



PSGR  
Krishnammal College for Women



## **DEPARTMENT OF PHYSICS**

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

**BACHELOR OF PHYSICS (B.Sc Physics-Aided & SF)  
2022-2025 BATCH**



## PROGRAMME LEARNING OUTCOMES-UG

At the end of the programme the students will

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

## PROGRAMME SPECIFIC OUTCOMES

At the time of graduation the students will

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



DEPARTMENT OF PHYSICS

CHOICE BASED CREDIT SYSTEM & OUTCOME BASED EDUCATION  
SYLLABUS & SCHEME OF EXAMINATION  
BACHELOR OF PHYSICS (B.Sc Physics) – 2022-2025 BATCH

SYLLABUS & SCHEME OF EXAMINATION(2022-2025BATCH)

Programme & Branch B.Sc Physics												
Scheme of Examination (Applicable to students admitted during the academic year 2022-2023 onwards)												
Semester	Part	Subject Code	Title of the Paper		Instruction hrs/week	Instruction hrs/sem	Tutorial hrs	Duration of Examination	Examination marks			
									CA	ESE	Total	Credits
I	I	TAM2201/ HIN2201/ FRE2201	Language T/H/F Paper I	Lan	6	86	4	3	50	50	100	3
	II	ENG2101	English Paper I	Eng	6	86	4	3	50	50	100	3
	III		<b>Group A– Core</b>									
		PS22C01	Core Physics Paper I: Mechanics, Properties of Matter and Sound	CC	6	86	4	3	50	50	100	5
		PS21CP1	Core Physics Practical I	CC	3			-	-	-	-	-
			<b>Group B–Allied-Paper I</b>									
		CE22A03	Allied Chemistry Paper –I (offered to B.Sc Physics)	GE	4	56	4	3	30	45	75	4
		TH22A01	Mathematical Statistics-I	GE								
		CE21AP2	Allied Chemistry Practicals (offered to B.Sc Physics)	GE	3			-	-	-	-	-
			<b>Non Tamil Students</b>									
IV		NME22B1	Basic Tamil I	AEC	2	27	3	3	50	50	100	2
		NME22A1	Advanced Tamil I	AEC	2	27	3	3	50	50	100	
			<b>Students with Tamil as Language</b>									
		NME21ES	Introduction to Entrepreneurship	AEC	2	27	3	3	100	-	100	
II	I	TAM2202/ HIN2202/ FRE2202	Language T/H/F Paper II	Lan	6	86	4	3	50	50	100	3
	II	ENG2102	English Paper II	Eng	5	86	4	3	50	50	100	3
	III		<b>Group A– Core</b>									
		PS22C02	Core Physics Paper II: Heat and Thermodynamics	CC	5	71	4	3	50	50	100	5

		PS21CP1	Core Physics Practical I	CC	3			3	50	50	100	4	
			<b>Group B–Allied-Paper I</b>										
		CE22A04	Allied Chemistry Paper–II (offered to B.Sc Physics)	GE	5	71	4	3	30	45	75	4	
		TH22A02	Mathematical Statistics-II	GE									
		CE21AP2	Allied Chemistry Practicals (offered to B.Sc Physics)	GE	3	84		3	25	25	50	2	
			<b>Group C</b>										
	IV	NME22B2	Basic Tamil II	AEC	SS	-	-	2	50	50	100	Grade	
		NME22A2	Advanced Tamil II	AEC									
		21PEPS1	Professional English for Physical Sciences	AEC	3	42	3	2	50	50	100	2	
			Open Course (Self Study online courses)		-	-	-	-	-	-	-	-	
III	I	TAM2203/ HIN2203/ FRE2203	Language T/H/F Paper III	Lan	6	88	2	3	50	50	100	3	
	II	ENG2103	English Paper III	Lan	5	73	2	3	50	50	100	3	
			<b>Group A – Core</b>										
	III	PS22C03	Core Physics Paper III Electricity and Magnetism	CC	4	58	2	3	50	50	100	4	
		PS21CP2	Core Physics Practical –II	CC	3			-	-	-	-	-	
			<b>Group B – Allied- Paper I</b>										
		TH22A12	Allied Mathematics for Physics-I	GE	7	103	2	3	50	50	100	5	
		PL22A01	Allied Botany Paper-I		4	58	2	3	30	45	75	4	
		AS22A01	Allied Zoology Paper I										
			<b>Skill Based Subject</b>										
			PS22SB01	Programming in C – Theory	SEC	3	43	2	2	100	-	100	3
		IV	NM22UHR	Universal Human Values and Human Rights	AEC	2	30	-	-	100	-	100	2
	IV	NM22EVS	Environmental Studies (Self Study)	AEC					100	-	100	Grade	
	VI	JOB1801	Job Oriented Course Certificate Course on Robotics		After 12.50 PM			3	-	-	Grade	-	
IV	I	TAM2204/ HIN2204/ FRE2204	Part I-Language T/H/F Paper IV	Lan	5	73	2	3	50	50	100	3	
	II	ENG2204	Part II – English Paper III	Lan	6	88	2	3	50	50	100	3	

			<b>Group A – Core</b>											
		PS22C04	Core Physics Paper IV Fundamentals of Digital Electronics	CC	4	58	2	3	50	50	100	4		
		PS21CP2	Core Physics Practical –II	CC	3	45	-	3	50	50	100	4		
			<b>Group B– Allied-Paper I</b>											
	III	TH22A31	Allied Mathematics for Physics-I	GE	7	103	2	3	50	50	100	5		
		PL22A02	Allied Botany Paper-II		4	58	2	3	30*	45*	75	4		
		AS22A02	Allied Zoology Paper II		3	45	-	3	25#	25#	50	2		
		PL21AP1	Allied Botany Practicals											
		AS21AP1	Allied Zoology Practicals											
					<b>Skill Based Subject</b>									
		III /IV	PS20SBCE /PS22SBP1		Coursera- Python for Everybody /Programming in C – Practicals	SEC	3	45/ 41	-/4	-	100	-	100	3
	IV	IV	NM22DTG	Design Thinking	FSA	2	30	-	2	100	-	100	2	
		V	COCOACT	NSS/NCC/YRC/SPORTS& GAMES		-	-	-	-	100	100	1		
		VI	JOC1801	Certificate Course on Robotics Level I (Outside Class hours)		-	-	-	3	-	-	Grade	-	
	V	PS21C05	Core Paper V Electronics	CC	6	88	2	3	50	50	100	5		
		PS21C06	Core Paper VI Solid State Physics	CC	6	88	2	3	50	50	100	5		
		PS21E01 PS21E02 PS21E03	<b>Elective I :</b> 1. Mathematical Physics 2. Materials Science – I 3. Bio medical Instrumentation I	DSE	4	58	2	3	50	50	100	5		
		PS21CP3	Core Physics Practicals – III	CC	6	90		3	50	50	100	4		
		PS21SB02/ PS21SBCE	Skill Based Subject III- Non Conventional Energy Resources/ Coursera - Python for Everybody #Advanced Learners' Course I –	SEC	3	45/4 1	-/4	2	100	-	100	3		
		PS16AC1 PS16AC2	Energy Physics- I Experimental techniques and data Analysis - I	ACC	-			3	25	75	100	5 <sup>s</sup>		
		PS21PR0J	Project	DSE	3	45		Viva	50	50	100	5		
		IV	NM21CS1	Cyber Security 1	AEC C	2	30	-	-	100	-	100	Gr	
		III	PS22COM	Comprehensive Exam	GC	-	-	-	-	100	100	Gr		
		IV	PS22INST	Fieldwork / Internship (15 days)	DSE	-	-	-	-	-	-	100	2	
I-V	VI	16BONL1 16BONL2	Online Course 1 Online Course 2	ACC	-	-	-	-	-	-	-	-		
V	VI	COMISSER	Community Services		30									

