



PSGR Krishnammal College for Women



DEPARTMENT OF PHYSICS

**BACHELOR OF PHYSICS (Aided & SF)
2021-2024 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 :** Become a potential graduate with subject knowledge in every subdivision of Physics with application tendency.
- PSO2 :** Gain a wide spectrum of skills which will enable them to solve both theoretical and experimental problems.
- PSO3 :** Acquire laboratory skills as per standards, and will proficiently handle the analytical and digital instruments.
- PSO4 :** Acquire the skill to gauge the physical properties of materials.
- PSO5 :** Procure competency to qualify comprehensive examinations finding opportunity in academic, banking and IT sectors.



DEPARTMENT OF PHYSICS

**CHOICE BASED CREDIT SYSTEM & LEARNING OUTCOME BASED EDUCATION
SYLLABUS & SCHEME OF EXAMINATION**

BACHELOR OF PHYSICS (B.Sc Physics) – 2021-2024 BATCH

Programme & Branch B.Sc Physics													
Scheme of Examination													
(Applicable to students admitted during the academic year 2021- 2022onwards)													
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	TAM2101/ HIN2101/ FRE2101	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		Group A – Core										
		PS21C01	Core Physics Paper I: Mechanics, Properties of Matter andSound	CC	6	86	4	3	50	50	100	5	
		PS21CP1	Core Physics Practical I	CC	3			-	-	-	-	-	
			Group B – Allied - Paper I										
		CE21A03	Allied Chemistry Paper –I (offered to B.Sc Physics)	GE	4	56	4	3	30	45	75	4	
		TH21A01	Mathematical Statistics- I	GE									
		CE21AP2	Allied Chemistry Practicals (offered to B.Sc Physics)	GE	3			-	-	-	-	-	
			Non Tamil Students										
		IV	NME19B1	Basic Tamil I	AEC	2	28	2	-	50	50	100	2
			NME19A1	Advanced Tamil I	AEC	2	28	2	-	50	50	100	
				Students with Tamil as Language									
		NME12WS	Women Studies/ Ambedkar Studies	AEC	2	26	4	2	50	50	100	2	
		NME12AS	Gandhian Studies/ Introduction to Entrepreneurship	AEC									
		NME12GS		AEC									
		NME21ES		AEC	2	26	4	2	100	-	100		
II	I	TAM2102/ HIN2102/ FRE2102	Language T/H/F Paper II	Lan	6	86	4	3	50	50	100	3	

II	ENG2102	Part II–English Paper II	Eng	5	86	4	3	50	50	100	3	
III		Group A – Core										
	PS21C02	Core Physics Paper II Heat and Thermodynamics	CC	5	71	4	3	50	50	100	4	
	PS21CP1	Core Physics Practicals – I	CC	3			3	50	50	100	4	
III		Group B – Allied - Paper II										
	CE21A03	Allied Chemistry Paper –II (offered to B.Sc Physics)	GE	5	71	4	3	30	45	75	4	
	TH21A01	Mathematical Statistics –II										
	CE21AP2	Allied Chemistry Practicals (offered to B.Sc Physics)	GE	3			3	25	25	50	2	
		Group C										
IV	NME19B2/ NME19A2	Basic Tamil II/ Advanced Tamil II	AEC	2	-	-	-	-	-	-	Grade	
	21PEPS1	Professional English for Physical Sciences		3	3	40	5	50	50	100	2	
		Online courses		-	-	-	-	-	-	-	-	
VI	NM12GAW	General Awareness		Self Study				-	-	Grade	-	
III	I	TAM2103/ HIN2103/ FRE2103	Language T/H/F Paper III	Lan	6	86	4	3	50	50	100	3
	II	ENG2103	Part II–English Paper III	Lan	5	71	4	3	50	50	100	3
			Group A – Core									
	III	PS21C03	Core Physics Paper III Electricity and Magnetism	CC	4	56	4	3	50	50	100	4
		PS21CP2	Core Physics Practical – II	CC	3			-	-	-	-	-
			Group B – Allied - Paper I									
		TH21A12	Allied Mathematics for Physics - I	GE	7	101	4	3	50	50	100	5
		PL21A01	Allied Botany Paper- I		4	101	4	3	30	45	75	4
		AS21A01	Allied Zoology Paper I		4	101	4	3	30	45	75	4
				Skill Based Subject								
		PS21SB01/ PS21SBCE	Programming in C – Theory Coursera – Python for Everybody	SEC	3	44	1	2	25	75	100	3
	IV	NM21UHR	Universal Human Values and Human Rights	AEC	2	27	3	3	100	-	100	2
	IV	NM21EVS	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	TAM2104/ HIN2104/ FRE2104	Language T/H/F Paper IV	Lan	5	71	4	3	50	50	100	3

