



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'B+' grade by NAAC)

B.Sc. PHYSICS – SYLLABUS

(Under CBCS based on OBE) (For those admitted during 2024 – 2025 and after)

1

ABOUT THE DEPARTMENT

The Department of Physics was started in the year 1967. Pre–University course was introduced in the college for the students who studied Physics as Ancillary subject. There were tutors and demonstrators for teaching the theory and practical. Later on the department was upgraded with B.Sc. (Physics) Major course in the year 1980 in the college. Since then the department has been offering the course to cater the academic needs and aspiration of first generation learners belonging to educationally, socially and economically backward sections and maintains its standards of academic excellence.

VISION

- To impart quality education both in theoretical as well as experimental Physics with special emphasis on “learning by doing”
- To build a foundation for excellence and encourage the development of the institution

MISSION

The Mission of the Department is to awaken the young minds and discover their talents in theory and in practical Physics, through dedication to teach, commitment towards students and innovative instructional methods like PPT and Visual aids.



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2

GRADUATE ATTRIBUTES

1. **(KB) A knowledge base for Physics:** Demonstrated competence in university level mathematics, natural sciences, Physics fundamentals, and specialized Physics knowledge appropriate to the program.
2. **(PA) Problem analysis:** An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex Physics problems in order to reach substantiated conclusions
3. **(Inv.) Investigation:** An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data and synthesis of information in order to reach valid conclusions.
4. **(Des.) Design:** An ability to design solutions for complex, open-ended Physics problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.
5. **(Tools) Use of Physics tools:** An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern Physics tools to a range of Physics activities, from simple to complex, with an understanding of the associated limitations.
6. **(Team) Individual and teamwork:** An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.
7. **(Comm.) Communication skills:** An ability to communicate complex engineering concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.
8. **(Prof.) Professionalism:** An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.
9. **(Impacts) Impact of Physics on society and the environment:** An ability to analyze social and environmental aspects of Physics activities. Such ability includes an understanding of the interactions that Physics has with the economic, social, health, safety, legal, and cultural aspects of society, the uncertainties in the prediction of such interactions; and the concepts of sustainable design and development and environmental stewardship.
10. **(Ethics) Ethics and equity:** An ability to apply professional ethics, accountability, and equity.
11. **(Econ.) Economics and project management:** An ability to appropriately incorporate economics and business practices including project, risk, and change management into the practice of Physics and to understand their limitations.
12. **(LL) Life-long learning:** An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge



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3

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The B.Sc. Physics Graduates of the Sourashtra College will

PEO 1	possess fundamental knowledge of Physics and able to transfer and apply the acquired phenomena and principles to learn different branches of Physics.
PEO 2	realize and develop an understanding of the impact of Physics and Science on Society.
PEO 3	report the solutions to Physics problems and experimental studies either orally or in written format
PEO 4	be motivated to pursue PG courses in reputed institutions and to kindle the interest for research in students.
PEO 5	be equipped with creative and analytical skills that will enrich them to participate in co-curricular and extra – curricular activities
PEO 6	be cultivated to grow leadership skills, can act sensitively to recent issues and play a positive role for the benefit of the society.

UNDERGRADUATE (UG) PROGRAMME OUTCOMES (POs)

Undergraduate (B.A., B.Sc., B.Com., B.C.A., B.B.A., etc.) is a 3 – year degree Programme with 6 semesters consisting the following Programme Outcomes (POs) under various criteria including critical thinking, problem solving, effective communication, societal/ citizenship/ ethical credibility, sustainable growth and employable abilities.

PO 1	Critical Thinking: Intellectual exploration of knowledge towards actions in clear and rational manner by understanding the logical connections between ideas and decisions.
PO 2	Problem Solving: Understanding the task/ problem followed by planning and narrow execution strategy that effectively provides the solution.
PO 3	Effective Communication: Knowledge dissemination by oral and verbal mechanisms to the various components of our society.
PO 4	Societal/ Citizenship/ Ethical Credibility: Realization of various value systems/ moral dimensions and demonstrate the empathetic social concern as well as equity in all the decisions, executions and actions.
PO 5	Environmental Concern and Sustainable Growth: Understanding the emerging environmental challenges and provide the possible contribution in sustainable development that integrates environment, economy and employment.
PO 6	Skill Development and Employable Abilities: Adequate training in relevant skill sector and creating employable abilities among the under graduates.



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4

PROGRAMME SPECIFIC OUTCOMES (PSOs)

On completion of **B.Sc. Physics (UG) Programme**, the students are expected /will be able to

PSO 1	acquire core knowledge in Physics, including major areas of Classical Mechanics, Quantum Mechanics, Electromagnetism, Optics, Electronics, Modern physics, Thermal physics and Mathematical methods.
PSO 2	develop the proficiency in the acquisition of data using a variety of laboratory instruments and in the analysis and interpretation of such data.
PSO 3	have learned laboratory skills enabling them to take measurements in physics laboratory and analyse the measurements to draw valid conclusion.
PSO 4	be capable of oral and written scientific communication and will prove that they can think critically and work independently.
PSO 5	realize and develop an understanding of the impact of physics and science on society.
PSO 6	discover physics concepts in other disciplines such as Mathematics, Computer Science, Chemistry etc.,

DISTRIBUTION OF CREDITS (UG PROGRAMME)