CC–Core Courses

GE–Generic Elective

AEC– Ability Enhancing Course

**FSA**– Finishing School Part A  
**DSE** – Discipline Specific Elective  
**ACC** – Additional Credit Course

**CA**–Continuous Assessment  
**GC** – General Courses  
**AECC** – Ability Enhancement  
Compulsory Course

**ESE**– End Semester  
**SEC** – Skill Enhancement Course  
**Gr** - Grade

**\*CA Conducted for 25 converted to 20, ESE conducted for 75 converted to 55.**

**#CA Conducted for 25 converted to 15, ESE conducted for 75 converted to 55.**

**# - Self Study**

**<sup>s</sup>Credits applicable to candidates who take up Advanced level Course examination**

### **QUESTION PAPER PATTERN**

#### **CIA Question Paper Pattern: 2 x 25 = 50 Marks**

One question from each unit with each question comprising of

- Two questions with a weightage of 2 marks (no choice)
- Two questions with a weightage of 6 marks (no choice)
- One question with weightage of 9 marks (Internal Choice at the same CLO level)

#### **ESE Question Paper Pattern : 5x20 = 100Marks**

One question from each unit with each question comprising of

- One question with a weightage of 2 marks (no choice)
- One question with a weightage of 6 marks (Internal Choice at the same CLO level)
- One question with weightage of 12 marks (Internal Choice at the same CLO level)

***CIA components for 2022-23 Batch with CIA: ESE pattern 50:50 Marks***

### **INTERNAL COMPONENT MARKS:**

CAI	10
MODEL	20
Seminar /Assignment/Quiz	10
Class Participation	7
Attendance	3
<b>TOTAL</b>	<b>50</b>

## **RUBRICS**

### *Rubrics for 5marks*

#### *(Application Oriented/Innovation/Creativity Assignment)*

<b>Criteria</b>	<b>Marks</b>
Originality	2
Presentation	2
References or Library Resources	1
<b>Total</b>	<b>5</b>

### **Assignment/Seminar**

#### *Maximum-20Marks (converted to 4 marks)*

<b>Criteria</b>	<b>4 Marks</b>	<b>3 Marks</b>	<b>2 Marks</b>	<b>1 Mark</b>
<b>Focus Purpose</b>	Clear	Shows awareness	Shows little awareness	No awareness
<b>Main idea</b>	Clearly presents a main idea.	Main idea Supported throughout	Vague sense	No main idea
<b>Organisation: Overall</b>	Well planned	Good overall organization	There is a sense of organization	No sense of organization
<b>Content</b>	Exceptionally well presented	Well presented	Content is sound	Not good
<b>Style: Details and Examples</b>	Large specific examples and detailed descriptions	Some use of examples and detailed descriptions	Little use of specific examples and details	No use of examples

**CLASS PARTICIPATION**  
***Maximum-20 Marks (converted to 5marks)***

<b>Criteria</b>	<b>5Marks</b>	<b>4Marks</b>	<b>3Marks</b>	<b>2Marks</b>	<b>1 Mark</b>
<b>Level of Engagement In Class</b>	Student proactively contributes to class by offering ideas and asks questions more than once per class.	Student proactively contributes To class by offering ideas and asks questions once per class	Student contributes To class and asks questions occasionally	Student rarely contributes To class by offering ideas and asking no questions	Student never contributes To class by offering ideas
<b>Listening Skills</b>	Student listens when others talk, both in groups and in class.  Student incorporates or builds off of the ideas of others.	Student listens when others talk, both in groups and in class.	Student listens when others talk in Groups and In class occasionally	Student does not listen when others talk, both in groups and in class.	Student does not listen when others talk, both in groups and in class.  Student often interrupts when others speak.
<b>Behavior</b>	Student almost never displays disruptive behavior during class	Student rarely displays disruptive behavior during class	Student occasionally displays disruptive behavior during class	Student often displays disruptive behavior during class	Student almost always displays disruptive behavior during class
<b>Preparation</b>	Student is almost always prepared for class with required class materials	Student is usually prepared for class with required class materials	Student is occasionally prepared for class with required class materials	Student is rarely prepared for class with required class materials	Student is almost never prepared for class.



<b>PS22C01</b>	<b>MECHANICS, PROPERTIES OF MATTER AND SOUND</b>	Category	L	T	P	Credit
		III	86	4	-	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	Analyse the behaviour of various bodies due to kinematic and dynamic forces acting on the body.	K4
CLO3	Apply the key evidence of the classical description of the properties of matter	K3
CLO4	Recall the principles and basic equations and apply them to unseen problems	K4
CLO5	Acquire problem solving skills on par with industry	K4

### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

## Syllabus

### Unit I

17 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

17Hrs

#### 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 – Jaegar's method- Quincke's method- variation of surface tension with temperature - drop weight method- experimental determination of interfacial tension between water and kerosene.

### Unit V

18 hrs

#### Sound

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

**Acoustics-** Reverberation- Sabine's reverberation formula- Determination of absorption coefficient. **Ultrasonics-** properties- production- Galton whistle – Magnetostriction oscillator – Piezo-electric oscillator- detection and application.

Importance of Industry 4.0 in Physics.

## Text Books

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

## 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	7 <sup>th</sup> Edition
2	Brijlal Subramanyam	Properties of Matter	S. Chand and Company Pvt Ltd	1995	3 <sup>rd</sup> Edition
3	Murugesan. R	Properties of matter, Sound and thermal physics	S. Chand & Co Ltd	2011	1 <sup>st</sup> Edition

## Pedagogy

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

## Course Designers

1. Dr. M. Lavanya

<b>PS21C02</b>	<b>HEAT AND THERMODYNAMICS</b>	Category	L	T	P	Credit
		III	71	4	-	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

14 Hrs

#### Kinetic theory of gases

Maxwell's Law of Distribution of Velocities, Mean Free Path - Brownian motion – Langevin's theory of Brownian motion – Einstein's theory of Brownian motion – 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 Petit's 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.

### Unit II

14 Hrs

#### Low Temperature Physics

Methods of production of low temperatures – 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 - Lambda point - super fluidity – adiabatic demagnetization – application in refrigerators and deep freezers.

### Unit III

14Hrs

#### 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)

### Unit IV

14Hrs

#### Entropy

Entropy - Concept of entropy - temperature – entropy diagram – physical significance of entropy - Entropy of a perfect gas. Thermo dynamic potentials- internal energy (U)- Helmholtz 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

15 Hrs

#### Statistical Physics

Probability- Macrostate and microstate – thermodynamic probability – Ensembles – Kinds of Ensembles – Maxwell's Boltzmann distribution law- Maxwell's Boltzmann distribution in terms of temperature – Maxwell quantum statistics – phase space – 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	3 <sup>rd</sup> edition
2	R.Murugeshan Er. Kiruthiga Sivaprasath	Thermal Physics	S.Chand	2012	3 <sup>rd</sup> 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	1 <sup>st</sup> edition
2	Agrawal Prakash	Thermal Physics	Pragati Prakashan	2015	27 <sup>th</sup> edition
3	Agrawal Prakash	Thermodynamics and Statistical Physics	Pragati Prakashan	2015	27 <sup>th</sup> edition

**Pedagogy**

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

**Course Designers**

1. Dr. G. Praveena

PS21CP1	CORE PRACTICALS I	Category	L	T	P	Credit
		III	-	-	3/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

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



PS22A01	ALLIED PHYSICS PAPER- I (For Chemistry)	Category	L	T	P	Credit
		III	56	4	-	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 recognize their applications in various real problems.	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**- 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

11 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- **Pyroheliometer- 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

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**

### 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.**

Nuclear 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	Edition
1	Brijlal Subramaniam	Heat and thermodynamics	S. Chand and Co	2012	16 <sup>th</sup> Edition
2	Brijlal Subramaniam & Hemne.P.S	Heat thermodynamics and Statistical Physics	S. Chand and Co	2011	12 <sup>th</sup> Edition
3	Brijlal Subramaniam	Optics	S. Chand andCo	2012	21 <sup>st</sup> edition
4	Murugesan R	Allied Physics	S. Chand and Co	1998	1 <sup>st</sup> Edition