V	II	ENG2104	English Part - IV	Lan	6	86	4	3	50	50	100	3
	III		Group A – Core									
		PS21C04	Core Physics Paper IV Fundamentals of Digital Electronics	CC	4	56	4	3	50	50	100	4
		PS21CP2	Core Physics Practicals – II	CC	3			3	50	50	100	4
			Group B – Allied - Paper II									
		TH21A13	Allied Mathematics for Physics - II	GE	7	101	4	3	40	60	100	5
		PL21A02	Allied Botany Paper- II	GE	4		4	3	40	60	100	4
		AS21A02	Allied Zoology Paper II	GE								
		PL21AP1	Allied Botany Practicals	GE	3			3	20	30	50	2
		AS21AP1	Allied Zoology Practicals	GE								
			Skill Based Subject									
		PS21SBP1/ PS21SBCE	Skill Based Elective II- Programming in C - Practicals/Coursera – Python for everybody	SEC	3	44	1	2	25	75	100	3
	IV	NM21DTG	Design Thinking	FSA	2	26	4	2	100	-	100	2
	VI	INSTI	Internship (4 Weeks)		-			-	-	100	100	2
	V	COCOACT	NSS/NCC/YRC/ SPORTS&GAMES		-			-	-	100	100	1
V	III	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	Elective : 1.Mathematical Physics 2. Materials Science – I 3.Biomedical Instrumentation - I	GE	4	58	2	3	50	50	100	5
		INST1	FIELD WORK / INSTITUTIONAL TRAINING	AEC	-	-	-	-	-	-	100	2
		NM21CS1	Cyber Security 1	AEC	2	30	-	-	100	-	100	-
		PS21PROJ	Project	AEC	3	45			50	50	100	5

		PS16AC1	#Advanced Learners' Course I – Energy Physics- I		-			3	25	75	100*	*5
		PS16AC2	#Advanced Learners' Course I – Experimental techniques and data Analysis - I		-			3	25	75	100*	*5
		PS21SBCE	Skill Based Elective III – Coursera - Python for Everybody	SEC	3	45	-	-	100	-	100	3
		PS21CP3	Core Physics Practicals – III	CC	6	88	2	3	50	50	100	4
		CE	Comprehensive Exam		-			2 On line	-	-	-	Grade
	VI		Supportive Course		-			-	-	-	-	Submission of certificate
VI	III	PS21C07	Core Paper VII Optics and Spectroscopy	CC	5	73	2	3	50	50	100	5
	III	PS21C08	Core Paper VIII Quantum Mechanics	CC	5	73	2	3	50	50	100	5
	III	PS21C09	Core Paper IX Atomic and Nuclear Physics	CC	5	73	2	3	50	50	100	5
	III	PS21E04 PS21E05 PS21E06	Elective : 1. Microprocessor 2. Materials Science - II 3. Bio medical Instrumentation -II	GE	6	88	2	3	50	50	100	5
	III	PS16AC3	#Advanced Learners' Course II - Energy Physics- II		-			3	25	75	100*	*5
	III	PS16AC4	#Advanced Learners' Course II – Experimental techniques and data Analysis - II		-			3	25	75	100*	*5
	III	PS21CP4	Core Physics Practicals- IV	CC	6	90	-	3	50	50	100	4
V/ VI	III	PS21SB02	Skill Based Elective – IV Non Conventional Energy Resources	SEC	3	41	4	-	-	-	100	3
	IV	16ONL1	Online Course 1		-							1 (extra credits)
		16ONL2	Online Course 2		-							1 (extra credits)

Total Marks – 3800

Total Credits – 140 +10 #

CC – Core Courses

GE – Generic Elective

AEC – Ability Enhancement Course

SEC – Skill Enhancement Course

CA – Continuous Assessment

ESE - End Semester Examination

FSA – Finishing School Part A

QUESTION PAPER PATTERN

SEMESTER I & II

CORE & ALLIED PAPERS

Continuous Internal Assessment: 50 Marks

Bloom's Category	SECTION	MARKS	WORD LIMIT	TOTAL
Remember (K1) & Understand	A – 5 X 2 Marks	10	One or two sentences	50
Remember(K1) & Understand (K2)	B – 4 X 5 Marks	20	250	
Apply(K3) & Analyse (K4)	C - 2/3 X 10 Marks	20	500	

