PSGR
Krishnammal College for Women

Affiliated to Bharathiar University \ Autonomous \ College of Excellence \ Accredited with A++ Grade \ Ranked 9th in NIRF

DEPARTMENT OF PHYSICS

BACHELOR OF PHYSICS

2024-2027 BATCH

BACHELOR OF SCIENCE IN PHYSICS

CHOICE BASED CREDIT SYSTEM (CBCS) &

LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK (LOCF)

SCHEME & SYLLABUS OF EXAMINATION
2024-2027 BATCH

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 GE	4 7	58 103	2 2	3 3	20 25	55 75	75 100	4 5
		CE23AP2	Chemistry Practicals	GE	3			-	-	-	-	-
	IV	**Non Tamil Students**										
		NME23B1/ NME23A1/	Basic Tamil I/ Advanced Tamil I/	AEC	2	28	2	-	100	-	100	2
		Students with Tamil as Language										
		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	-	-	-	-	-	-

II	**I**	TAM2302/ HIN2302/ FRE2302	Tamil Paper – II/ Hindi Paper – II/ French Paper II	L	6	88	2	3	25	75	100	3
	II	ENG2302	English Paper II	E	5	73	2	3	25	75	100	3
	III	PS24C02	Heat and Thermodynamics	CC	6	88	2	3	25	75	100	5
		PS23CP1	Physics Practicals – I	CC	3	45	-	3	25	75	100	4
		CE24A04/ TH24A18	Chemistry Paper – II / Mathematics – Elementary to Advanced	GE	5/8	73/ 103	2	3	20/ 25	55/ 75	75/ 100	4 /5
		CE23AP2	Chemistry Practicals	GE	3	45	-	3	15#	35#	50	2
	IV	NME23B2 NME23A2*	Basic Tamil II / Advanced Tamil II	AEC	SS			-	100	-	100	Gr.
		NM24UHR	Universal Human Values and Human Rights	AECC	2	30	-	-	100	-	100	2
		NM23GAW	General Awareness		-	-	-	-	100	-	100	Gr.
I - V	VI	24BONL1 24BONL2 24BONL3	Online Course 1 Online Course 2 Online Course 3	ACC	-	-	-	-	-	-	-	-
I-IV	VI	COM15SER	Community Services 30 hours	GC	-	-	-	-	-	-	-	-
	I	TAM2303/ HIN2303/ FRE2303	Tamil Paper III/ Hindi Paper III/ French Paper III	L	6	88	2	3	25	75	100	3
	II	ENG2403	English Paper III	E	5	73	2	3	25	75	100	3
	III	PS23C03	Electricity and Magnetism	CC	4	58	2	3	25	75	100	4

III		PS23CP2	Physics Practicals II	CC	3	45	-	-	-	-	-	-
		TH24A18	Mathematics I	GE	7	103	2	3	25	75	100	5
		PL24A01 PL23AP1	Fundamentals of Botany I Botany Practical	GE	5 2	73 30	2 -	3 -	20 -	55 -	75 € -	4 -
		AS23A01 AS23AP1	Invertebrata & Chordata Zoology Practical	GE	5 2	73 30	2 -	3 -	20 -	55 -	75€ -	4 -
		CS23SBGP	Gen - AI	SEC	3	44	1	-	100	-	100	3
	IV	NM23DTG	Design Thinking	AEC	2	30	-	-	100	-	100	2
I-IV	VI	COM15SER	Community Services 30 Hours	GC	-	-	-	-	-	-	-	-
I-V	VI	24BONL1 24BONL2 24BONL3	Online Course I Online Course II Online Course III	ACC	-	-	-	-	-	-	-	-
IV	I	TAM2304/ HIN2304/ FRE2304	Tamil Paper IV/ Hindi Paper IV/ French Paper IV	L	5	73	2	3	25	75	100	3
	II	ENG2404	English Paper IV	E	6	88	2	3	25	75	100	3
	III	PS23C04	Fundamentals of Digital Electronics	CC	4	58	2	3	25	75	100	4
		PS23CP2	Physics Practicals – II	CC	3	45	-	3	25	75	100	4
		TH24A24/ PL23A02/ AS23A02	Mathematics II/ Fundamentals of Botany II / General Principles in Zoology	GE	7 5 5	103 73 73	2 2 2	3 3 3	25 20* 20*	75 55* 55*	100 75 75	5 4 4
		PL23AP1 AS23AP1	Botany Practical / Zoology Practical	GE	2	30	-	3	15#	35#	50	2
	III	PS23SCE1	IoT and Embedded Systems	SEC	3	45	-	-	100	-	100	3
	IV	NM23EII	Entrepreneurship and Innovation (IgniteX)	AEC C	2	30	-	-	100	-	100	2
	IV	NM24EVS	Environmental Studies	AEC C	SS	-	-	-	100	-	100	Gr.

	V	COCOACT	Co-curricular Activities	GC	-			-	100	-	100	1
I-V	VI	24BONL1 24BONL2 24BONL3	Online Course I Online Course II Online Course III	ACC	-	-	-	-	-	-	-	-

* **-** After class hours

CC – Core Courses

GE – Generic Elective

AEC – Ability Enhancing Course

GC – General Course

SS – Self Study

CA – Continuous Assessment

ESE - End Semester Examination

AEC – Ability Enhancement Compulsory Course

ACC – Additional Credit Course

Gr - Grade

 # CA conducted for 25 and converted to 15

 # ESE conducted for 75 and converted to 35

Examination System

Pattern:

Semester system will be followed. A semester consists of a minimum of 90 working days excluding the days of conduct of ESE. There will be Continuous Internal Assessment (CA) to evaluate the performance of students in each course and the End Semester Examination will be held at the end of every semester.