PART	SEM	COURSES	NO. OF COURSES	HOURS	CREDITS	TOTAL CREDITS
I	I-IV	LANGUAGE	4	6	3	12
II	I-IV	ENGLISH	4	6	3	12
III	I-VI	CORE	15	5-6	4	60
III	I-IV	ALLIED	6	4+2	4+4	20
III	V-VI	ELECTIVE	3	5	5	15
IV	I-IV	SKILL BASED SUBJECT	6	2	2	12
IV	I	VALUE EDUCATION	1	2	2	2
IV	I	ENVIRONMENTAL STUDIES	1	2	2	2
IV	III, IV	NON MAJOR ELECTIVE	2	2	2	4
V	IV	EXTENSION ACTIVITY	1	0	1	1
	V	SELF – STUDY (SOFT SKILLS)	1	0	0	0
	VI	SELF –STUDY (G.K. (ONLINE))	1	0	0	0
TOTAL						140
Any online courses in SWAYAM PORTAL						



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5

B.Sc. PHYSICS – COURSE STRUCTURE

SEMESTER – I

S. No.	Course Code	Course Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	24UACT11	Part – I: Tamil – பொதுத் தமிழ் – I	6	3	25	75	100	3
	24UACH11	Hindi – General Hindi – I						
	24UACS11	Sanskrit – Poetry, Grammar and History of Sanskrit Literature						
2.	24UACE11	Part – II: English – General English – I	6	3	25	75	100	3
3.	24UPSC11	Part – III: Core – 1: Properties of Matter and Sound	5	3	25	75	100	4
4.	24UPSA11	Part – III: Allied – 1: Properties of Matter, Thermal Physics and Optics	4	3	25	75	100	4
5.	24UPSS11	Part – IV: SBS – 1: Laser Physics	2	3	25	75	100	2
6.	24UPSCP1	Part – III: Core : Major Practical – I *	3	–	–	–	–	–
7.	24UPSAP1	Part – III: Allied : Ancillary Practical – I *	2	–	–	–	–	–
8.	24UACVE1	Part – IV: Value Education	2	3	25	75	100	2
TOTAL			30	TOTAL CREDITS			18	

* Practical exam will be conducted in the second semester.

SEMESTER – II

S. No.	Course Code	Course Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	24UACT21	Part – I: Tamil – பொதுத் தமிழ் – II	6	3	25	75	100	3
	24UACH21	Hindi – General Hindi – II						
	24UACS21	Sanskrit – Prose, Grammar and History of Sanskrit Literature						
2.	24UACE21	Part – II: English – General English – II	6	3	25	75	100	3
3.	24UPSC21	Part – III: Core – 2: Mechanics & Relativity	5	3	25	75	100	4
4.	24UPSA21	Part – IV: Allied – 2: Electricity, Electronics, Atomic and Nuclear Physics	4	3	25	75	100	4
5.	24UPSS21	Part – IV: SBS – 2: Programming in C	2	3	25	75	100	2
6.	24UPSCP1	Part – III: Core : Major Practical – I	3	3	40	60	100	2
7.	24UPSAP1	Part – IV: Allied : Ancillary Practical–I	2	3	40	60	100	2
8.	24UACES1	Part – IV: Environmental Studies	2	3	25	75	100	2
TOTAL			30	TOTAL CREDITS			22	

Passed in the BoS Meeting held on 09/03/2024

Signature of the Chairman



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6

SEMESTER – III

S. No.	Course Code	Course Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.		Part – I: Tamil – காப்பியமும் நாடகமும்	6	3	25	75	100	3
		Hindi – Hindi – III						
		Sanskrit – Sanskrit – III						
2.		Part – II: English – English For Enrichment – III	6	3	25	75	100	3
3.		Part – III: Core – 3: Electricity & Electromagnetism	4	3	25	75	100	4
4.		Part – III: Core – 4: Heat & Thermodynamics	4	3	25	75	100	4
5.		Part – III: Allied : Ancillary Physics	4	3	25	75	100	4
6.		Part – IV: NME: Fundamentals of Physics – I	2	3	25	75	100	2
7.		Part – III: Core: Major Practical – 2*	2	–	–	–	–	–
8.		Part – III: Allied : Ancillary Practical–II *	2	–	–	–	–	–
TOTAL			30	TOTAL CREDITS				20

* Practical exam will be conducted in the fourth semester.

SEMESTER – IV

S. No.	Course Code	Course Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.		Part – I: Tamil – சங்க இலக்கியமும் அற இலக்கியமும்	6	3	25	75	100	3
		Hindi – Hindi – IV						
		Sanskrit – Sanskrit – IV						
2.		Part – II: English – English For Enrichment – IV	6	3	25	75	100	3
3.		Part – III: Core – 5: Optics & Spectroscopy	4	3	25	75	100	4
4.		Part – III: Core – 6: Mathematical Methods	4	3	25	75	100	4
5.		Part – III: Allied 2: Ancillary	4	3	25	75	100	4
6.		Part – IV: NME: Fundamentals of Physics – II	2	3	25	75	100	2
7.		Part – III: Core: Major Practical – 2	2	3	40	60	100	2
8.		Part – III: Allied : Ancillary Practical–II	2	3	40	60	100	2
		PART –V: Extension Activities	–	–	–	–	100	1
TOTAL			30	TOTAL CREDITS				24+*1