End Semester Examination: 100 Marks

Bloom's Category	SECTION	MARKS	WORD LIMIT	TOTAL
Remember (K1) & Understand(K2)	A-11/13 X 2 Marks	22	One or two sentences	100
Remember(K1) & Understand (K2)	B – 5/7 X 6 Marks	30	250	
Apply(K3) & Analyse (K4)	C - 4/6 X 12 Marks	48	500	

Semester III Academic Year 2022-23 Onwards

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: 5 x 20 = 100 Marks

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 2021-22 Batch with CIA: ESE pattern 50:50 Marks

INTERNAL COMPONENT MARKS:

CA I	7
CA II	7
MODEL	10
Assignment	4
Seminar	5
Quiz	4
Class Participation	5
Application Oriented/Innovation/Creativity Assignment	5
Attendance	3
TOTAL	50

RUBRICS

Rubrics for 5 marks

(Application Oriented/Innovation/Creativity Assignment)

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

Assignment/ Seminar

Maximum - 20 Marks (converted to 4 marks)

Criteria	4 Marks	3 Marks	2 Marks	1 Mark
Focus Purpose	Clear	Shows awareness	Shows little awareness	No awareness
Main idea	Clearly presents a main idea.	Main idea supported throughout	Vague sense	No main idea
Organisation: Overall	Well planned	Good overall organization	There is a sense of organization	No sense of organization
Content	Exceptionally well presented	Well presented	Content is sound	Not good
Style: Details and Examples	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 5 marks)

Criteria	5 Marks	4 Marks	3 Marks	2 Marks	1 Mark
Level of Engagement in Class	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
Listening Skills	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.
Behavior	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
Preparation	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.

PS21C01	MECHANICS , PROPERTIES OF MATTER AND SOUND	Cate gory	L	T	P	Credit
			86	6	-	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 anddynamic forces acting on the body.	K4
CLO3	Apply the key evidence of the classical description of the properties of matter	K3
CLO4	Recall the principles and basic equations and apply them to unseen problems	K4
CLO5	Acquire problem solving skills on par with industry	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

Syllabus

Unit I

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 nd Edition
3	R.Murugesan	Properties of Matter	S.Chand and Company Pvt Ltd	2013	11 th edition
4	Saighal.R.L	Textbook of Sound	S.Chand & Co Ltd	1998	2 nd 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 th Edition

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

Pedagogy

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

Course Designers

1. Dr.M.Lavanya
2. Dr.S.ShanmugaSundari

PS21C02	HEAT AND THERMODYNAMICS	Category	L	T	P	Credit
			71	5	-	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 Petits law and the deduction – failure of Dulong and Petit’s law – Einstein’s theory and its limitation – Debye theory of specific heat of solids – specific heat of gases – Variation of specific heat of diatomic gases with temperature.

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 -Lamda point - super fluidity – adiabatic demagnetization – application in refrigerators and deep freezers.

Unit III

14 Hrs

Thermal Physics

Quantum theory of radiation- Planck’s hypothesis – average energy of Planck’s oscillator – Planck’s radiation law and its experimental verification -Derivation of Planck’s law– Derivation of Wein’s law and Rayleigh-Jean’s from Planck’s law – Stefan’s and Wein’s displacement laws from Planck’s law –Room heaters and radiators in cars - solar thermal system (water heater)

Unit IV

14 Hrs

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 rd edition
2	R.Murugeshan Er. Kiruthiga Sivaprasath	Thermal Physics	S.Chand	2012	3 rd 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 st edition
2	Agrawal Prakash	Thermal Physics	Pragati Prakashan	2015	27 th edition
3	Agrawal Prakash	Thermodynamics and Statistical Physics	Pragati Prakashan	2015	27 th 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
			-	-	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, Sound, Heat, Optics, Electricity and Magnetism.