Weightage assigned to various components of Continuous Internal Assessment

Theory

CIA Test	: 5 marks **(conducted for 45 marks after 50 days)**
Model Exam	: 7 marks **(Conducted for 75 marks after 85 days)**
Seminar/Assignment/Quiz	: 5 marks
Class Participation	: 5 marks
Attendance	: 3 marks
Total	**: 25 Marks**

Practical

Lab Performance	: 7 marks
Regularity	: 5 marks
Model Exam	: 10 marks
Attendance	: 3 marks
Total	**: 25 marks**

CA - Question Paper Pattern and Distribution of Marks

Language and English

Section A 5 x 1 (No choice)	: 5 Marks
Section B 4 x 5 (4 out of 6)	: 20 Marks (250 words)
Section C 2 x 10 (2 out of 3)	: 20 Marks (500 words)
Total	**: 45 Marks**

Core and Allied (first 3 units)

CA Question Paper Pattern: 3 x 15 = 45 Marks

CA Question from each unit comprising of

One question with a weightage of 2 Marks :2 x 3 = 6

One question with a weightage of 5 Marks (Internal Choice at the same CLO level):5 x 3 =15

One question with a weightage of 8 Marks (Internal Choice at the same CLO level):8 x 3 =24

Gen-AI

Quiz : 50 Marks (5 quizzes with each 10 marks)
Case study : 25 Marks
Online Exam : 25 Marks (Departments to plan and conduct the exam)
Total : 100 Marks

Design Thinking

Quiz	: 50 marks
Assignment	: 25 marks
Project / Case Study	: 25 marks
Total	**: 100 Marks**

End Semester Examination – Question Paper Pattern and Distribution of Marks

Language and English

Section A 10 x 1 (10 out of 12)	: 10 Marks
Section B 5 x 5 (5 out of 7)	: 25 Marks (250 words)
Section A 4 x 10 (4 out of 6)	: 40 Marks (600 - 700 words)
Total	**: 75 Marks**

Core and Allied

ESE Question Paper Pattern: 5 x 15 = 75 Marks
Question from each unit comprising of
One question with a weightage of 2 Marks : 2 x 5=10
One question with a weightage of 5 Marks (Internal Choice at the same CLO level): 5 x 5 =25
One question with a weightage of 8 Marks (Internal Choice at the same CLO level): 8 x 5 =40

Criteria for Attendance:

3 Marks (Attendance 75% - 80% - 1 Mark, 81% - 90% - 2 Marks, 91% - 100% - 3 Marks)

PS23C01	MECHANICS , PROPERTIES OF MATTER AND SOUND	Category	L	T	P	Credit
		THEORY	**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
CLO1	M	M	S	S	S	S
CLO2	S	S	S	S	S	S
CLO3	S	S	S	S	S	S
CLO4	S	S	S	L	S	S
CLO5	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	Murugeshan. 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	2nd Edition
3	R.Murugesan	Properties of Matter	S.Chand and Company Pvt Ltd	2013	11th edition
4	Saighal.R.L	Textbook of Sound	S.Chand&Co Ltd	1998	2ndEdition
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	Ratan Prakashan Mandir	1990	7thEdition
2	Brijlal Subramanyam	Properties of Matter	S. Chand and Company Pvt Ltd	1995	3rd Edition
3	Murugesan. R	Properties of matter, Sound and thermal physics	S. Chand & Co Ltd	2011	1st Edition

Pedagogy

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

Course Designers

1. Dr.M.Lavanya

PS23CP1	PHYSICS PRACTICALS I	Category	L	T	P	Credit
		PRACTICAL	-	-	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	ALLIED PHYSICS PAPER- I (For Chemistry)	Category	L	T	P	Credit
		THEORY	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 **12 Hrs**

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 – Pyrheliometer – 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 **12 Hrs**

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 Subramanium	Heat and thermodynamics	S.Chand and Co, 16th Edition.	2012
2	Brijlal Subramanium & Hemne.P.S,	Heat thermodynamics and Statistical Physics	S.Chand and Co, 12th edition	2011
3	Brijlal Subramanium	Optics	S.Chand and Co, 21st Edition	2012
4	Murugeshan R	Allied Physics	S.Chand and Co, 1st 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, 16th Edition.	2012
2	Mathur D.S	Properties of Matter	S Chand and Co, 2nd Edition	1970
3	Murugesan R	Modern Physics	S.Chand and Co , 9th edition	2013

Pedagogy

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

Course Designers:

1. Mrs.S.Sowmya

References For E-Content:

1. https://youtu.be/qQhOYbztNIQ
2. https://youtu.be/gcI-bkr7ilg
3. https://youtu.be/7tr4qWPgP40
4. https://youtu.be/N5GAHntU_nQ
5. https://youtu.be/hDP6egLrsdM
6. https://youtu.be/nmsPcTzIkrw
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
13. 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

		Category	L	T	P	Credit
PS23AP1	**ALLIED PHYSICS PRACTICALS** (For I BSc Chemistry Sem I and II and II BSc Mathematics Sem III and IV)	PRACTICAL	-	-	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

SEMESTER-II

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
PS24C02	HEAT AND THERMODYNAMICS	Theory	88	2	-	5