**Books for Reference:**

S.No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	Jayaprakash. N	Ancillary Physics, Volume I	J.P.Publications	1994	1 <sup>st</sup> Edition
2	Mathur D.S	Properties of Matter	S.Chand andCo	1970	2 <sup>nd</sup> Edition
3	Murugesan R	Modern Physics	S.Chand andCo	201	9 <sup>th</sup> edition

**Course Designers:**

1. Dr. B. Punithaveni

**References For E-Content:**

1. <https://youtu.be/qOhOYbztNIO>
2. <https://youtu.be/gcI-bkr7ilg>
3. <https://youtu.be/7tr4qWPgP40>
4. [https://youtu.be/N5GAHntU\\_nQ](https://youtu.be/N5GAHntU_nQ)
5. <https://youtu.be/hDP6egLrsdM>
6. <https://youtu.be/nmsPcTzIkrw>
7. <https://youtu.be/rAhvvyQBUt0>
8. <https://youtu.be/TUaTNzZ00oM>
9. <https://youtu.be/tDB3zP9MEZc>
10. <https://youtu.be/wvl0QAOCJyc>
11. <https://youtu.be/4nbBAG-848c>
12. [https://youtu.be/nJXB0yD\\_wEw](https://youtu.be/nJXB0yD_wEw)
13. [https://youtu.be/K4Do\\_yWJt2k](https://youtu.be/K4Do_yWJt2k)
14. <https://youtu.be/HH58VmUbOKM>
15. <https://youtu.be/DjnDX28l4xA>
16. <https://youtu.be/iVYGGOWAtZCO>
17. <https://youtu.be/SQtOYCeI-Pc>
18. <https://youtu.be/kykp-S8S5dU>

PS22A02	ALLIED PHYSICS PAPER- II (For Chemistry)	Category	L	T	P	Credit
		III	71	4	-	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 to day 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

11 Hrs

#### Alternating currents:

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

### Unit – II

11 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

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

11 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

12 Hrs

#### Digital Electronics:

Boolean algebra- De Morgan'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

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

#### Text Books

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	1 <sup>st</sup> Edition
3	Murugesan R	Allied Physics	S. Chand and Co	2005	1 <sup>st</sup> 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	1 <sup>st</sup> Edition

## Pedagogy

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

## Course Designers

1. Dr. G. Vanitha

## 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. BH Curve Experiment - <https://www.youtube.com/watch?v=1GGsbU698x8>
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](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=jsKSfaFQ4>

<b>PS21AP1</b>	<b>ALLIED PHYSICS PRACTICALS SEMESTERS I &amp; II</b> (For I BSc Chemistry and II BSc Mathematics)	Category	L	T	P	Credit
		III	-	-	3 Hrs/Week	3

### Preamble

To enable the student to gain practical knowledge

### Course Learning Outcomes

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

CO Number	CO 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
<b>CLO1</b>	S	S	S	S	M	S
<b>CLO2</b>	S	S	S	S	S	S
<b>CLO3</b>	S	M	S	M	M	M
<b>CLO4</b>	S	M	M	S	M	S

S- Strong; M-Medium; L-Low

## **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
16. forward and reversedirections
17. Logic gates - Verification of the truth table
18. Characteristics of Zener diode
19. Closed loop gain of Operational Amplifier in Inverting mode
20. Closed loop gain of Operational Amplifier in Non Inverting mode

## **Pedagogy**

Demonstration and Practical Sessions

## **Course Designers:**

1. Mrs. T. Poongodi



<b>PS22C03</b>	<b>ELECTRICITY AND MAGNETISM</b>	Category	L	T	P	Credit
		III	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 circuit 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; L-Low

## 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**<sup>1,2,3,4</sup>, 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**<sup>5,6</sup> 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**<sup>7,8</sup>.

### Unit II

12 Hrs

#### Electric potential:

**Introduction to potential, Comments on potential**<sup>9,10</sup>, 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**<sup>11,12,13</sup>.

### Unit III

11 Hrs

#### DC currents:

Growth and decay of charge in series RC circuit, **Growth and decay of current in series LR circuit**<sup>14</sup>, 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**<sup>15</sup>. 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**<sup>15,16,17</sup>. 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**<sup>18,19,20</sup> - Maxwell's equations in free space-Electromagnetic waves in free space- Poynting theorem (Statement and Proof)

### Text Books

S. No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	R. Murugesan	Electricity and Magnetism	S. Chand & Co Pvt Ltd	2019	8 <sup>th</sup> Edition
2	Dr. K. K. Tewari	Electricity and Magnetism	S. Chand & Co Pvt Ltd	2016	Revised Edition
3	Brijlal and N. Subrahmanyam	Electricity and Magnetism	S. Chand & Co Pvt Ltd	2017	18 <sup>th</sup> Edition

### Reference Books

S. No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	David J Griffith	Electrodynamics	Prentice Hall	2015	4 <sup>th</sup> Edition
2	Edward M. Purcell	Electricity and Magnetism, Berkeley Physics Course – Volume 2	Tata Mc-Graw Hill Education	2013	3 <sup>rd</sup> Edition
3	D C Tayal	Electricity and Magnetism	Himalaya Publishing House	2009	Revised edition
4	Sehgal, Chopra, Sehgal	Electricity and Magnetism	S. Chand and sons	2020	2 <sup>nd</sup> edition
5	A S Mahajan, A A Rangwala	Electricity and Magnetism	S. Chand and sons	2017	6 <sup>th</sup> edition

### Pedagogy

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

### Course Designer

1. Dr. N. Priyadharsini

### 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](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=7YbLDIbv17w>
14. <https://www.youtube.com/watch?v=04THKYsONKA>

15. [https://www.youtube.com/watch?v=I8X1EpH\\_VQY](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>

PS22SB01	PROGRAMMING IN C	Category	L	T	P	Credit
		III	43	2	-	2

### Preamble

The main objective of this course is to i) train the students to the basic concepts of programming language ii) to provide exposure to problem solving through programming iii) also create foundation for students to learn other complex programming languages like C++, Java etc.,

### 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 fundamental concepts of C programming	K1
CLO 2	Understand the characteristics of operators, arrays, structures	K2
CLO 3	Apply the acquired knowledge to design programs and algorithms	K3
CLO 4	Analyze and develop programs for simple real time applications	K4

### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

## Syllabus

### Unit I 9 Hrs

#### Introduction to C

Overview of C - C character set - C tokens - Key words and identifiers-**Constants- Variables - Data types and sizes-** Declaration of variables –Assigning valued to the variables –Defining symbolic constants.

### Unit II 9 Hrs

#### Operators and Expressions

Arithmetic operators - relational and logical operators-assignment operators - **increment and decrement operator-Conditional operator-Bit wise and Special operator** - Arithmetic Expression- Evaluation of expression – Precedence of arithmetic operations-Type conversion in expressions- Operator precedence and some computational problems.

### Unit III 8 Hrs

#### Statements and Loops - I

IF Statement – **IF ELSE Statement- Nesting IF ELSE Statements- Switch Statements- the?: Operator-** GOTO Statements - Simple Programs

### Unit IV 8 Hrs

#### Statements and Loops - II

While Statements – DO statements – For Statements- Jumps in loops - Simple Programs

### Unit V 9 Hrs

#### Arrays and Structures

One Dimensional array – Two dimensional Array- Initializing two-dimensional Array- Multidimensional arrays - Dynamic Arrays. **Structure definition – Giving values to members- Structure initialization – Comparison of structure variables-** Arrays of Structures – Arrays within Structure – Structure with in Structures.