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Signature of the Chairman



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7

SEMESTER – V

S. No.	Subject Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1		Part – III: Core – 7: Atomic Physics & Quantum Mechanics	5	3	25	75	100	4
2		Part – III: Core – 8: Nuclear Physics	4	3	25	75	100	4
		Part – III: Elective – 1:						
3		Analog Electronics	5	3	25	75	100	5
4		Part – IV: SBS – 3: Astrophysics	2	3	25	75	100	2
5		Part – IV: SBS – 4: Medical Physics	2	3	25	75	100	2
6		Part – III: Core: Major Practical – 3	6	3	40	60	100	5
7		Part – III: Core: Major Practical – 4	6	3	40	60	100	5
		Soft Skills (Self – Study)	–	–	–	–	100	–
		TOTAL	30			Total Credits		27

SEMESTER – VI

S. No.	Subject Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1		Part – III: Core – 9: Solid State Physics	4	3	25	75	100	4
		Part – III: Elective – 2:						
2		Classical and Statistical Mechanics	5	3	25	75	100	5
		Part – III: Elective – 3:						
3		Digital Electronics and Communication	5	3	25	75	100	5
4		Part – IV: SBS – 5: Electronics	2	3	25	75	100	2
5		Part – IV: SBS – 6: Nano Physics	2	3	25	75	100	2
6		Part – III: Core: Major Practical – 5	6	3	40	60	100	5
7		Part – III: Core: Major Practical – 6	6	3	40	60	100	5
		General Knowledge (Self – Study)	–	–	–	–	100	–
		TOTAL	30			TOTAL CREDITS		28



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8

COURSE STRUCTURE – I SEMESTER

S. No.	Course Code	Course Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	24UACT11	Part – I: Tamil – பொதுத் தமிழ் – I	6	3	25	75	100	3
	24UACH11	Hindi – General Hindi – I						
	24UACS11	Sanskrit – Poetry, Grammar and History of Sanskrit Literature						
2.	24UACE11	Part – II: English – General English – I	6	3	25	75	100	3
3.	24UPSC11	Part – III: Core – 1: Properties of Matter and Sound	5	3	25	75	100	4
4.	24UPSA11	Part – III: Allied – 1: Properties of Matter, Thermal Physics and Optics	4	3	25	75	100	4
5.	24UPSS11	Part – IV: SBS – 1: Laser Physics	2	3	25	75	100	2
6.	24UPSCP1	Part – III: Core : Major Practical 1 *	3	–	–	–	–	–
7.	24UPSAP1	Part – III: Allied : Ancillary Practical – I *	2	–	–	–	–	–
8.	24UACVE1	Part – IV: Value Education	2	3	25	75	100	2
TOTAL			30	TOTAL CREDITS			18	

* Practical exam will be conducted in the second semester.

CA – Class Assessment (Internal)

SE – Summative Examination

SBS – Skill Based Subject

NME – Non –Major Elective

T – Theory

P – Practical



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9

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UPSC11	PROPERTIES OF MATTER AND SOUND	CORE – 2	5	-	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	25	75	100

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship <input type="checkbox"/>
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COURSE DESCRIPTION:

This course describes the elastic properties of materials, viscous properties of liquid, nature of sound, transformations and applications.

COURSE OBJECTIVE:

To expose students to the fundamentals of properties of Matter and Sound

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	identify the materials suitable for construction of buildings, based on the moduli of elasticity.	Upto K3
CO 2	get the knowledge on properties of liquids and its applications..	Upto K3
CO 3	know the viscous properties of liquids and creating knowledge about how different liquids utilized in various mechanism	Upto K3
CO 4	realize the concept of sound in physics and design the different methods of producing	Upto K3
CO 5	understand the concepts of acoustic comfort and the apply theories used in building acoustics	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY



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10

PROPERTIES OF MATTER AND SOUND

UNIT – I: 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 (pilln and Microscope method) – Torsion of a body – Expression for couple per unit twist – Work done in twisting a wire – Torsional oscillations of a body – Rigidity modulus by dynamic torsion method((Torsional pendulum)

UNIT – II: 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

UNIT – III: VISCOSITY

Viscosity – Co efficient 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 – Rankine 's method

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 – application. Laws of transverse vibration of strings – Sonometer – Determination of AC frequency using sonometer – Determination of frequency using Melde's apparatus – Decibels – Intensity levels – noise pollution.

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 – Requisites for good acoustics.

TEXT BOOKS:

1. *Elements of Properties of Matter* – D.S. Mathur – S. Chand & Co., 2004.
2. *Properties of Matter* – R. Murugesan – S. Chand & Co., 2004.

REFERENCE BOOKS:

1. *Properties of Matter* – Brijlal and Subramanian S. Chand & Co., 2006.
2. *Textbook of Sound* – D.R.Khanna and R.S. Bedi, Atmaram and sons (1969)
3. *A Text Book of Sound* – N.Subrahmanyam and BrijLal, ,Vikas Publishing

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	1	2		3	2
CO2	2				2	
CO3	3	1	2		3	
CO4	2		1	1	3	2
CO5	3		2	1	2	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Dr. N.R. SENTHIL KUMAR



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B.Sc. PHYSICS – SYLLABUS

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11

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UPSA11	PROPERTIES OF MATTER, THERMAL PHYSICS AND OPTICS	ALLIED – 1	4	-	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	25	75	100

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship <input type="checkbox"/>
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COURSE DESCRIPTION:

This course helps to develop an understanding of the various concepts in different areas of physics. This course covers elastic properties of materials to know the strength of materials, viscous properties of liquid, heat transfer processes, basic properties of light.