Course 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 Outcomes

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

S- Strong; M-Medium; L-Low

Syllabus

List of Experiments (Any 16)

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

Pedagogy:

Demonstration and practical sessions

Course Designers:

1. Dr. P. Meena
2. Dr. G. Praveena

PS21C03	ELECTRICITY AND MAGNETISM	Category	L	T	P	Credit
		III	56	4	-	4

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme 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^{1,2,3,4}**, Vector Integration, Line, surface and volume integrals of Vector fields, Gauss divergence theorem and Stoke's theorem of vectors (Statement and proof only)

Electrostatic Field:

Electric field, Continuous charge distribution, **Divergence and curl of electrostatic fields;**

Field lines, flux^{5,6} and Gauss' law statement and its proof, applications of Gauss's law – uniformly charged spherical shell and conducting sphere, infinite line of charge, uniform infinite cylindrical charge and infinite plane sheet of charge, **Coulomb's Law**^{7,8}.

Unit II

11 Hrs

Electric potential:

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

Electrical Images:

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

Unit III

11 Hrs

DC currents:

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

AC Circuits:

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

Unit IV

11 Hrs

Magnetic Field:

Magnetic force between current elements and definition of Magnetic Field **B**. Biot-Savart's Law and its simple applications: long straight wire and **circular loop**¹⁵. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital Law and its application to (1) Solenoid and (2) **Toroid. Properties of B: curl and divergence**^{15,16,17}. Differential form of Ampere's circuital law- Magnetic scalar and Vector Potential -Importance.

Unit V

11 Hrs

Electromagnetic waves:

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

Text Books

S. No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	R. Murugesan	Electricity and Magnetism	S. Chand & Co Pvt Ltd	2019	8 th 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 th Edition
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Reference Books

S. No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	David J Griffith	Electrodynamics	Prentice Hall	2015	4 th Edition
2	Edward M. Purcell	Electricity and Magnetism, Berkeley Physics Course – Volume 2	Tata Mc-Graw Hill Education	2013	3 rd 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 nd edition
5	A S Mahajan, A A Rangwala	Electricity and Magnetism	S. Chand and sons	2017	6 th 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=2GOTfpDE9DQ>
8. <https://www.youtube.com/watch?v=rYjo774UpHI>
9. https://www.youtube.com/watch?v=j3GrOKre_0
10. <https://www.youtube.com/watch?v=PEcPcNMfNks>
11. <https://www.youtube.com/watch?v=-SakEHbtryA>
12. <https://www.youtube.com/watch?v=jippPv6Gz14>
13. <https://www.youtube.com/watch?v=7YbLDLbv17w>
14. <https://www.youtube.com/watch?v=04THKYsONKA>
15. https://www.youtube.com/watch?v=I8X1EpH_VQY
16. <https://www.youtube.com/watch?v=sFre-bMvBeI>
17. <https://www.youtube.com/watch?v=yr0RkoUHgf0>
18. <https://www.youtube.com/watch?v=CX7X6YrVUdk>
19. <https://www.youtube.com/watch?v=pn9yxCxzJfY>
20. <https://www.youtube.com/watch?v=HvK35jjMb5I>

PS21SB01	PROGRAMMING IN C	Category	L	T	P	Credit
		III	45	3	-	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 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 - Date types and sizes-** Declaration of variables –Assigning valued to the variables –Defining symbolic constants.

Unit II

10 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 th 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 rd Edition.	2013
2	V.Rajaraman	Computer Programming in C	Prentice Hall of India Pvt Ltd, 1 st Edition.	2004
3	Smarajit Ghosh	Programming in C	Prentice Hall of India Pvt Ltd, 1 st Edition.	2004
4	Yeswanth Kanethkar	Let us C	BPB Publications, 13 th Edition.	2014

5	MartinJ Gentile	An Easy Guide to Programming in C	Create Space Independent Publishing Platform, 2 nd Edition	2012
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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=VSU7EaHMzI8>
4. <https://www.youtube.com/watch?v=S8TWdFIMrpU>
5. 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
11. <https://www.youtube.com/watch?v=mwIqsMieK5c>

PS21C04	FUNDAMENTALS OF DIGITAL ELECTRONICS	Category	L	T	P	Credit
		III	56	4	-	4

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme 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**^{1,2}-**Logic gates – AND, OR, NOT, NAND, NOR gates**^{3,4} – 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

11 Hrs

Half adder- full adder – Parallel binary adder, half subtractor – full subtractor – Parallel binary Subtractor, parity generator – **encoder – decoder**^{5,6}.

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

11 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**^{7,8} - 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**^{9,10}.