Preamble

The aim of this course is to acquire knowledge in heat transfer, entropy, production of low temperature and liquefaction of gases, thermal radiation and statistical thermodynamics.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the central concepts and basic idea on specific heat, entropy, quantum theory of radiation	K2
CLO2	Apply the concepts of low temperature physics in liquefaction of gases	K3
CLO3	Use the tools needed to formulate and solve problems in thermodynamical systems such as gases, heat engines etc	K3
CLO4	Become familiarize with the concepts of thermodynamical potentials.	K3
CLO5	Distinguish the particles based on the concepts and principles of Statistical Physics	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

Syllabus

Unit I **18 Hrs**

Kinetic theory of gases

Postulates of kinetic theory of gases – derivation of expression for pressure exerted by gas - Maxwell's Law of Distribution of Velocities(no derivation), Mean Free Path - Brownian motion – Langevin's theory of Brownian motion – Einstein's theory of Brownian motion– degree's of freedom – Maxwell's law of equipartition of energy - van der Waal's equation of state – critical constants –experimental determination of critical constants.

Quantum Theory of Specific Heat

Specific heat of solids - Dulong and Petits law and the deduction – failure of Dulong and Petit's law – Einstein's theory and its limitation – Debye theory of specific heat of solids – specific heat of gases – Variation of specific heat of diatomic gases with temperature – applications of high specific heat capacity of water.

Unit II **18 Hrs**

Low Temperature Physics

Methods of production of low temperatures – Expression for temperature inversion – Principle of regenerative cooling - Joule Thomson effect – Porous plug experiment – its theory and result – Joule Thomson effect for perfect and real gases –Liquefaction of Hydrogen & Helium – Helium I and Helium II -Lamda point - super fluidity – adiabatic demagnetization – application in refrigerators and deep freezers - Traditional Cooling Techniques in India - Heat Transfer in Traditional Indian Architecture - Applications of IKS in Modern Heat Management[1-2]

Unit III **17 Hrs**

Thermal Physics

Quantum theory of radiation- Planck's hypothesis – average energy of Planck's oscillator – Planck's radiation law and its experimental verification -Derivation of Planck's law– Derivation of Wein's law and Rayleigh-Jean's from Planck's law – Stefan's and Wein's displacement laws from Planck's law – Room heaters and radiators in cars - solar thermal system (water heater) – Evolution of Solar cooking - Its Role in Advancing Sustainable Cooking Alternatives[3-4]

Unit IV **18 Hrs**

Laws of Thermodynamics and Entropy

First law of thermodynamics and it's consequences – Isothermal and adiabatic processes – reversible, irreversible and quasi-static processes – second law and entropy - physical significance of entropy - Entropy of a perfect gas - Thermodynamic potentials- internal energy (U)- Helmtzholtz function (F)- Gibb's function (G) and enthalpy (H) – significance of thermodynamic potentials - Maxwell's thermodynamics relation – the (T-dS) equation –

Clapeyron's latent heat equation using Maxwell's thermodynamics relation – understanding entropy in steam engines.

Unit V **17 Hrs**

Statistical Physics

Probability- Macrostate and microstate – phase space – thermodynamic probability – Ensembles – Kinds of Ensembles (concepts only) – Maxwell's Boltzmann distribution law- Maxwell's Boltzmann distribution in terms of temperature – quantum statistics – Bose Einstein distribution law – Fermi - Dirac distribution law – Comparison of three statistics.

Text Books

S. No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	Brijlal N Subrahmanyam P.S. Hemne	Heat Thermodynamics and Statistical Physics and applications	S. Chand	2012	3rd edition
2	R. Murugeshan Er. Kiruthiga Sivaprasath	Thermal Physics	S. Chand	2012	3rd edition

Reference Books

S. No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	A.B Gupta H.P. Roy	Thermal Physics	Arunabha Sen	2005	1st edition
2	Agrawal Prakash	Thermal Physics	Pragati Prakashan	2015	27th edition
3	Agrawal Prakash	Thermodynamics and Statistical Physics	Pragati Prakashan	2015	27th edition

Resources of e-content for IKS

1. https://www.youtube.com/watch?v=LGh5uQhTEXc
2. https://ozonecell.nic.in/wp-content/uploads/2024/04/Booklet-on-Indias-Journey-Towards-Sustainable-Cooling-web-version-Final.pdf

3. https://mnre.gov.in/en/solar-cookers
4. https://www1.eere.energy.gov/solar/pdfs/solar_timeline.pdf

Pedagogy

Chalk and talk, PPT, Seminar, Group discussion, Interaction, Weblinks, NPTEL Lectures.

Course Designers

Dr. G. Praveena

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
PS23CP1	PHYSICS PRACTICALS I	Practical	-	-	3hrs/week	4

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

(any 16)

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:

Dr. G. Praveena

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
PS24A02	PHYSICS PAPER- II	Theory	73	2	-	4

Preamble

This paper introduces the student to the basic concepts of AC Circuits, Magnetic materials, electronics and digital electronics

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Explore the fundamental concepts of physics	K1
CLO2	Import knowledge about the importance of material properties, heat, sound, optics, atomic and nuclear physics.	K2
CLO3	Understand the energy involved in nuclear reaction	K2
CLO4	Carry out the practical by applying these concepts	K3
CLO5	Get depth knowledge of physics in day today life	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 **14 Hrs**

Alternating currents:

Mean and RMS values of AC -Series and parallel resonant circuits-Power factor- power factor ofan ac circuit containing resistance, inductance and capacitance -Transformer-construction- working-losses.