COURSE OBJECTIVE:

The main objective of this course is to give the essence of basic concepts, laws, and phenomena in areas of properties of matter, thermal physics, and optics in physics.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand the basic concepts of the elastic behavior of solids and the bending behavior of beams and determine the expressions for young's modulus and rigidity modulus.	Upto K3
CO 2	explain the physics of the flow of liquid in terms of viscosity and derive the equation of Bernoulli's theorem in hydrodynamics and its applications.	Upto K3
CO 3	identify modes of heat transfer in solids, liquids, and gases and explain laws governing radiations.	Upto K3
CO 4	define fundamental laws of thermodynamics and explain their application to thermodynamic processes –Carnot cycle, entropy change in a reversible and irreversible process.	Upto K3
CO 5	describe the phenomena in wave optics like interference, diffraction, and polarization, identify the differences in them and demonstrate the experiments based on these phenomena.	Upto K3

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3-APPLY



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12

PROPERTIES OF MATTER, THERMAL PHYSICS AND OPTICS

UNIT – I: ELASTICITY

Introduction–stress, strain, Hooke’s law – Poisson’s ratio (definition alone) –Torsion– Expression for Couple per unit twist – work done in twisting a wire – Rigidity modulus of a wire and M.I. of a disc by torsion pendulum(dynamic torsion method)–Bending of beams – definitions – Expression for bending moment – determination of young’s modulus – uniform and non–uniform bending (pin and microscope method).

UNIT – II: VISCOSITY

Definition – Viscous force – Co-efficient of viscosity – Poiseuille’s formula for coefficient of viscosity of a liquid – determination of co-efficient of viscosity using burette and comparison of Viscosities – Equation of continuity– the energy of liquid– Bernoulli’s theorem : Statement and proof– application: Venturimeter.

UNIT – III: CONDUCTION, CONVECTION, AND RADIATION

Conduction: Thermal conductivity– coefficient of thermal conductivity – Lee’s disc method – Convection: convection in atmosphere– Lapse rate – Radiation: Black body radiation – Planck’s radiation law –Wien’s displacement law – Stefan’s law of radiation (Noderivations) – Newton’s law of cooling.

UNIT – IV: THERMODYNAMICS

Zerth and I Law of thermodynamic– specific heat capacity– adiabatic and isothermal process – Entropy – Change in entropy in reversible and irreversible process – change in entropy of a perfect gas – change in entropy when ice is converted into steam– II law of thermodynamics – Carnot’s engine and Carnot’s cycle – Efficiency of a Carnot’s engine.

UNIT – V: OPTICS

Interference : Interference in thin films(reflected ray)– Air wedge – thickness of a thin wire – Newton’s rings – determination of wavelength using Newton’s rings– Diffraction: –Theory of plane transmission grating – normal incidence – Polarization: Production of polarized light by Nicol Prism– optical activity – Specific rotatory power – Determination of specific rotatory power using Laurent’s half shade polarimeter.

TEXT BOOKS:

1. *Elements of Properties of Matter* – D.S. Mathur – S. Chand & Co., 2004.
2. *Properties of Matter* – R. Murugesan – S. Chand & Co., 2004.
3. *Properties of Matter* – Brijlal and Subramanian S. Chand & Co., 2006.

REFERENCE BOOKS:

1. *Textbook of Sound*, D.R. Khanna and R.S. Bedi, Atmaram and sons (1969)
2. *A Text Book of Sound*, N.Subrahmanyam and BrijLal, Vikas Publishing

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	1	2		3	2
CO2	2				2	
CO3	3	1	2		3	
CO4	2		1	1	3	2
CO5	3		2	1	2	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Dr. N. R. SENTHIL KUMAR



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13

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UPSS11	LASER PHYSICS	SBS – 1	2	–	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	25	75	100

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship <input type="checkbox"/>
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COURSE DESCRIPTION:

This course helps to develop and understand various concepts in Laser Physics. Also this Course helps the students to know the applications of Laser in various fields.

COURSE OBJECTIVE:

To introduce the principles of laser operation and their applications

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand the basic concepts of Laser.	Upto K3
CO 2	explain the types of Lasers.	Upto K3
CO 3	explain the Industrial applications of Laser.	Upto K3
CO 4	explain the application of Laser in the Medical field.	Upto K3
CO 5	infer the importance of Laser in Communications.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY



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B.Sc. PHYSICS – SYLLABUS

(Under CBCS based on OBE) (For those who joined during 2024 – 2025 and after)

14

LASER PHYSICS

UNIT – I: FUNDAMENTALS OF LASER

Laser action – Principles of Laser – Laser Characteristics – Spontaneous emission – Stimulated emission – Population inversion – Pumping – Methods

UNIT – II: PRODUCTION OF LASER

Helium – Neon Laser – Ruby Laser – Semiconductor Laser

UNIT – III: INDUSTRIAL APPLICATIONS OF LASER

Laser cutting – Welding – Drilling – Hologram – Recording and reconstruction of hologram