## Text Book

S. No	Authors	Title of the Book	Publishers	Year of Publication
1	E. Balagurusamy	Programming in ANSI C	Tata Mc Graw Hill, 8 <sup>th</sup> Edition.	2019

## Reference Books

S. No	Authors	Title of the Book	Publishers	Year of Publication
1	Byran Gottfried	Programming with C	Tata McGraw Hill, 3 <sup>rd</sup> Edition.	2013
2	V.Rajaraman	Computer Programming in C	Prentice Hall of India Pvt Ltd, 1 <sup>st</sup> Edition.	2004
3	Smarajit Ghosh	Programming in C	Prentice Hall of India Pvt Ltd, 1 <sup>st</sup> Edition.	2004
4	Yeswanth Kanethkar	Let us C	BPB Publications, 13 <sup>th</sup> Edition.	2014
5	MartinJ Gentile	An Easy Guide to Programming in C	Create Space Independent Publishing Platform, 2 <sup>nd</sup> Edition	2012

## Pedagogy

Chalk and talk, PPT, Discussion, Assignment, Quiz, Seminar.

## Course Designer

1. Dr. S. Shanmuga Sundari

## References For E-Content:

1. <https://www.youtube.com/watch?v=p5MRUoEv5bw>
2. <https://www.youtube.com/watch?v=NyT9vvSB0eo>
3. <https://www.youtube.com/watch?v=VSU7EaHMz18>
4. <https://www.youtube.com/watch?v=S8TWdFIMrpU>
5. [https://www.youtube.com/watch?v=Z3WjR\\_KEVjk](https://www.youtube.com/watch?v=Z3WjR_KEVjk)
6. <https://www.youtube.com/watch?v=jlQmeyce65Q>
7. <https://www.youtube.com/watch?v=oWTnLzWkF5w>
8. <https://www.youtube.com/watch?v=0g82dDC-mtc>
9. <https://www.youtube.com/watch?v=LpHnHRI6gLc>
10. [https://www.youtube.com/watch?v=8\\_ACcusAhx4](https://www.youtube.com/watch?v=8_ACcusAhx4)
11. <https://www.youtube.com/watch?v=mw1qsMieK5c>

<b>PS22C04</b>	<b>FUNDAMENTALS OF DIGITAL ELECTRONICS</b>	Category	L	T	P	Credit
		III	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

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

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

### 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



## Syllabus

### 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**<sup>1,2</sup>-**Logic gates – AND, OR, NOT, NAND, NOR gates**<sup>3,4</sup> – 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.

### 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**<sup>5,6</sup>.

Flip flop –NAND Latch- RS Flip Flop- Edge triggered RS Flip Flop, D and T Flip Flop - JK Flip Flop, Master Slave Flip Flop.

### 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**<sup>7,8</sup> - 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**<sup>9,10</sup>.

### Unit – V

11 Hrs

#### Semiconductor memory

Read only memory – **Random access memory – PROM – EPROM-SRAMs – DRAMs**<sup>11,12,13</sup>. Digital IC Characteristics –Resistor Transistor Logic (RTL) – Transistor Transistor Logic (TTL) – Schottky TTL – Emitter Coupled Logic (ECL).

## Books for Study:

S.No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	Malvino & Leach	Digital principles and applications	Tata Mc Graw Hill	1995	5 <sup>th</sup> Edition
2	M. Morris Mano	Digital Logic & Computer Designs	Prentice Hall Of India.	2014	4 <sup>th</sup> Edition
3	Vijayendran V	Introduction to Integrated electronics	S.Viswanathan (Printers & Publishers, Chennai)	2005	1 <sup>st</sup> Edition

## Books for Reference:

S.No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	Chatterji B. N	- Digital Computer technology	Khanna Publishers, Delhi	1986	2 <sup>nd</sup> Edition
2	Puri V K	Digital Electronics circuits and systems	Tata McGraw Hill Publishing Company Limited New Delhi	1997	1 <sup>st</sup> Edition
3	S Salivahanan S Arivazhagan	Digital Circuits and Design	Vikas Publishing House Private Limited	2007	3 <sup>rd</sup> Edition

## References For E-Content

1. <https://www.youtube.com/watch?v=A-gWV5liKxM>
2. <https://www.youtu.be/IeWcvAsz88o>
3. [https://www.youtu.be/AzyG\\_wL3qMY](https://www.youtu.be/AzyG_wL3qMY)
4. <https://youtu.be/sJXTo3EZoxM>
5. <https://youtu.be/DqCDQH44y9>
6. <https://youtu.be/feBvhLFQEDk>
7. <https://youtu.be/vu0wgiDlrRs>
8. <https://youtu.be/iaIu5SYmWVM>
9. <https://www.youtube.com/watch?v=SAcVlreweOc>
10. <https://www.youtube.com/watch?v=dpq1uqFcKnM>
11. <https://youtu.be/p4R0Ej6FCn0>
12. <https://youtu.be/nemTyWV5lv8>
13. [https://youtu.be/r787m\\_IaR1I](https://youtu.be/r787m_IaR1I)

## Pedagogy

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

## Course Designer

1. D. Niveditha

PS22CP2	CORE PRACTICALS II	Category	L	T	P	Credit
		III	-	-	3 hrs/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, 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, 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.	K3

### Mapping with Programme 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-  $\mu$  of the prism-Spectrometer
3. Dispersive Power of Grating – Spectrometer- Wave length of Mercury Spectral Lines by minimum deviation method
4. Refractive index ( $\mu$ ) 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

<b>PS22SBP1</b>	<b>PROGRAMMING IN C - Practicals</b>	Category	L	T	P	Credit
		III	-	2	43	3

### Preamble

The main objective of this course is to i) train the students to the basic concepts of programming language ii) to provide exposure to problem solving through programming iii) create foundation for students to learn other complex programming languages like C++, Java, etc.,

### Course Learning Outcomes

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

<b>CLO Number</b>	<b>CLO Statement</b>	<b>Knowledge Level</b>
CLO1	Remember the concept and the ability to analyze the problem	K1
CLO2	Identify the syntax and semantics of the given problem to develop a program	K2
CLO3	Analyze and debug possible errors during program execution	K3
CLO4	Apply the skills to develop the program for real time applications	K4

### Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

## **Syllabus**

### **PROGRAMMING IN C**

Any 16

1. Write a program to perform transpose of a given matrix
2. Write a program to perform Matrix Addition
3. Write a program to perform Matrix Multiplication
4. Write a C Program to Convert Decimal Number to Binary Number
5. Write a C Program to Convert Binary to Gray Code using Recursion
6. Write a C program to use of XOR operations on two numbers.
7. Write a C program to print pascal triangle
8. Write a C program to solve the Quadratic Equation.
9. Write a C program to generate prime numbers within a range.
10. Write a C program to find sum of the digits and reverse the digits.
11. Write a C program to generate the Fibonacci series.
12. Write C program to find the Factorial of a given number using function.
13. Write C Program to add two complex numbers
14. Write a C program to maintain a student record using array of structures
15. Write a C program to find whether the given string is Palindrome or not.
16. Write a program to find the sum, average, standard deviation for the given numbers.
17. Write a C program to Count the number of positives, negatives and zeroes.
18. Write a C program to Sort set of numbers in ascending and descending order.
19. Write a C program to swap values of two variables without use of third variable.
20. Write C program to simulate a 4-bit binary full adder and half adder

## **Pedagogy**

Practical sessions

## **Course Designer**

1. Dr. J. Balavijayalakshmi

PS22A01	ALLIED PHYSICS PAPER- I (For Mathematics)	Category	L	T	P	Credit
		III	58	2	-	4

### Preamble

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

### Course Learning Outcomes

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

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

### Mapping with Programme 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<sup>1,2</sup>- bending moment-expression – Young's modulus by uniform and non-uniform bending-theory and experiment<sup>3</sup>- 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<sup>4,5</sup>- 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)<sup>6,7,8,9,10</sup> - 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<sup>11,12,13</sup>.