Unit – II **14 Hrs**

Magnetic materials:

Magnetic Induction – Magnetization – Relation between the three magnetic vectors B, H and M

– Magnetic susceptibility – Properties - diamagnetic – paramagnetic – ferromagnetic – anti ferromagnetism and ferrimagnetism – Electron theory of magnetism — Weiss's theory of ferromagnetism - energy loss in hysteresis – importance of hysteresis curves.

Unit – III **14 Hrs**

Semiconductor Diodes: P and N type semiconductors - PN Junction Diode - Current Flow Mechanism in Forward and Reverse Biased Diode - Zener Diode and Voltage Regulation - Principle and structure of (1) LEDs (2) Photodiode (3) Solar cell - Transistor – Characteristics of CB, CE and CC Configuration – Transistor biasing – Voltage divider biasing.

Unit - IV **14 Hrs**

Two - terminal Devices and their Applications: Rectifier Diode: Half- wave Rectifiers - Bridge Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency - **Amplifiers:** Single stage amplifier (CE) **- Sinusoidal Oscillators:** Barkhausen's Criterion for self - sustained oscillations - RC Phase shift oscillator, determination of Frequency- Hartley oscillator.

Unit – V **15 Hrs**

Digital Electronics:

Boolean algebra-DeMorgan's theorem-OR, AND, NOT, XOR NOR and NAND gates-NOR andNAND gates as universal building blocks-half adder, full adder-RS flip flop-JK flip flop Operational amplifier: Characteristics-virtual ground-summing point-inverting and non inverting amplifier-adder-subtractor.

Text Book

S.No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	R. Murugesan	Electricity and Magnetism	S.Chand and Co	2005	Revised Edition
2	V.K. Metha	Principles of electronics	S.Chand and Co	1980	1st Edition
3	Murugesan R	Allied Physics	S.Chand and Co	2005	1st edition

Reference Books

S.No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	V. Vijayendran	Introduction to Integrated Electronics	Viswanathan Publishers	2005	1st Edition

Pedagogy

Chalk and Talk lectures, Group Discussion, Seminar, Interaction, Power Point Presentation

Reference Links:

1. Mean and RMS values of AC - https://www.youtube.com/watch?v=qDHsokTcgck
2. Series & Parallel Resonant Circuits - https://www.youtube.com/watch?v=G8KLJjq1E2o
3. Transformer | Principle, Construction, Working and Efficiency - https://www.youtube.com/watch?v=i29dCoSGa38
4. Magnetization - https://www.youtube.com/watch?v=C-OoUvKXbLU&t=2s
5. Diamagnetic – paramagnetic – ferromagnetic - https://www.youtube.com/watch?v=wK7Jr1g4_ws
6. P and N type semiconductors - https://www.youtube.com/watch?v=5ZNeDxfgYAE
7. Different types of diodes - https://www.youtube.com/watch?v=-EqOEiEQGLI
8. Diode rectifier circuits - https://www.youtube.com/watch?v=Xmu31a-59vw
9. Single stage amplifier - https://www.youtube.com/watch?v=NEiVSbPYWNE
10. RC Phase Shift Oscillator - https://www.youtube.com/watch?v=Gvb4GIV5ig8
11. Hartley Oscillator - https://www.youtube.com/watch?v=3B_sBX_11Zw
12. Boolean Algebra and Logic gates - https://www.youtube.com/watch?v=JQBRzsPhw2w

13. Flip-flop - https://www.youtube.com/watch?v=LTtuYeSmJ2g
14. Operational amplifier - https://www.youtube.com/watch?v=jsKSfaFQ4d4

Course Designers

Dr. G. Praveena

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
PS23AP1	PHYSICS PRACTICALS	Practical	-	-	3hrs/week	2

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

20. Young's Modulus –Non- Uniform bending –Pin and Microscope
21. Young's Modulus – Uniform bending – Optic lever
22. Rigidity modulus - Static torsion
23. Rigidity Modulus - torsional pendulum
24. Moment of inertia - torsional pendulum
25. Acceleration due to gravity - compound pendulum
26. Thermal conductivity of a bad conductor – Lee's disc method
27. AC frequency - Sonometer
28. Refractive index of solid prism - spectrometer
29. Refractive index of liquid-Hollow prism - spectrometer
30. Wave length- Grating - Minimum deviation method - Spectrometer
31. Low range Ammeter Calibration - Potentiometer
32. Low range Voltmeter Calibration - Potentiometer
33. Moment of a magnet in the Tan C position
34. Volt-Ampere characteristic of a p-n junction diode in the forward and reverse directions
35. Logic gates - Verification of the truth table
36. Characteristics of Zener diode
37. Closed loop gain of Operational Amplifier in Inverting mode
38. Closed loop gain of Operational Amplifier in Non Inverting mode.