UNIT – IV: LASERS IN MEDICINE

Lasers in Surgery – Lasers in ophthalmology – Lasers in cancer treatment

UNIT – V: LASERS IN COMMUNICATION

Optic fibre communication – Total internal reflection – Block diagram of fibre optic communication system (Qualitative analysis) – Advantages of fibre optic communication

TEXT BOOKS:

1. *An Introduction to LASERS*, N. Avadhanulu, S. Chand & Company, 2001.
2. *Engineering Physics – I* by G.Senthilkumar VRB publishers (p) Ltd
3. *Modern Physics* – R.Murugesan, S.Chand & Sons, New Delhi,

REFERENCE BOOK:

Engineering Physics – I by Dr. P. Mani Dhanam Publications, Chennai.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2		2		
CO2	2				2	1
CO3	3	2				
CO4	2			2		
CO5			2		2	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level
COURSE DESIGNER: Dr. A. K. BALASUBRAMANIAN



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B.Sc. PHYSICS – SYLLABUS

(Under CBCS based on OBE) (For those who joined during 2024 – 2025 and after)

15

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UPSCP1	MAJOR PRACTICAL – I	CORE	-	3	-

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	-	-	-

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship
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COURSE DESCRIPTION:

This course helps to develop an understanding of the various concepts in different areas of physics. This course covers elastic properties of materials to know the strength of materials, viscous properties of liquid, basic properties of light.

COURSE OBJECTIVE:

The main objective of this course is to give the essence of basic concepts, laws, and phenomena in areas of Mechanics, properties of matter, sound and optics in physics.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO	gain the knowledge of Elasticity, properties of matter, sound and resonance concepts etc., which helps to solve problems	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'B+' grade by NAAC)

B.Sc. PHYSICS – SYLLABUS

(Under CBCS based on OBE) (For those who joined during 2024 – 2025 and after)

16

LIST OF EXPERIMENTS

ANY FOURTEEN EXPERIMENTS:

1. Young's Modulus of Elasticity by Uniform Bending (Pin & Microscope)
2. Young's Modulus of Elasticity by Non-Uniform Bending (Optic Lever)
3. Young's Modulus of Elasticity by Cantilever (Pin & Microscope)
4. Young's Modulus of Elasticity by Cantilever (Dynamic Method)
5. Determination of Rigidity Modulus of Elasticity by using Torsion Pendulum
6. Moment of Inertia of circular disc by Torsion Pendulum
7. Determination of Co-efficient of viscosity of liquid by Stokes method
8. Surface Tension of water by Drop Weight method.
9. Determination of acceleration due to gravity by using compound pendulum.
10. Melde's String – Determination of frequency of tuning fork
11. AC frequency by Sonometer
12. Co-efficient of Viscosity of water by Poiseuille's Method
13. Verification of Laws of Transverse vibrations
14. Determination of wavelength of Laser
15. Determination of Particle size by Laser
16. Determination of Particle size by Laser



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B.Sc. PHYSICS – SYLLABUS

(Under CBCS based on OBE) (For those who joined during 2024 – 2025 and after)

17

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UPSAP1	ANCILLARY PRACTICAL – I	ALLIED	-	2	-

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	-	-	-

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

COURSE DESCRIPTION:

This course helps the students to understand the basic concepts of electricity and electronics and to acquire the basic knowledge of atomic and nuclear Physics.

COURSE OBJECTIVES:

- To understand the fundamental laws of electricity
- To gain the basic idea about semiconductor diodes transistors and logic gates.
- To acquire knowledge of atomic models, nuclear fission and fusion

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	gain the knowledge of different laws of electrostatics, basic electronic devices , general concepts in physics which helps to solve various problems	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'B+' grade by NAAC)

B.Sc. PHYSICS – SYLLABUS

(Under CBCS based on OBE) (For those who joined during 2024 – 2025 and after)

18

LIST OF EXPERIMENTS

ANY FOURTEEN EXPERIMENTS:

1. Young's Modulus of Elasticity by Uniform Bending (Pin & Microscope)
2. Young's Modulus of Elasticity by Non-Uniform Bending (Optic Lever)
3. Calibration of Low range Voltmeter by Potentiometer
4. Calibration of Ammeter by Potentiometer
5. Determination of Thermal Conductivity of bad conductor by Lee's disc method
6. Grating N and λ by Normal incidence method
7. Refractive index of the Prism using spectrometer.
8. LCR Series Circuit – Determination of resonant frequency and L of the coil
9. Bridge Rectifier
10. Construction of Logic gates OR, AND and NOT using discrete components
11. Air-Wedge – Determination of thickness of the given material.
12. Newton's Rings – Radius of Curvature
13. Carey-Foster's Bridge – Resistance and Resistivity
14. Comparison of Capacities of the given two capacitors.
15. Comparison of emfs of the given two cells.
16. Verification of De-Morgan's Theorems.