### 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<sup>14,15,16</sup>

### Unit - V

12Hrs

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

Nuclear Physics: Elementary particles – classification<sup>18</sup>- particles and antiparticles- conservation laws and symmetry- Quark model.



**Books for Study:**

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

**Books for Reference:**

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

**Pedagogy**

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

**Course Designers:**

1. Dr. G. Vanitha

**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](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](https://youtu.be/nJXB0yD_wEw)
13. [https://youtu.be/K4Do\\_yWJt2k](https://youtu.be/K4Do_yWJt2k)
14. <https://youtu.be/HH58VmUbOKM>
15. <https://youtu.be/DjnDX28l4xA>
16. <https://youtu.be/iVYGOWAtZCQ>
17. <https://youtu.be/SQtOYCeI-Pc>
18. <https://youtu.be/kykp-S8S5dU>

<b>PS22A04</b>	<b>ALLIED PHYSICS PAPER- II (For Mathematics)</b>	Category	L	T	P	Credit
		III	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

<b>CLO Number</b>	<b>CLO Statement</b>	<b>Knowledge Level</b>
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

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>	<b>PLO6</b>
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

## Syllabus

### 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 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	1 <sup>st</sup> Edition
3	Murugesan R	Allied Physics	S.Chand and Co	2005	1 <sup>st</sup> 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	1 <sup>st</sup> Edition

## Pedagogy

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

## Course Designers

1. Dr. G. Vanitha

### Reference Links:

1. Mean and RMS values of AC - <https://www.youtube.com/watch?v=qDHsokTcgck>
2. AC Circuit Analysis - <https://www.youtube.com/watch?v=fIRocvQxQw4>
3. Series & Parallel Resonant Circuits - <https://www.youtube.com/watch?v=G8KLJjq1E2o>
4. Transformer - Principle, Construction, Working and Efficiency - <https://www.youtube.com/watch?v=i29dCoSGa38>
5. Magnetization - <https://www.youtube.com/watch?v=C-OoUvKXbLU&t=2s>
6. BH Curve Experiment - <https://www.youtube.com/watch?v=1GGsbU698x8>
7. P and N type semiconductors - <https://www.youtube.com/watch?v=5ZNeDxfgYAE>
8. Different types of diodes - <https://www.youtube.com/watch?v=-EqOEiEQGLI>
9. Diode rectifier circuits - <https://www.youtube.com/watch?v=Xmu31a-59vw>
10. Single stage amplifier - <https://www.youtube.com/watch?v=NEiVSbPYWNE>
11. Multistage amplifier - <https://www.youtube.com/watch?v=vDePe-if1gs>
12. RC Phase Shift Oscillator - <https://www.youtube.com/watch?v=Gvb4GIV5ig8>
13. Hartley Oscillator - [https://www.youtube.com/watch?v=3B\\_sBX\\_11Zw](https://www.youtube.com/watch?v=3B_sBX_11Zw)
14. Boolean Algebra and Logic gates - <https://www.youtube.com/watch?v=JQBRzsPhw2w>
15. Flip-flop - <https://www.youtube.com/watch?v=LTtuYeSmJ2g>
16. Operational amplifier - <https://www.youtube.com/watch?v=jsKSfaFQ4d4>

<b>PS21AP1</b>	<b>ALLIED PHYSICS PRACTICALS</b> (For I BSc Chemistry Sem I and II and II BSc Mathematics Sem III and IV)	Category	L	T	P	Credit
		III	-	-	3 Hrs/ week	3

### Preamble

To enable the student to gain practical knowledge

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Gain knowledge in the scientific methods and learn the process of measuring different physical variables	K1
CLO2	Educate the basics of instrumentation, data acquisition and interpretation of results	K2
CLO3	Enhance the students understand the concepts in materials properties	K2
CLO4	Have a deep knowledge of fundamentals of optics, electric circuits, magnetism and sound	K3

### Mapping with Programme Learning Outcomes

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
CLO5	S	S	S	S	M	S

S- Strong; M-Medium; L-Low

## 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

COURSE NUMBER- NM22DTG	COURSE NAME – DESIGN THINKING	Category	L	T	P	Credit
		IV	30	-	-	2

**Preamble:**

1. To expose the students to the concept of design thinking as a tool for innovation
2. To facilitate them to analyze the design process in decision making
3. To impart the design thinking skills

**Course Learning Outcome**

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

CLO Number	CLO Statement	KnowledgeLevel
CLO 1	Understand the concepts of Design thinking and its application in varied business settings	K1
CLO 2	Describe the principles, basis of design thinking and its stages	K2
CLO 3	Apply design thinking process in problem solving	K3
CLO 4	Analyze the best practices of design thinking and impart them in business and individual day to day operations.	K4

**Mapping with Programme Learning Outcomes**

CLOs	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5
CLO 1	S	M	M	S	S
CLO 2	M	S	S	M	M
CLO 3	S	S	S	M	S
CLO 4	S	S	S	S	S

S-Strong; M-Medium; L-Low



**UNIT – 1****(6 Hours)****Design Thinking Overview:** Introduction to Design Thinking and Design Research Strategies - Design Thinking Skills**UNIT – II****(6Hours)****Design Thinking Mindset:** Principles of Design Thinking - Basis for design thinking - Design Thinking Hats - Design thinking team**UNIT – III****(6 Hours)****Empathize:** Definition - Listen & Empathize with the Customers and / or Users - Tools and Techniques**UNIT – IV****(6 Hours)****Define :** Definition - Defining the Problem - Tools and Techniques - Journey mapping and Ideate - definition - Ideation techniques**UNIT – V****(6 Hours)****Prototype:** Definition - Prototype Alternate Solutions - Test the Solutions - Visualization -Story Telling - Cautions and Pitfalls - Best Practices**Text Books:**

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Christian Mueller-Roterberg	Handbook of Design Thinking Tips& Tools for how to design thinking	Amazon Kindle Version	2018
2	Gavin Ambrose PaulHarris	Design Thinking	AVA Publishing Switzerland	2010
3	<a href="#">Sambhrant Srivastava</a> and <a href="#">Vijay Kumar</a>	A Text Book of DESIGN THINKING	Vayu Education of India	2022

**Reference Books:**

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Maurício Vianna Ysmar Vianna Isabel K. Adler Brenda Lucena Beatriz Russo	Design Thinking – Business Innovation	MJV Press	2011
2	Moritz Gekeler	A practical guide to design thinking	Friedrich- Ebert-Stiftung	2019
3	J. Berengueres	The Brown Book of DesignThinking	UAE University College, Al Ain	2014

## Blended Learning Links

### UNIT TOPIC LINK

#### UNIT I

Introduction to Design Thinking

<https://www.digimat.in/nptel/courses/video/109104109/L01.html>

Design Thinking skills

<https://www.youtube.com/watch?v=b-9Id-Jt-PI>

#### UNIT II

Principles & Basis of Design Thinking

<https://youtu.be/6-NRiom8K9Y>

Design Thinking hats

<https://www.youtube.com/watch?v=bc-BvFQDmmk>

#### UNIT III

Empathize

<http://acl.digimat.in/nptel/courses/video/109104109/L02.html>

<http://acl.digimat.in/nptel/courses/video/109104109/L03.html><https://youtu.be/lS2mqHs02B0>

#### UNIT IV

Define

<http://acl.digimat.in/nptel/courses/video/109104109/L04.html>

<https://youtu.be/veixQsRnZZU> <https://youtu.be/6-bDSKZJEAM>

Ideate

<http://acl.digimat.in/nptel/courses/video/109104109/L11.html>

<http://acl.digimat.in/nptel/courses/video/109104109/L12.html>

<http://acl.digimat.in/nptel/courses/video/109104109/L13.html>

#### UNIT V

Prototype

<http://acl.digimat.in/nptel/courses/video/109104109/L15.html>

Testing

<http://acl.digimat.in/nptel/courses/video/109104109/L16.html>

<http://acl.digimat.in/nptel/courses/video/109104109/L17.html>

<http://acl.digimat.in/nptel/courses/video/109104109/L18.html>

<http://acl.digimat.in/nptel/courses/video/109104109/L19.html>

PS21C05	ELECTRONICS	Category	L	T	P	Credit
		III	88	2		5

### Preamble

This course helps the students to gain basic ideas of the construction and working of electronic devices and circuits and to understand the fundamentals of communication systems.