Pedagogy

Demonstration and Practical Sessions

Course Designers:

Mrs. T. Poongodi

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
PS23C03	ELECTRICITY AND MAGNETISM	Theory	58	2	-	4

Preamble

The aim of this course is i) to acquire in-depth knowledge in electrostatics and magnetostatics so that students would apply theories of static and moving charges and extend its applications to instruments involving electric and magnetic fields and ii) to give idea on the fundamentals of electromagnetic conduction and electromagnetic waves.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO 1	Recall the basic knowledge of scalar, vector fields, AC/DC circuits and electromagnetic wave.	K1
CLO 2	Understand the concept of different laws in electrostatics, generation of currents and the variation of current in magnetic field.	K2
CLO 3	Apply theorems to construct and solve electrical circuits.	K3
CLO 4	Analyze the generation of magnetic fields by electrical currents through circuital laws.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO 1	M	M	S	S	M	S
CLO 2	S	M	S	S	M	S
CLO 3	S	M	S	S	S	S
CLO 4	S	M	S	S	S	S

S- Strong; M-Medium;

Syllabus

Unit I **12 Hrs**

Vector Analysis:

Scalar and Vector fields, **gradient of a scalar field, divergence of a vector field, Curl of a vector field and their physical significance**[1,2,3,4], Vector Integration, Line, surface and volume integrals of Vector fields, Gauss divergence theorem and Stoke's theorem of vectors (Statement and proof only)

Electrostatic Field:

Electric field, Continuous charge distribution, **Divergence and curl of electrostatic fields; Field lines, flux**[5,6] and Gauss' law statement and its proof, applications of Gauss's law – uniformly charged spherical shell and conducting sphere, infinite line of charge, uniform infinite cylindrical charge and infinite plane sheet of charge, **Coulomb's Law**[7,8].

Unit II **12 Hrs**

Electric potential:

Introduction to potential, **Comments on potential**[9,10], Poisson's and Laplace's equations, Potential of a localized charge distribution, electrostatic boundary value problems – Uniqueness theorem

Electrical Images:

Solution of field problems in case of a point charge near a grounded conducting infinite plane. Boundary value problems: in uniform external field for (1) insulated Conducting Sphere **(2) conducting spherical shell and (3) dielectric sphere**[11,12,13].

Unit III **11 Hrs**

DC currents:

Growth and decay of charge in series RC circuit, **Growth and decay of current in series LR circuit**[14]**,** Growth and Decay of charge in series LCR circuit - **Damped, under-damped and over-damped conditions**

AC Circuits:

Series resonance circuit- Parallel LCR Circuit – Complex form of LCR circuits- j operator method - Characteristics of LCR Circuit: (1) Resonance, (2) Quality Factor, (3) Band Width and (4) Sharpness of Resonance - power consumed by the above circuits.

Unit IV **12 Hrs**

Magnetic Field:

Magnetic force between current elements and definition of Magnetic Field **B**. Biot-Savart's Law and its simple applications: long straight wire and **circular loop**[15]**.** Current Loop as a Magnetic

Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital Law and its application to (1) Solenoid and **(2) Toroid. Properties of B: curl and divergence[15,16,17].** Differential form of Ampere's circuital law- Magnetic scalar and Vector Potential -Importance.

Unit V **11 Hrs**

Electromagnetic waves:

Equation of continuity – Displacement current – Significance of displacement current – Derivation of Maxwell's equations – Maxwell's equations in integral form **- Differential form – Plane electromagnetic waves – Transverse nature of electromagnetic waves[18,19,20] -** Maxwell's equations in free space-Electromagnetic waves in free space- Poynting theorem (Statement and Proof)

Text Books

S. No	Authors	Title	Publishers	Year & Edition
1	R. Murugesan	Electricity and Magnetism	S. Chand & Co Pvt Ltd	2019, 8th Edn
2	Dr. K. K. Tewari	Electricity and Magnetism	S. Chand & Co Pvt Ltd	2016, 2nd Edn
3	Brijlal and N. Subrahmanyam	Electricity and Magnetism	S. Chand & Co Pvt Ltd	2017, 18th Edn

Reference Books

S. No	Authors	Title	Publishers	Year & Edition
1	David J Griffith	Electrodynamics	Prentice Hall	2015, 4th Edn
2	Edward M. Purcell	Electricity and Magnetism, Berkeley Physics Course – Volume 2	Tata Mc-Graw Hill Education	2013, 3rd Edn
3	D C Tayal	Electricity and Magnetism	Himalaya Publishing House	2009, 4th Edn
4	Sehgal, Chopra, Sehgal	Electricity and Magnetism	S. Chand and sons	2020, 2nd Edn

5	A S Mahajan, A A Rangwala	Electricity and Magnetism	S. Chand and sons	2017, 6th Edn

References For E-Content

1. https://www.youtube.com/watch?v=W8N8XswNei8
2. https://www.youtube.com/watch?v=gLsoAjuRWCw
3. https://www.youtube.com/watch?v=SZCsFS9izfQ
4. https://www.youtube.com/watch?v=v3ZC4Mo1fS0
5. https://www.youtube.com/watch?v=VBCzo91uUi8
6. https://www.youtube.com/watch?v=_4VC3IHbuW8
7. https://www.youtube.com/watch?v=2GQTfpDE9DQ
8. https://www.youtube.com/watch?v=rYjo774UpHI
9. https://www.youtube.com/watch?v=j3GrOKre__0
10. https://www.youtube.com/watch?v=PEcPcNMfNks
11. https://www.youtube.com/watch?v=-SakEHbtryA
12. https://www.youtube.com/watch?v=jippPv6Gz14
13. https://www.youtube.com/watch?v=7YbLDlbv17w
14. https://www.youtube.com/watch?v=04THKYsONKA
15. https://www.youtube.com/watch?v=I8X1EpH_VQY
16. https://www.youtube.com/watch?v=sFre-bMvBeI
17. https://www.youtube.com/watch?v=yr0RkoUHgf0
18. https://www.youtube.com/watch?v=CX7X6YrVUdk
19. https://www.youtube.com/watch?v=pn9yxCxzJfY
20. https://www.youtube.com/watch?v=HvK35jjMb5I

