2008).

BOOKS FOR REFERENCE:

1. Optics, Khanna D. R. & Gulati H. R., S. Chand & Co., New Delhi (1979).

2.Fundamental of optics, Jenkins & White, McGraw Hill 4th edition (1981).

Course Outcomes: The Learners will be able to

CO	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Discuss the applications of interference through Airwedge, Newton's rings and Michelson's interferometer experiments.	2, 4	Understanding
CO-2	Determine the wavelength of spectral lines using grating with the concept of diffraction.	2,4 & 5	Applying
CO-3	Examine the nature of different types of polarised light using Nicol prism, QWP and HWP.	3,4	Applying
CO-4	Estimate the frequency by applying the laws of transverse vibrations of a string in the Sonometer and Melde's string apparatus.	1,2,3 & 5	Analyzing
CO-5	Analyze the sound distribution in an auditorium.	1, 2 & 4	Analyzing

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credit						
I	21UCPH12	OPTICS AND ACOUSTICS	60	4						
Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓		✓		✓		✓	
CO-2	✓	✓	✓		✓		✓		✓	✓
CO-3	✓	✓	✓	✓				✓	✓	
CO-4	✓	✓	✓	✓	✓	✓	✓	✓		✓
CO-5	✓	✓	✓	✓	✓	✓	✓		✓	
	Number of matches (✓) =36 Relationship = High									

Prepared by

Checked by

Name : Dr. M. Mohamed Roshan

Head of the Department

Signature :

SEMESTER-I

Course Title	PHYSICS PRACTICALS-I
Total Hrs.	30
Hrs./Week	2
Sub.Code	21UCPH1P1
Course Type	Practical
Credits	1
Marks	50

General Objective:

To examine the principles of properties of matter, Optics, Polarization and heat through experiments.

Course Objectives: The learner will be able to:

CO	Course Objectives
CO-1	Comprehend the basic ideas of measuring instruments.
CO-2	Apply the principles of elasticity to evaluate the Young's modulus of the given material.
CO-3	Determine the specific heat capacity of a liquid by the method of cooling.
CO-4	Examine the basic principles of optics through air wedge and spectrometer experiments.
CO-5	Deduce the optical activity values of various liquids.

1. Measurements of length (or diameter) using vernier caliper, screw gauge and travelling microscope.
2. To determine the Young's Modulus of the material of the bar by Uniform bending method (Pin and Microscope).
3. To determine the Young's Modulus of the material of the bar by Non-Uniform bending method (Scale and telescope).
4. To determine acceleration due to gravity (g) by Compound Pendulum.
5. To determine the Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
6. To determine the AC frequency - Sonometer
7. To determine the Refractive index and Dispersive power of the material of a given prism using sodium light- spectrometer.

8. To determine the thickness of a wire – Airwedge.
9. To determine the specific heat capacity of a liquid-Newton’s law of cooling
10. Optical activity- Polarimeter.

Books for Reference:

1. Practical Physics, C.C. Ouseph, U.J.Rao, V.Vijayendran, S.Viswanathan (Printers & Publishers) Pvt. Ltd., (1st ed., 2007).
2. Practical Physics, P. R. Sasi Kumar, PHI.
3. Advanced Practical Physics ,S. P. Singh, Pragathi Prakasam.
4. Practical Physics – St. Joseph College, Trichy.
5. A Text book of Practical Physics, Indu Prakash and Ram Krishna, Kitab Mahal (1999).