### Course Learning Outcomes

On the successful completion of the course, students will

CLO Number	CLO Statement	Knowledge Level
CLO 1	Be familiar with the basic concepts of construction and working of electronic devices and optical fibers	K1
CLO 2	Apply the knowledge to understand the working of amplifiers, oscillators and multivibrators	K3
CLO 3	Understand the principles of modulation and demodulation	K2
CLO 4	Apply the knowledge to understand the working of special types of diodes	K3
CLO 5	Apply the principles of feedback in amplifiers and oscillators	K3

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO 1	S	M	S	M	S	M
CLO 2	S	S	M	S	S	M
CLO 3	S	S	S	S	S	S
CLO 4	S	S	S	S	S	S
CLO 5	S	S	S	S	S	S

S- Strong; M-Medium;

## Syllabus

### Unit I

#### Electronic Devices:

18 Hrs

Kirchhoff laws- Network Theorem: **Thevenin's and Norton's theorem** -PN junction- formation – properties - applying voltage-current flow VI characteristics- breakdown voltage and knee voltage. Crystal diode as a rectifier-resistance. Half wave rectifier-**Full wave rectifier**-Centre tap and Bridge Rectifier-Efficiency-Ripple factor- comparison. Filter circuits-types. **Zener diode**-equivalent circuit- Voltage stabilizer -Photo diode-characteristics-applications- Tunnel Diode-Tunnel diode oscillator-Varactor diode-Application of Varactor diode –Transistors -introduction-origin of the name transistor-naming the transistor terminals-Transistor Action-Transistor symbols – Transistor connections-relation between the current amplification factors-Transistor as an amplifier in common emitter connection-Transistor load line analysis- characteristics of common emitter connection-operating point-cut off and saturation points

### Unit II

18 Hrs

#### Amplifiers:

**Multistage transistor amplifiers**-Role of Capacitors in Transistor Amplifiers-Gain frequency and bandwidth- Properties of decibel gain- RC coupled amplifier -Transformer coupled amplifier.

**Amplifiers with negative feedback**-Principles of negative voltage feedback-gain-Advantages of negative voltage feedback- Principle of negative current feedback-gain-Effects of negative current feedback- emitter follower.

**Operational amplifier:** Basic concepts- **Ideal Operational Amplifier**- Inverting OP-AMP - Non inverting OP-AMP-Characteristics- CMRR- Applications of OPAMP- inverting amplifier as adder-Subtractor-differentiator-**integrator**.

### Unit III

17Hrs

#### Oscillators and Multivibrators

Barkhausen's criteria for self sustained oscillations-Hartley oscillator –frequency and condition for sustained oscillations -**Colpitt's oscillator** –frequency and condition for sustained oscillations-crystal oscillator-Phase shift oscillators-Analysis - **Wien bridge oscillator** – Analysis.

Astable, monostable and bistable Multivibrators

### Unit IV

17Hrs

#### Modulation & Demodulation

Radio Broadcasting, Transmission and Reception-Modulation-**Need for modulation**-**Types of Modulation**-Amplitude Modulation-Modulation factor-Analysis of Amplitude Modulated wave-Sideband frequencies in AM waves-Transistor AM modulator-Superheterodyne AM Receiver -Frequency modulation (FM)- Theory of Frequency modulation – Comparison of

FM and AM-Demodulation-Essentials in demodulation-Phase modulation (PM)-definition–analysis-**comparison of AM, FM and PM**

**Unit V**

**18Hrs**

**Fiber Optics and special purpose diodes**

Fiber construction- Application of Fiber cables. - Propagation of light waves in an optical fibre – Acceptance angle and Acceptance cone of a fibre – Numerical Aperture (NA) – NA of a graded Index Fibre – **Classification of Optical fibers** –Step index Fiber- Step index Monomode Fiber- Graded index Multimode Fiber

Tunnel diode- **LED**-Structures of LED-LED materials - **semiconductor Laser diode LED** – The process involved in LEDS – Modulation bandwidth and Spectral Emission of LEDS-PIN photo detector.

**Books for Study:**

S.No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	Mehta V.K & Rohit Mehta	Principles of Electronics ( Unit I,II&III)	Tata McGraw Hill Publishing Company Limited New Delhi	2012	11 <sup>th</sup> Edition
2	B.L Theraja	Basic Electronics- Solid State (Unit I and II)	S.Chand & Company Ltd	2009	5 <sup>th</sup> Edition
3	Gupta Kumar	Handbook of Electronics (Unit II)	Pragati Prakashan	2007	34 <sup>th</sup> Revised Edition
4	Dennis Roddy & John Coolen	Electronic Communication (Unit IV)	PHI	1995	4 <sup>th</sup> edition
	George Kennedy & Bernard Devis	Electronic Communication systems (Unit IV)	Tata McGraw-Hill	2005	28 <sup>th</sup> Reprint
5	Millman and Halkias	Integrated Electronics (Unit II)	Tata Mc Graw Hill	2005	41 <sup>st</sup> Reprint
6	Subir Kumar Sarkar	Optical Fibers and Fiber Optic	S.Chand & Co	2001	2 <sup>nd</sup> edition

		Communication Systems ( Unit V)			
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### Books for Reference:

S.No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	Bernard Grob	-Basic electronics	Tata McGraw-Hill	2007	2 <sup>nd</sup> Edition
2	R S Sedha	Applied Electronics	S.Chand	2004	24 <sup>th</sup> reprint

### Pedagogy

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

### Course Designer:

1. Dr. J. Balavijayalakshmi

### E Resources

1. <https://youtu.be/NPqLUFN9tAE>
2. <https://youtu.be/I2nrBITEVls>
3. <https://youtu.be/ghXZuVFhVzo>
4. <https://youtu.be/WYKsYvLJ7HE>
5. <https://youtu.be/OPvs7A554Rw>
6. [https://youtu.be/LXzvN\\_8qmgQ](https://youtu.be/LXzvN_8qmgQ)
7. <https://youtu.be/1fgw-ONIAcc>
8. [https://youtu.be/xMvb\\_druL18](https://youtu.be/xMvb_druL18)
9. [https://youtu.be/mHvV\\_Tv8HDQ](https://youtu.be/mHvV_Tv8HDQ)
10. [https://youtu.be/x\\_APePdrfQ](https://youtu.be/x_APePdrfQ)
11. <https://youtu.be/JkhRKvOPuHw>
12. [https://youtu.be/3\\_2k4fYtbpo](https://youtu.be/3_2k4fYtbpo)
13. <https://youtu.be/NJ0ZivKfLD8>
14. <https://youtu.be/III49pDeQc>

<b>PS21C06</b>	<b>SOLID STATE PHYSICS</b>	Category	L	T	P	Credit
		III	88	2	-	5

### Preamble

The objective of this paper is to enable the students to have a physical understanding of matter from an atomic view point. Topics covered include the structure, super conductivity and electrical properties of matter and its applications.