Pedagogy

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

Course Designer

1. Dr. N. Priyadharsini

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
PS23CP2	**PHYSICS PRACTICALS II**	Practical	-	-	3 hrs/ 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, heat, optics, electricity and electronics.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the usage of basic laws and theories to determine various properties of the materials given.	K2
CLO2	Understand the application side of the experiments.	K2
CLO3	Apply knowledge of mathematics and physics fundamentals and an instrumentation to arrive solution for various problems.	K3
CLO4	Use standard methods to calibrate the given high range voltmeter and to measure the elasticity and thickness of the given material.	K3
CLO5	Use of basic laws to study the spectral properties and optical properties of the given prism and grating.	K4

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

Any 16

1. Young's Modulus – Uniform Bending – Koenig's Method
2. i-d curve- μ of the prism-Spectrometer
3. Dispersive Power of Grating – Spectrometer- Wave length of Mercury Spectral Lines by minimum deviation method
4. Refractive index (μ) of the material of the prism lens – Newton's rings method
5. Calibration of High Range Voltmeter –Potentiometer
6. Wave length of Mercury Spectral Lines – Grating - Normal Incidence –Spectrometer
7. Young's Modulus –Non-Uniform Bending – Koenig's Method
8. Thickness of a thin wire – Air Wedge method
9. EMF of thermocouple –Potentiometer
10. High resistance by i) Charging ii) Leakage using Ballistic Galvanometer
11. Comparison of Mutual Inductance's – Ballistic Galvanometer
12. Measurement of dielectric constant - Parallel Plate Capacitor Method
13. Series Resonant Circuit
14. Parallel Resonant Circuit
15. i) Verification of Truth Tables of IC Gates: OR, AND, NOT, XOR, NOR, and NAND

    ii) Verification of Demorgan's theorem using Logic Gates
16. Verification of Truth Table of Half and Full Adders
17. Verification of NAND as a Universal Building Block
18. Verification of NOR as a Universal Building Block
19. Verification of Truth Tables of Half and Full Subtractor

Pedagogy

Demonstration

Course Designer

1. Dr. M. Lavanya

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
PS23A03	**PHYSICS PAPER- I**	Theory	58	2	-	4

Preamble

This paper introduces the student**s** 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

S- Strong; M-Medium; L-Low

Syllabus

Unit – I **11 Hrs**

Properties of Matter

Elasticity: Moduli of elasticity[1,2]- bending moment-expression – Young's modulus by uniform and non-uniform bending-theory and experiment[3]- I–section girders-Torsion pendulum-couple per unit twist-work done in twisting –determination of the rigidity modulus of the material of the wire.

Unit - II **11 Hrs**

Transmission of Heat

Conduction process: Thermal conductivity[4,5]- 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- Pyroheliometer- solar energy and its applications (flat plate collector & solar cooker)[6,7,8,9,10] - 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[11,12,13].

Unit - IV **11 Hrs**

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

Polarisation: Production, detection and analysis of different types of polarized light-quarter and half wave plates[14,15,16]

Unit - V **12Hrs**

Atomic Physics: Vector atom model[17] -Quantum numbers associated with vector atom model -Pauli's exclusion principle-excitation and ionization potential-experimental determination-**Franck and Hertz method[17].**

Particle Physics: Elementary particles – classification[18]- particles and antiparticles- conservation laws and symmetry- Quark model.

Books for Study:

S. No	Authors	Title	Publishers	Year & Edition
1	Brijlal Subramanium	Heat and thermodynamics	S. Chand and Co	2012, 16th Edn
2	Brijlal Subramanium & Hemne.P.S,	Heat thermodynamics and Statistical Physics	S.Chand and Co	2011, 12th Edn
3	Brijlal Subramanium	Optics	S.Chand and Co	2012, 21st Edn
4	Murugeshan R	Allied Physics	S.Chand and Co	1998, 1st Edn

Books for Reference:

S. No	Authors	Title	Publishers	Year & Edition
1	Jayaprakash. N	Heat and thermodynamics	S Chand and Co	2012, 16th Edn
2	Mathur D.S	Properties of Matter	S Chand and Co	1970, 2nd Edn
3	Murugesan R	Modern Physics	S.Chand and Co	2013, 9th Edn

References For E-Content:

19. https://youtu.be/qQhOYbztNIQ
20. https://youtu.be/gcI-bkr7ilg
21. https://youtu.be/7tr4qWPgP40
22. https://youtu.be/N5GAHntU_nQ
23. https://youtu.be/hDP6egLrsdM
24. https://youtu.be/nmsPcTzIkrw
25. https://youtu.be/rAhvvyQBUt0
26. https://youtu.be/TUaTNzZ00oM
27. https://youtu.be/tDB3zP9MEZc
28. https://youtu.be/wvl0QAQCJyc

29. https://youtu.be/4nbBAG-848c
30. https://youtu.be/nJXB0yD_wEw
31. https://youtu.be/K4Do_yWJt2k
32. https://youtu.be/HH58VmUbOKM
33. https://youtu.be/DjnDX28l4xA
34. https://youtu.be/iVYGOWAtZCQ
35. https://youtu.be/SQtOYCei-Pc
36. https://youtu.be/kykp-S8S5dU