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'B+' grade by NAAC)

B.Sc. PHYSICS – SYLLABUS

(Under CBCS based on OBE) (For those who joined during 2024 – 2025 and after)

19

COURSE STRUCTURE – II SEMESTER

S. No.	Course Code	Course Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	24UACT21	Part – I: Tamil – பொதுத் தமிழ் – II	6	3	25	75	100	3
	24UACH21	Hindi – General Hindi – II						
	24UACS21	Sanskrit – Prose, Grammar and History of Sanskrit Literature						
2.	24UACE21	Part – II: English – General English – II	6	3	25	75	100	3
3.	24UPSC21	Part – III: Core – 2: Mechanics & Relativity	5	3	25	75	100	4
4.	24UPSA21	Part – IV: Allied – 2: Electricity, Electronics, Atomic and Nuclear Physics	4	3	25	75	100	4
5.	24UPSS21	Part – IV: SBS – 2: Programming in C	2	3	25	75	100	2
6.	24UPSCP1	Part – III: Core : Major Practical – I	3	3	40	60	100	2
7.	24UPSAP1	Part – IV: Allied : Ancillary Practical-I	2	3	40	60	100	2
8.	24UACES1	Part – IV: Environmental Studies	2	3	25	75	100	2
		TOTAL	30	TOTAL CREDITS			22	

CA – Class Assessment (Internal)

SE – Summative Examination

SBS – Skill Based Subject

NME – Non –Major Elective

T – Theory

P – Practical



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B.Sc. PHYSICS – SYLLABUS

(Under CBCS based on OBE) (For those who joined during 2024 – 2025 and after)

20

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UPSC21	MECHANICS AND RELATIVITY	CORE – 1	5	-	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	25	75	100

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship <input type="checkbox"/>
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COURSE DESCRIPTION:

The course provides an introduction to the laws of mechanics and clarifies how relativity affects Physics.

COURSE OBJECTIVES:

The Course intends to provide the students to have a thorough understanding of the basic concepts of mechanics and relativity in Physics. It provides the details about Laws of motion, Dynamics of rigid body, Gravitation, Central force motion and also deals with Statics and Hydrodynamics.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	apply laws of conservation of momentum appropriately in rigid body rotations and analyze the change in velocity and loss of Kinetic energy for the impact of elastic bodies.	Upto K3
CO 2	explain the Moment of Inertia of rigid bodies.	Upto K3
CO 3	elucidate the Kepler's laws of motion and ascertain the gravitational constant and acceleration due to gravity at different places.	Upto K3
CO 4	describe the properties velocity, torque, angular acceleration and centre of mass of rotating body.	Upto K3
CO 5	explain the concept of Relativity and its applications.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'B+' grade by NAAC)

B.Sc. PHYSICS – SYLLABUS

(Under CBCS based on OBE) (For those who joined during 2024 – 2025 and after)

21

MECHANICS AND RELATIVITY

UNIT – I: LAWS OF MOTION

Laws of conservation of energy, linear momentum and angular momentum – work energy theorem – 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 – Oblique impact between two smooth spheres –Calculation of final velocities of the spheres – Loss of K.E due to impact.

UNIT – II: DYNAMICS OF RIGID BODY

Moment of inertia – Theorems of perpendicular and parallel axes – M.I of circular ring, disc, solid cylinder about an axis passing through its centre and perpendicular to its own axis – M.I of a Solid sphere about all axes – Compound pendulum – theory – equivalent simple pendulum – reversibility of centers of oscillation and suspension – determination of g and k

UNIT – III: GRAVITATION

Newton’s law of gravitation – Kepler’s laws of planetary motion – G by Boy’s method – Mass and density of earth – Acceleration due to gravity – Variation of g with altitude, depth and latitude of earth – Value of g at poles and equator. Gravitational field – Gravitational potential – Gravitational potential due to spherical shell

UNIT – IV: CENTRAL FORCE MOTION

Angular velocity, angular momentum and K.E of rotation – Torque and angular acceleration – Relation between them – Expression for acceleration of a body rolling down an inclined plane without slipping. Center of mass –velocity and acceleration of centre of mass –Rocket motion– Satellite

UNIT – V: RELATIVITY

Frames of reference – Galilean transformation – Michelson – Morley experiment – Postulates of special theory of relativity – Lorentz transformation – length Contraction – time dilation – variation of mass with velocity– Mass energy relation.

TEXT BOOKS:

1. *Mechanics* – Part I and II by Narayanamoorthy, National Publishing Company.
2. *Mechanics* – D.S.Mathur, S. Chand & Co., 2ndEdition (2001).
3. *Mechanics* – P. Duraipandian, Laxmi Duraipandian, Muthamizh Jayapragasam,S. Chand & Co., New Delhi (1988).
4. *Modern Physics* – R. Murugesan and Kiruthiga Sivaprasath, S. Chand &Co.,(2008
5. *Properties of Matter* by R.Murugesan, S. Chand & Co., New Delhi (2001).

REFERENCE BOOK:

Fundamentals of Physics by D. Halliday, R.Rensick and J. Walker, 6th edition, Wiley,NY (2001).

DIGITAL TOOLS:

<http://www.sourashtracollege.com/images/OPEN-EDUCATIONAL-RESOURCES. pdf>

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2		2		
CO2	2				2	1
CO3	3	2				
CO4	2			2		
CO5			2		2	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Dr. M. BALAJI



SOURASHTRA COLLEGE, MADURAI – 625004

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B.Sc. PHYSICS – SYLLABUS

(Under CBCS based on OBE) (For those who joined during 2024 – 2025 and after)

22

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UPSA21	ELECTRICITY, ELECTRONICS, ATOMIC AND NUCLEAR PHYSICS	ALLIED – 2	4	-	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	25	75	100

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship
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COURSE DESCRIPTION:

This course helps the students to understand the concept of basic concepts of electricity and electronics, the effect of the magnetic field due to the passage of current and to acquire the basics of atomic and nuclear physics.