### Course Learning Outcome

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

<b>CLO number</b>	<b>CLO Statement</b>	<b>Knowledge Level</b>
CLO 1	Outline the importance of solid state physics in the modern society	K1
CLO 2	Explore the relationships between chemical bonding & crystal structure and their defects	K2
CLO 3	Understand the basic properties of metals, insulators and semiconductors and their technological applications	K2
CLO 4	Extend their knowledge in theoretical fundamentals of electron theory and super conductivity	K3
CLO 5	Transfer their knowledge level from theoretical physical subjects towards the understanding of basic properties of solid state matter	K2 & K3

### Mapping with Programming Learning Outcomes

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>	<b>PLO6</b>
CLO 1	S	S	S	S	S	S
CLO 2	S	S	S	M	S	S
CLO 3	S	S	S	M	S	M
CLO 4	S	M	S	L	M	S
CLO 5	S	S	S	S	S	S

S- Strong; M-Medium; L-Low



## Syllabus

### Unit I

18Hrs

#### Elementary Crystallography

Introduction- Lattice parameters of a unit cell-Primitive cell- **Bravais lattices**- crystal structures of important engineering materials and stacking sequences- coordination number- -density of packing- sc, bcc, fcc and hcc structures- **diamond cubic structure** -Zinc blend structure-Sodium Chloride structure- Caesium Chloride structure- Polymorphism and Allotropy

#### Crystal Planes in Crystals

Introduction –Nomenclature of crystal directions - Nomenclature of crystal planes–Miller indices – Important features of Miller indices of crystal planes – Procedure for finding Miller indices Perpendicular distance between two parallel planes in a cubic crystal lattice-Important features of Miller Indices- **Crystal imperfections and defects** (elementary ideas only)

### Unit II

#### Electron Theory of Metals:

18 Hrs

Introduction, - the Classical Free electron theory – **Electrical conductivity of a metal based on Drude Lorentz theory** - Electrical conductivity before steady state- **Relaxation Time, Collision time and mean free path-success of free electron theory-Breakdown of classical theory**-The quantum free electron theory-Electron energies in metals— Electrical conductivity of a metal from quantum free electron theory - **Fermi-Dirac distribution function and its variation with temperature**-Density of states-Band theory of solids-Electron in a periodic potential - Kronig Penney model of periodic potential Effective mass of electron and concept of hole--factors affecting conductivity of conductors-Derivation of Ohm's law – Thermal Conductivity-Derivation of Coefficient of Thermal Conductivity due to Conduction electrons-**Wiedemann Franz law**.

### Unit III

18 Hrs

#### Dielectric Properties

Introduction- Fundamental definitions in dielectrics-Different types of electric polarization-frequency and temperature effects on polarization-Dielectric loss-Frequency dependence of dielectric constant-local; field or internal field-Clausius Mossotti relation-Determination of dielectric constant and dipole moment of a dielectric material-**Dielectric breakdown**-Different types of dielectrics-Essential requirements of a good insulating material-Classification of insulating materials-**Applications of insulating and dielectric materials**

**Unit IV****17 Hrs****Magnetic Properties**

Introduction – Different types of magnetic materials – classical theory of dia magnetism (Langevin theory)- **Langevin theory of para magnetism**- Weiss theory of para magnetism – Weiss theory of ferromagnetism (molecular field theory on field magnetism)- Heisenberg interpretation on internal field and quantum theory of ferromagnetism – **domain theory of ferromagnetism** – hard and soft materials -Hysteresis curve experiment

**Unit V****17 Hrs****Superconductivity**

Introduction – Explanation for the occurrence of superconductivity – General properties of superconductors-**Meissner effect**-Type I and Type II superconductors- London equations and penetration depth- energy gap in superconductors –Superconductors in A.C fields Thermodynamics of superconductors –BCS theory - **Applications of superconductors**

**Books for study:**

S.No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	M. Arumugam	Solid state Physics (Units I to III)	Anuradha agencies	2009	1 <sup>st</sup> Edition
2	Pillai .S.O	Solid state Physics (Unit IV &V)	New age International Private Limited	2011	6 <sup>th</sup> Edition

**Books for Reference:**

S.No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	Kittel	Solid state Physics	Wiley student edition	2007	8 <sup>th</sup> Edition
2	Gupta and Kumar	Solid state Physics	K.Nath & Co	1992	8 <sup>th</sup> edition
3	Arthur Beiser	Concepts of Modern Physics	Tata McGrew Hill	2008	6 <sup>th</sup> edition
4	Dekker	Solid state Physics	Macmillan & Co limited	1967	1 <sup>st</sup> edition

## **Pedagogy**

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

## **Course Designer**

1. Dr. B. Punithaveni

## **E Resources**

1. [https://youtu.be/SpainlpL\\_SYI](https://youtu.be/SpainlpL_SYI)
2. [https://youtu.be/mGWF\\_YtW71o](https://youtu.be/mGWF_YtW71o)
3. <https://youtu.be/Z0Ks3wjFnrk>
4. <https://youtu.be/nJ-SqT-0vgs>
5. [https://youtu.be/w0\\_J4xqtW7A](https://youtu.be/w0_J4xqtW7A)
6. <https://youtu.be/i5VykZxXjzc>
7. <https://youtu.be/MZS9SBRfl4o>
8. <https://youtu.be/v72AQhCtixI>
9. <https://youtu.be/4IUoAwWmYsc>
10. <https://youtu.be/Mz314lyi1f0>
11. <https://youtu.be/PDgvNPMxrsY>
12. <https://youtu.be/4IcXvmnVole>
13. <https://youtu.be/2xOAb68agy0>

<b>PS21E01</b>	<b>MATHEMATICAL PHYSICS</b>	Category	L	T	P	Credit
		III	58	2	-	5

### Preamble

The aim of this course is to make students acquire knowledge in mathematics and the learners are expected to provide extensive mathematical formalism for understanding and interpreting various physical problems.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Remember the basic concepts and knowledge on mathematical methods	K1
CLO2	Understand the various techniques in solving physical problems on Vectors, Matrices, differential equations, Complex numbers and functions.	K2
CLO3	Apply the acquired knowledge on various analytical techniques to obtain the solution for complex physics problems	K3
CLO4	Analyse and interpret the solutions obtained by mathematical methods	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;

## Syllabus

### Unit I

#### Vectors

12 Hrs

Vectors with applications -Vector algebra – **addition of vectors** – multiplication of a vector by a scalar – orthogonal resolution of vectors – rotation of coordinates – product of two vectors – **some physical applications of the product of two vectors** – product of three vectors and four vectors – reciprocal system of vectors – differentiation of vectors.

### Unit II

#### Matrix

12 Hrs

Definition- **Four basic algebra operations for matrices** - Equality of matrices - Addition of matrices - Multiplication of a matrix by a number - Matrix multiplication –partitioning of matrices - transpose of a matrix – the conjugate of a matrix – the conjugate transpose - Symmetric and antisymmetric matrices – Hermitian and skew Hermitian matrix -determinant of matrix – singular and non-singular matrices – adjoint of a matrix - **Orthogonal matrix- Unitary matrix** - Rotation matrices - Trace of a matrix – rank of matrix.

### Unit – III

#### Complex Analysis

11 Hrs

Complex Numbers–Review – **Complex Conjugates** – Modulus and argument of a Complex number – Graphical representation - functions of complex variables - Analytic function -Cauchy Riemann conditions – Laplace Equations – **Harmonic Functions** – Problems

### Unit – IV

#### Differential Equations of First Order:

12 Hrs

Order and degree of a differential equation – **formation of differential equation** – solution – differential equation of the first order and first degree – variables separable – Homogeneous differential equation – equation reducible to homogeneous form - **linear differential equation** – equations reducible to the linear form (Bernoulli equation).

### Unit – V

#### Special Functions

11 Hrs

Beta and Gamma functions- evaluation - properties - Transformation of beta and gamma function -**relation between beta and gamma functions**– Evaluation of  $\Gamma(1/2)$ ,  $\Gamma(3/2)$ ,  $\beta(1,2)$ ,  $\beta(2,1)$ , Bessel function – solution of Bessel equation.