Pedagogy

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

Course Designers:

1. Dr. G. Vanitha
2. Dr. B. Punithaven

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
PS23AP1	**PHYSICS PRACTICAL**	Practical	-	-	3 Hrs / week	-

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

39. Young's Modulus –Non- Uniform bending –Pin and Microscope
40. Young's Modulus – Uniform bending – Optic lever
41. Rigidity modulus - Static torsion
42. Rigidity Modulus - torsional pendulum
43. Moment of inertia - torsional pendulum
44. Acceleration due to gravity - compound pendulum
45. Thermal conductivity of a bad conductor – Lee's disc method
46. AC frequency - Sonometer
47. Refractive index of solid prism - spectrometer
48. Refractive index of liquid-Hollow prism - spectrometer
49. Wave length- Grating - Minimum deviation method - Spectrometer
50. Low range Ammeter Calibration - Potentiometer
51. Low range Voltmeter Calibration - Potentiometer
52. Moment of a magnet in the Tan C position
53. Volt-Ampere characteristic of a p-n junction diode in the forward and reverse directions
54. Logic gates - Verification of the truth table
55. Characteristics of Zener diode
56. Closed loop gain of Operational Amplifier in Inverting mode
57. Closed loop gain of Operational Amplifier in Non Inverting mode.

Pedagogy

Demonstration and Practical Sessions

Course Designers:

2. Mrs. T. Poongodi

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
PS23C04	FUNDAMENTALS OF DIGITAL ELECTRONICS	THEORY	58	2	-	4

Preamble

- The aim of this course is to make students acquire knowledge about Boolean algebra, logic circuits, designing counters and the basic concepts of memory and programmable logic device.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Outline the fundamental concepts and techniques used in digital electronics.	K1
CLO2	Understand the various basic and complex digital circuits	K2
CLO3	Apply the acquired knowledge to build and troubleshoot digital circuits.	K3
CLO4	Design and analyze the working of digital circuits and system.	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

FUNDAMENTALS OF DIGITAL ELECTRONICS - PS23C04 – 58 HRS

Unit I

Number Systems, Logic gates and Boolean algebra (**12 Hrs)**

Number Systems-Binary-octal-Hexadecimal and its conversions-Binary Codes- BCD codes-8421 code-Excess 3 code-Grey code -Logic gates – AND, OR, NOT, NAND, NOR gates – Boolean algebra- operators – logic expressions De-Morgan's theorem – laws and rules of Boolean algebra – truth table – reducing Boolean expressions – Karnaugh maps – simplification of digital circuits - Ancient arithmetical operations.

Unit II

Arithmetic circuits and Flip flops (**12 Hrs)**

Half adder- full adder – Parallel binary adder, half subtractor – full subtractor – Parallel binary Subtractor, parity generator – encoder – decoder.

Flip flop –NAND Latch- RS Flip Flop- Edge triggered RS Flip Flop, D and T Flip Flop - JK Flip Flop, Master Slave Flip Flop – Sequential circuit concepts in ancient India.

Unit – III

Registers and Counters (**12 Hrs)**

Registers – Shift Registers-Shift left and Shift right registers – Ring Counter – Johnson's Counter - Asynchronous / Ripple counters – modulus counter- Mod 3, 4, 5, 6, 7, 8 and 9 counters - Decade counter - Synchronous Counters.

Unit – IV (**11 Hrs)**

A/D & D/A Converters

Digital to Analog (D/A) converter- Binary weighted resistor method – R / 2R Ladder Network - Analog to Digital (A/D) Converter – counter type - Dual slope integrator – successive approximation A/D Converter.

Unit – V (**11 Hrs)**

Semiconductor memory

Read only memory – Random access memory – PROM – EPROM-SRAMs –DRAMs - Digital IC Characteristics –Resistor Transistor Logic (RTL) – Transistor Transistor Logic (TTL) – Schottky TTL – Emitter Coupled Logic (ECL).

Text Book

S. No	Authors	Title	Publishers	Year and Edition
1	Malvino & Leach	Digital principles and applications	Tata Mc Graw Hill	1995 and 5th edn
2	M. Morris Mano	Digital Logic & Computer Designs	Prentice Hall of India.	2014 and 4th edn
3	Vijayendran V	Introduction to Integrated electronics	S.Viswanathan (Printers & Publishers, Chennai)	2005 and 1st edn
4	Swami Sri Bharatikrishna tirthaji	Vedic Mathematics	Motilal Bararsidass	1998 and 1st edn

Books for Reference

S. No	Authors	Title	Publishers	Year and Edition
1	ChatterjiB.N	- Digital Computer technology	Khanna Publishers, Delhi	1986 and 2nd edn
2	Puri V K	Digital Electronics circuits and systems	Tata McGraw Hill Publishing Company Limited New Delhi	1997 and 1st edn
3	S Salivahanan S Arivazhagan	Digital Circuits and Design	Vikas Publishing House Private Limited	2007 and 3rd edn
4	Mahamahopadhyaya Ganganatha Jha	The Nyaya Sutras of Gautama	Motilal Bararsidass	1984 and 2nd edn

Pedagogy

- Chalk and Talk lectures, Seminar, Interaction, Power Point Presentation, E-content

Course Designer

Mrs. D. Niveditha

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
PS23CP2	PHYSICS PRACTICALS II	PRACTICAL	45	-	45	4