COURSE OBJECTIVES:

- To understand the fundamental laws of electricity and magnetism.
- To gain knowledge about the effect of magnetic field due to the passage of current.
- To gain the basic idea about semiconductor diodes transistors and logic gates.
- To acquire knowledge atomic models, nuclear fission and fusion.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	gain the knowledge of different laws of electrostatics which helps to solve problems	Upto K3
CO 2	understand the concepts and laws of current electricity and demonstrate the experiment to determine the resistivity of the material of wire and calibrate voltmeter and ammeter.	Upto K3
CO 3	distinguish moving coil galvanometers dead beat ballistic and show the experiments for voltage and currentsensitiveness	Upto K3
CO 4	understand the basics of diodes and transistors and solve the problems in the binary number system	Upto K3
CO 5	acquire the basic knowledge in atomic and nuclear physics	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY



SOURASHTRA COLLEGE, MADURAI – 625004

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B.Sc. PHYSICS – SYLLABUS

(Under CBCS based on OBE) (For those who joined during 2024 – 2025 and after)

23

ELECTRICITY, ELECTRONICS, ATOMIC AND NUCLEAR PHYSICS

UNIT – I: ELECTROSTATICS

Coulomb's law– Electric field and flux–Gauss law–applications of gauss law– Field due to a charged sphere– Electric potential – Potential at a point due to uniformly charged conducting sphere – Relation between electric field and electric potential .Capacitors– Principle of a capacitor – Capacitance of a spherical capacitor– Energy stored in a capacitor.

UNIT – II: CURRENT ELECTRICITY

Kirchoff's laws – Application of Kirchoff's laws to Wheatstone's network– Carey foster's bridge– Determination of resistivity and temperature coefficient of resistance – Potentiometer – Principle– Calibration of ammeter – Calibration of low range voltmeter.

UNIT – III: MAGNETIC EFFECT OF ELECTRIC CURRENT

Force on a current-carrying conductor in a magnetic field– Torque on a current loop in a uniform magnetic field – Mirror galvanometer (Description only) – current and voltage sensitiveness of a moving coil galvanometer – Moving coil Ballistic galvanometer – Difference between Dead beat and Ballistic galvanometer– Measurement of charge sensitiveness.

UNIT – IV: ELECTRONICS

PN junction diode – Forward and reverse biasing – VI Characteristics of a junction diode– Bridge rectifier using junction diodes –Transistor–Transistor Characteristics (CE mode only)Number system – Decimal – Binary – conversion of decimal to binary – Conversion of binary to decimal – Binary addition – Binary subtraction – De Morgan's theorem – Basic logic gates (AND, OR, NOT) – NAND and NOR gates.

UNIT – V: ATOMIC AND NUCLEAR PHYSICS

Bohr's atom model – radius and energy – Atomic excitation – Ionization potential – Frank and Hertz Method – Nucleus – Nuclear properties – Mass defect – Binding energy. Nuclear fusion and Nuclear fission – X-rays – Derivation of Bragg's law

TEXTBOOKS:

1. *Electricity and Electronics* – R. Murugesan, First edition, 2011.
2. *Electricity and Magnetism* – R. Murugesan, S. Chand & co, 2001.

REFERENCE BOOKS:

1. *Modern Physics* – R. Murugesan, S. Chand & co, 1998.
2. *Basic Electronics* – B.L. Theraja, S. Chand & co, 2003.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	2	3	3	3
CO2	2	2	2	3	2	2
CO3	2	2	3	2	2	
CO4	2	2	3	2	3	1
CO5	2	1	1	2	2	3

3. Advanced Application 2. Intermediate Development 1. Introductory Level
COURSE DESIGNER: Prof. K.S. MAHALAKSHMI



SOURASHTRA COLLEGE, MADURAI – 625004

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B.Sc. PHYSICS – SYLLABUS

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24

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UPSS21	PROGRAMMING IN C	SBS – 2	2	-	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	25	75	100

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship <input type="checkbox"/>
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COURSE DESCRIPTION:

This course introduces elementary knowledge in the fields of data communication and programming in c. This course covers the principles of data communication, signals, basic transmission process, error detection and correction, network concepts and basics in the programming language.

COURSE OBJECTIVE:

The primary objective of this course is to provide an overview of various concepts of data communication and computer networks and the fundamentals of C Programming. Emphasize the role of c programming in solving problems.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand the basic concepts of C tokens	Upto K3
CO 2	explain the 'C' expressions and operators.	Upto K3
CO 3	understand the fundamentals of control statements in C programming	Upto K3
CO 4	elaborate the decision making instruction using branching and looping and implement simple problems using C language.	Upto K3
CO 5	apply concepts of an array to handle a group of data and implement simple problems using C language.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY



SOURASHTRA COLLEGE, MADURAI – 625004

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25

PROGRAMMING IN C

UNIT – I: INTRODUCTION TO PROGRAMMING IN C

Introduction – character set – C tokens – identifiers and keywords – constants and variables – data types – declaration of variables (primary type declaration)

UNIT – II: EXPRESSIONS AND OPERATORS

Operators and expressions – Arithmetic, Relational, Logical and Assignment, Increment and Decrement, Conditional operators – Arithmetic expressions – Data input and output.