Course Outcomes: The Learners will be able to:

CO	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Observe readings with measuring instruments such as Vernier Microscope, Telescope, Spectrometer and Polarimeter.	3,4,5	Understanding
CO-2	Determine the Young’s modulus of the given material by Uniform and Non-uniform bending methods.	2,3,4,5	Applying
CO-3	Apply the Newton’s law of cooling to calculate the specific heat capacity of a liquid.	1,3,4,5	Applying
CO-4	Calculate the thickness of a thin wire using airwedge and wavelength of the spectral lines using spectrometer.	3,4,5	Analyzing
CO-5	Estimate the optical activity of a liquid using polarimeter.	2,3,4,5	Analyzing

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credit						
I	21UCPH1P1	Physics practicals-I	2	1						
Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓	✓	✓			✓	✓	✓
CO-2	✓	✓	✓	✓	✓		✓	✓	✓	✓
CO-3	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO-4	✓	✓	✓	✓	✓			✓	✓	✓
CO-5	✓	✓	✓	✓	✓		✓	✓	✓	✓
Number of matches (✓) = 43										
Relationship = High										

Prepared by
Name :Dr.S.Nazarath Begum
Signature :

Checked by
Head of the Department

Semester I

Course Title	STATISTICS AND CALCULUS
Total Hours	60
Hours / Week	4
Code	21UAMA11
Course type	Theory
Credits	3
Marks	100

General Objective:

To understand physical science by gaining knowledge of elementary calculus and introduce various statistical tools to satisfy the need of concept personals.

Course Objectives: The learner will be able to

CO.NO	Course Objectives
CO-1	Recall the measures of central tendency and compute different kinds of partition algebraically and graphically
CO-2	Estimate the measures of dispersion of statistical data
CO-3	Evaluate Karl Pearson's coefficients of correlation for the given data
CO-4	Apply their knowledge in polar curves, pedal equation of a curve.
CO-5	Evaluate integrals using beta and gamma functions.

UNIT I: Measures of Central Tendency – simple average – Mean, Median & Mode – Geometrical mean and Harmonic mean.

UNIT II: Measures of dispersion range-quartile deviation-standard deviation and mean deviation – coefficient of variation.

UNIT III: Correlation and regression: Scatter diagram – Karl Pearson's Coefficient of Correlation – properties – Rank Correlation- lines of regression - regression coefficient and properties.

UNIT IV: Pedal equations - Curvature – Radius of Curvature in Cartesian, parametric & polar co-ordinates – Evolute -Circle and centre of curvature.

Unit V: Beta and Gamma functions.

Textbooks:

1. Arumugam. S. and Issac, *Statistics*, New Gamma Publications, Palayamkottai Edition July 2013.
2. Arumugam. S. and Issac, *Calculus*, New Gamma Publications, Palayamkottai -Edition 2005.

Unit I : TB 1: Chapter II Section 2.1 - 2.4

Unit II : TB 1: Chapter III Section 3.1

Unit III :TB 1: Chapter VI Section 6.1 – 6.3

Unit IV :TB 2 Part I Chapter III Section 3.3 – 3.5

Unit V :TB 2: Part II Chapter IV

Reference Books:

1. Gupta S.C. and Kapoor V.K. *Fundamentals of Mathematical Statistics*. Published by Sulthan Chand & Sons, New Delhi, 11th Edition.
2. Narayanan S. & Manicavachagam Pillay T.K.: *Calculus Volume I & II*, S. Viswanathan Printers & Publishers Pvt Ltd, Chennai, Edition 2014.

COURSE OUTCOMES

CO	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Define the basic terms of statistics, such as measures of central tendency and dispersion of the data.	1,2	Remembering
CO-2	Evaluate standard deviation, quartile deviation and mean deviation of the given data	1,2,3	Evaluating
CO-3	Estimate the degree of association between two variables using the concept of correlation and regression	1,2,3	Evaluating
CO-4	Solve problems in evolutes and calculate circle and centre of curvature	1,2	Applying
CO-5	Determinethe value of complicated integral using Beta and Gamma functions.	1,2,3	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credit			
I	21UAMA11	Statistics and Calculus					60	3			
Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)					
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO-1	✓	✓			✓	✓	✓				
CO-2	✓	✓	✓		✓	✓	✓	✓			
CO-3	✓	✓	✓		✓	✓	✓	✓			
CO-4	✓	✓			✓	✓	✓				
CO-5	✓	✓	✓		✓	✓	✓	✓			
		Number of matches (✓) = 31					Relationship = Medium				

Prepared by
A. Rashetha Begam

Checked by
A. Rashetha Begam
Head of the Department