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, heat, optics, electricity and electronics.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the usage of basic laws and theories to determine various properties of the materials given.	K1
CLO2	Understand the application side of the experiments.	K2
CLO3	Apply knowledge of mathematics and physics fundamentals and an instrumentation to arrive solution for various problems.	K3
CLO4	Use standard methods to calibrate the given high range voltmeter and to measure the elasticity and thickness of the given material.	K3
CLO5	Use of basic laws to study the spectral properties and optical properties of the given prism and grating.	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

PHYSICS PRACTICALS II - PS23CP2 – 45 HRS

List of Experiments

Any 16

1. Young's Modulus – Uniform Bending – Koenig's Method
2. i-d curve- μ of the prism-Spectrometer
3. Dispersive Power of Grating – Spectrometer- Wave length of Mercury Spectral Lines by minimum deviation method
4. Refractive index (μ) of the material of the prism lens – Newton's rings method
5. Calibration of High Range Voltmeter –Potentiometer
6. Wave length of Mercury Spectral Lines – Grating - Normal Incidence –Spectrometer
7. Young's Modulus –Non-Uniform Bending – Koenig's Method
8. Thickness of a thin wire – Air Wedge method
9. EMF of thermocouple –Potentiometer
10. High resistance by i) Charging ii) Leakage using Ballistic Galvanometer
11. Comparison of Mutual Inductance's – Ballistic Galvanometer
12. Measurement of dielectric constant - Parallel Plate Capacitor Method
13. Series Resonant Circuit
14. Parallel Resonant Circuit
15. i) Verification of Truth Tables of IC Gates: OR, AND, NOT, XOR, NOR, and NAND

    ii) Verification of Demorgan's theorem using Logic Gates

16. Verification of Truth Table of Half and Full Adders
17. Verification of NAND as a Universal Building Block
18. Verification of NOR as a Universal Building Block
19. Verification of Truth Tables of Half and Full Subtractor

Pedagogy

Demonstration

Course Designer

Dr.M.Lavanya

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
PS23A04	PHYSICS PAPER- II	THEORY	58	2	-	4

Preamble

- This paper introduces the student to the basic concepts of AC Circuits, Magnetic materials, electronics and digital electronics

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Remember the fundamental concepts of physics.	K1
CLO2	Understanding the importance of electronics, digital circuits and magnetic materials.	K2
CLO3	Apply the acquired knowledge of physics in day today life.	K3
CLO4	Analyze the concept of electronics, digital circuits and magnetic materials and to recognize their applications in various real time problems.	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

PHYSICS PAPER- II - PS23A04 – 58 HRS

Unit – I **(12 Hrs)**

Alternating currents:

Mean and RMS values of AC – Alternating current relation between current and voltage in Pure R, C and L - Analysis of AC circuits containing i) resistance and inductance, ii) resistance and inductance iii) capacitance and resistance - Series and parallel resonant circuits - Power factor- - Transformer-construction-working-losses.

Unit – II **(11 Hrs)**

Magnetic materials:

Magnetic Induction – Magnetization – Relation between the three magnetic vectors B, H and M

–BH curve Experiment -Magnetic susceptibility – Properties - diamagnetic – paramagnetic – ferromagnetic – anti ferromagnetism and ferrimagnetism – Electron theory of magnetism - Weiss's theory of ferromagnetism - energy loss in hysteresis – importance of hysteresis curves.

Unit – III **(11 Hrs)**

Semiconductor Diodes: P and N type semiconductors - PN Junction Diode - Current Flow Mechanism in Forward and Reverse Biased Diode - Zener Diode and Voltage Regulation - Principle and structure of (1) LEDs (2) Photodiode (3) Solar cell - Transistor – Characteristics of CB, CE and CC Configuration – Transistor biasing – Voltage divider biasing.

Unit - IV **(12 Hrs)**

Two - terminal Devices and their Applications: Rectifier Diode: Half- wave Rectifiers - Bridge Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency - **Amplifiers:** Single stage amplifier (CE) and Multi stage amplifier (CE)

Sinusoidal Oscillators: Barkhausen's Criterion for self - sustained oscillations - RC Phase shift oscillator, determination of Frequency- Hartley oscillator.

Unit – V **(12 Hrs)**

Digital Electronics:

Analog and Digital Signals- Boolean algebra- Boolean theorem- Simplification of Boolean expression- DeMorgan's theorem-OR, AND, NOT, XOR NOR and NAND gates-NOR and NAND gates as universal building blocks-half adder, full adder-flip flops - RS flip flop-JK flip flop (Truth table and circuit).

Operational amplifier: Characteristics-virtual ground-summing point-inverting and non- inverting amplifier-adder-subtractor.

Text Books

S. No	Authors	Title	Publishers	Year and Edition
1	R. Murugesan	Electricity and Magnetism	S.Chand andCo	2019 and 10^{th} edn
2	V.K. Metha	Principles of electronics	S.Chand andCo	1980 and 1^{st} edn
3	Murugesan R	Allied Physics	S.Chand and Co	2005 and 1^{st} edn

Reference Books

S. No	Authors	Title	Publishers	Year and Edition
1	V. Vijayendran	Introduction to Integrated Electronics	Viswanathan Publishers	2009 and 1^{st} edn

Pedagogy

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

Course Designer

Mrs. S. Subanya

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
PS23AP1	PHYSICS PRACTICALS	PRACTICAL	-	-	45	2

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

CLOs	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;

PHYSICS PRACTICALS - PS23AP1 – 45 HRS

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:

Dr. B. Punithaveni