UNIT – III: DECISION MAKING INSTRUCTION

Branching – Decision making – Control statements – Simple if statement, if-else statement, else if ladder, switch statement, conditional statement, GOTO statement

UNIT – IV: LOOPING AND SIMPLE PROGRAMS

Looping– while loop, do-while loop, for loop – Simple programs– To find volume of a sphere, area of the triangle and circle – To find the factorial of a number – To evaluate $\sin x$ – To find roots of a quadratic equation.

UNIT – V: ARRAYS

Arrays– Declaration–Initialization of one dimensional, two dimensional and multidimensional Simple programs to multiply, add and subtraction of two matrices – To arrange the given set of numbers in ascending and descending order – To find the arithmetic mean, geometric mean and harmonic mean

TEXTBOOK:

1. *Programming in ANSI C* – Balagurusamy E, (2008), Second Edition, Tata McGraw Hill.

REFERENCE BOOKS:

1. *Programming in C* – Kamthane Ashok. N, (2013), 2nd Edition, Pearson Education.
2. *Let us C* – Yashvant P. Kanetkar, (2008), 8th Edition, Infinity Science Press. State Integrated Board of Studies – Physics UG

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1			2	2	1	1
CO2	2			1	3	1
CO3		2				1
CO4	2	2		2		1
CO5				2		1

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Dr. A. K. BALASUBRAMANIAN



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B.Sc. PHYSICS – SYLLABUS

(Under CBCS based on OBE) (For those who joined during 2024 – 2025 and after)

26

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UPSCPI	MAJOR PRACTICAL – I	CORE	-	3	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	40	60	100

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship
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COURSE DESCRIPTION:

This course helps to develop an understanding of the various concepts in different areas of physics. This course covers elastic properties of materials to know the strength of materials, viscous properties of liquid, basic properties of light.

COURSE OBJECTIVE:

The main objective of this course is to give the essence of basic concepts, laws, and phenomena in areas of Mechanics, properties of matter, sound and optics in physics.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO	gain the knowledge of Elasticity, properties of matter, sound and resonance concepts etc., which helps to solve problems	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'B+' grade by NAAC)

B.Sc. PHYSICS – SYLLABUS

(Under CBCS based on OBE) (For those who joined during 2024 – 2025 and after)

27

LIST OF EXPERIMENTS

ANY FOURTEEN EXPERIMENTS:

17. Young's Modulus of Elasticity by Uniform Bending (Pin & Microscope)
18. Young's Modulus of Elasticity by Non-Uniform Bending (Optic Lever)
19. Young's Modulus of Elasticity by Cantilever (Pin & Microscope)
20. Young's Modulus of Elasticity by Cantilever (Dynamic Method)
21. Determination of Rigidity Modulus of Elasticity by using Torsion Pendulum
22. Moment of Inertia of circular disc by Torsion Pendulum
23. Determination of Co-efficient of viscosity of liquid by Stokes method
24. Surface Tension of water by Drop Weight method.
25. Determination of acceleration due to gravity by using compound pendulum.
26. Melde's String – Determination of frequency of tuning fork
27. AC frequency by Sonometer
28. Co-efficient of Viscosity of water by Poiseuille's Method
29. Verification of Laws of Transverse vibrations
30. Determination of wavelength of Laser
31. Determination of Particle size by Laser
32. Determination of Particle size by Laser



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'B+' grade by NAAC)

B.Sc. PHYSICS – SYLLABUS

(Under CBCS based on OBE) (For those who joined during 2024 – 2025 and after)

28

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UPSAP1	ANCILLARY PRACTICAL – I	ALLIED	-	2	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	40	60	100

NATURE OF COURSE	Employability <input checked="" type="checkbox"/>	Skill Oriented <input checked="" type="checkbox"/>	Entrepreneurship <input type="checkbox"/>
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COURSE DESCRIPTION:

This course helps the students to understand the basic concepts of electricity and electronics and to acquire the basic knowledge of atomic and nuclear Physics.

COURSE OBJECTIVES:

- To understand the fundamental laws of electricity
- To gain the basic idea about semiconductor diodes transistors and logic gates.
- To acquire knowledge of atomic models, nuclear fission and fusion

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	gain the knowledge of different laws of electrostatics, basic electronic devices , general concepts in physics which helps to solve various problems	Upto K3

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3-APPLY



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B.Sc. PHYSICS – SYLLABUS

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29

LIST OF EXPERIMENTS

ANY FOURTEEN EXPERIMENTS:

1. Young's Modulus of Elasticity by Uniform Bending (Pin & Microscope)
2. Young's Modulus of Elasticity by Non-Uniform Bending (Optic Lever)
3. Calibration of Low range Voltmeter by Potentiometer
4. Calibration of Ammeter by Potentiometer
5. Determination of Thermal Conductivity of bad conductor by Lee's disc method
6. Grating N and λ by Normal incidence method
7. Refractive index of the Prism using spectrometer.
8. LCR Series Circuit – Determination of resonant frequency and L of the coil
9. Bridge Rectifier
10. Construction of Logic gates OR, AND and NOT using discrete components
11. Air-Wedge – Determination of thickness of the given material.
12. Newton's Rings – Radius of Curvature
13. Carey-Foster's Bridge – Resistance and Resistivity
14. Comparison of Capacities of the given two capacitors.
15. Comparison of emfs of the given two cells.
16. Verification of De-Morgan's Theorems.