**Books for study:**

S.No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	B.D. Gupta	Mathematical Physics	Vikas Publishing House	2010	4 <sup>th</sup> Edition
2	Satyaprakash	Mathematical Physics	Sultan Chand & Sons	2016	6 <sup>th</sup> Revised Edition
3	H.K. Dass	Mathematical Physics	S.Chand and Co	2014	7 <sup>th</sup> Edition
4	Gupta S.P	Statistical Methods	S.Chand and Co	1998	31 <sup>st</sup> Edition

**Books for References:**

S.No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	P.K Chattopadhyay	Mathematical Physics	Wiley Eastern Ltd.	2008	2 <sup>nd</sup> Edition
2	N.P. Bali	Statistics	Laxmi Publications	2020	4 <sup>th</sup> Edition
3	S.S.Rajput	Mathematical Physics	Pragati Pragasam, Meerut	2019	11 <sup>th</sup> Edition

**Pedagogy**

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

**Course Designers**

1. Dr. M. Lavanya

**E Resources**

1. <https://youtu.be/VFRW0f0XUU8>
2. <https://youtu.be/ZM2-Bb8Zdt0>
3. <https://youtu.be/gPnWm-IXoAY>
4. <https://youtu.be/TBpDMLCC2uY>
5. <https://youtu.be/p48uw2vFWQs>
6. <https://youtu.be/gYacCtBJ8VA>
7. [https://youtu.be/BZxZ\\_eEuJBM](https://youtu.be/BZxZ_eEuJBM)
8. <https://youtu.be/-HF7jgvtxI8>

9. <https://youtu.be/0V282K1cmOk>
10. <https://youtu.be/MQOookEYLoU>
11. <https://youtu.be/gd1FYn86P0c>
12. <https://youtu.be/HleSLrOf0wI>

<b>PS21SB02</b>	<b>NON-CONVENTIONAL ENERGY RESOURCES</b>	Category	L	T	Field Work/P	Credit
		III	42	21	21	3

### Preamble

The main objective of this course is to impart theoretical knowledge non-conventional sources of energy to the students and provide them with field exposure and hands-on learning.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Familiarize with the basics of renewable energy sources	K1
CLO2	Understand the generation of power from non conventional energy sources available in the geographical region.	K2
CLO3	Apply and demonstrate the acquired knowledge through hands on training.	K3
CLO4	Analyse the environmental aspects of solar, wind and biomass energy resources and their prospects and limitations.	K4

### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low



## Syllabus

### Unit I

7 Hrs

**Introduction to Energy Sources:** Energy sources and their availability – Renewable energy sources - non-conventional energy sources. An overview of Wind Energy, Tidal Energy, solar energy, biomass, geothermal energy and hydroelectric energy – Advantages of Renewable energy sources.

### Unit II

7 Hrs

**Solar energy:** Solar constant – Solar Radiation at the earth's surface - solar radiation geometry – solar radiation Measurements – Pyrheliometers – Pyranometers – schematic diagrams and principles of working - applications of solar energy – solar water heating – solar cooking – solar furnace – agricultural and industrial process heat- solar green house.

### Unit III

7 Hrs

**Wind Energy:** Introduction – Fundamentals of Wind energy – Basic components of wind energy conversion – Wind data and energy estimation - Site selection consideration - Classifications – Advantages – Disadvantages –Wind energy collectors - Applications of Wind energy.

**Bio Energy:** Biomass energy – Biomass conversion process - Photosynthesis – classification.

### Unit IV: Field Visit

10 Hrs

Students shall visit to Energy Resource laboratories in Universities/Research Organizations/ nearby industries to observe, understand the techniques and procedures adopted. Student to submit consolidated field visit reports for evaluation.

### Unit V: Group Project

11 Hrs

(Any one mini-Project)

17. Design a miniaturised working model (energy resources/energy generation/conversion/ Iot based prototypes)

The project evaluation will be done by the HoD and Staff Co-ordinator by conducting viva voce Examination.

## Text Books

S. No	Authors	Title of the Book	Publishers	Year of Publication
1.	G.D Rai	Non-Conventional Energy Sources	Khanna Publishers	2003

2.	B H Khan	Non-Convention Energy Resources	McGraw Hill Education (India) Pvt. Ltd	2003, 3 <sup>rd</sup> Edition
3.	Subhas P Sukhatme	Solar energy	Tata McGraw Hill	1996, 2 <sup>nd</sup> Edition
4.	Kothari D.P, K.C. Singal and Rakesh Ranjan	Renewable energy sources and emerging Technologies	Prentice Hall of India	2008

### Reference Books

S. No	Authors	Title of the Book	Publishers	Year of Publication
1.	N.K.Bansal, Manfred Kleeman & Mechael Meliss	Renewable Energy Sources and Conversion Technology	Tata McGraw Hill	2004
2.	Ashok V	Non-Conventional Energy.	Desai Wiley Eastern Ltd, NewDelhi.	2003
3.	Ramesh R & Kumar K U	Renewable Energy Technologies	Narosa Publishing House New Delhi	2004

### Pedagogy

Chalk and talk, PPT, Discussion, Assignment, Quiz, Seminar, Field visit, Project Submission

### Course Designer

1. Mrs. S. Subanya

### Resources of E-content

<https://archive.nptel.ac.in/courses/121/106/121106014/>

<b>PS21PR0J</b>	<b>PROJECT</b>	Category	L	T	P	Credits
		III	-	-	3 Hrs/Week	5

### **Objective**

To make the students understand the importance of experimental analysis, scientific approach in solving problems relate to physics and to educate and train the students to write scientific papers

### **Project and Viva Voce**

Topics in Physics will be assigned to each group of students by the staff coordinator guiding the project. The project work is to be carried out at the department or any other organization approved by the staff coordinator and the HoD. Review meeting will be conducted once in a month. Viva Voce presentation will be conducted by the HoD, internal examiner and the staff coordinator guiding the project.

### **Methodology**

Each project should contain the following details

Introduction

Literature Survey

Theory/Experimental details

Results and Discussion

Conclusion

Bibliography

The above content should not exceed 60 pages.

<b>PS21CP4</b>	<b>CORE PRACTICALS III</b>	Category	L	T	P	Credits
		III	-	-	6 Hrs/Week	4

### Preamble

This course helps the student to acquire practical knowledge to design the basic electrical circuits using diodes, transistors, etc. The concepts that are learnt in the lecture sessions will be translated to the laboratory sessions thus providing a hands-on learning experience to design the circuits. It also helps them to understand the applications of solar cells.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand Basic laws and theories involving diodes, transistors, solar cells, thermistors etc.,	K1
CLO2	Understand the given concepts and its physical significance	K2
CLO3	Apply the theory to design the basic electrical circuits	K3
CLO4	Use these basic circuits to create amplifier circuits, oscillator circuits, regulated power supplies etc.,	K4

### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

## Syllabus

### List of Experiments

(Any 16)

1. Determination of Absolute Mutual Inductance – Ballistic Galvanometer
2. Determination of Absolute Capacity- Ballistic Galvanometer
3. Cauchy's Constants using Spectrometer
4. Dispersive power of a prism using Spectrometer
5.  $\mu$  of a prism – Stoke's formula – Spectrometer
6. Characteristics of Junction Diode
7. Characteristics of Zener Diode
8. Transistor Characteristics - Common Emitter Configuration
9. Characteristics of FET
10. Characteristics of UJT
11. R-C Coupled Amplifier – Single Stage
12. Emitter Follower
13. Voltage Doubler
14. Regulated low Range power supply
15. Closed loop Gain Op Amp (Inverting & Non inverting)
16. Op Amp as adder in inverting mode & Subtractor
17. Op Amp as Differentiator & Integrator
18. Op Amp - Astable Multivibrator
19. Characteristics of Laser diode
20. Study of characteristics of photodiode (solar cell)
21. Colpitts Oscillator
22. Hartley Oscillator
23. Determination of Band Gap using Thermistor.
24. Measurement of Resistance using Carey Fosters Bridge.

### Pedagogy:

Demonstration and practical sessions

### Course Designers:

1. Dr. M. Lavanya
2. Dr. N. Priyadharsini