Unit – V

11 Hrs

Semiconductor memory

Read only memory – **Random access memory – PROM – EPROM-SRAMs – DRAMs**^{11,12,13}. 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 th Edition
2	M. Morris Mano	Digital Logic & Computer Designs	Prentice Hall Of India.	2014	4 th Edition
3	Vijayendran V	Introduction to Integrated electronics	S.Viswanathan (Printers & Publishers, Chennai)	2005	1 st 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 nd Edition
2	Puri V K	Digital Electronics circuits and systems	Tata McGraw Hill Publishing Company Limited New Delhi	1997	1 st Edition
3	S Salivahanan S Arivazhagan	Digital Circuits and Design	Vikas Publishing House Private Limited	2007	3 rd 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
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

Pedagogy

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

Course Designer

1. D. Niveditha
2. S. Sivaranjani

PS21SBP1	PROGRAMMING IN C - Practicals	Category	L	T	P	Credit
			-	-	42	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

CLO Number	CLO Statement	Knowledge Level
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

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
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. S. Shanmuga Sundari
2. Dr. C. R. Minitha

PS21CP2	CORE PRACTICALS II	Category	L	T	P	Credit
		III	-	-	3 Hrs/Week	2

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

Pedagogy

Demonstration

Course Designer

1. Dr.M.Lavanya

PS21A03	ALLIED PHYSICS PAPER- I (For Mathematics)	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 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-** 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- 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 spectroscopy.

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:

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

Books for Reference:

1. Jayaprakash. N, Ancillary Physics, Volume I, J.P.Publications, 1994, 1st Edition.
2. Mathur D.S, Properties of Matter , S.Chand and Co, 1970, 2nd Edition .
3. Murugesan R, Modern Physics , S.Chand and Co , 2013, 9th edition.

Pedagogy

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

Course Designers:

1. Mrs.S.Sowmya

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_nO
5. <https://youtu.be/hDP6egLrsdM>
6. <https://youtu.be/nmsPcTzIkrw>
7. <https://youtu.be/rAhvvyOBUt0>
8. <https://youtu.be/TUaTNzZ00oM>
9. <https://youtu.be/tDB3zP9MEZc>
10. <https://youtu.be/wvl0OAOCJyc>
11. <https://youtu.be/4nbBAG-848c>
12. https://youtu.be/nJXB0vD_wEw
13. https://youtu.be/K4Do_yWJt2k
14. <https://youtu.be/HH58VmUbOKM>
15. <https://youtu.be/DinDX28l4xA>
16. <https://youtu.be/iVYGOWAtZCO>
17. <https://youtu.be/SOtOYCeI-Pc>
18. <https://youtu.be/kykp-S8S5dU>

PS21A04	ALLIED PHYSICS PAPER- II (For Mathematics)	Category	L	T	P	Credit
			56	4	-	4

Preamble

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

Course Outcomes

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

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

Mapping with Programme Outcomes

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

S- Strong; M-Medium; L-Low

Syllabus

Unit – I

11 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

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) 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 andCo	2005	Revised Edition
2	V.K. Metha	Principles of electronics	S.Chand andCo	1980	1 st Edition
3	Murugesan R	Allied Physics	S.Chand and Co	2005	1 st 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 st Edition

Pedagogy

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

Course Designers

1. Dr. G. Magesh

Reference Links:

1. Mean and RMS values of AC - <https://www.youtube.com/watch?v=qDHsokTegck>
2. AC Circuit Analysis - <https://www.youtube.com/watch?v=flRocvQxQw4>
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-iflgs>
12. RC Phase Shift Oscillator - <https://www.youtube.com/watch?v=Gvb4GIV5ig8>
13. Hartley Oscillator - https://www.youtube.com/watch?v=3B_sBX_11Zw
14. Boolean Algebra and Logic gates - <https://www.youtube.com/watch?v=JOBZrsPhw2w>
15. Flip-flop - <https://www.youtube.com/watch?v=LTtuYeSmJ2g>
16. Operational amplifier - <https://www.youtube.com/watch?v=jsKSfaFO4d4>

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

Preamble

To enable the student to gain practical knowledge

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1.	Gain knowledge in the scientific methods and learn the process of measuring different Physical variables	K1
CO2.	Educate The Basics Of Instrumentation, Data Acquisition And Interpretation of Results	K2
CO3.	Enhance The Students Understand The Concepts In Materials Properties	K2
CO4.	Have a deep knowledge of fundamentals of optics, electric circuits, magnetism and sound	K3

Mapping with Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1.	S	S	S	S	M	S
CO2.	S	S	S	S	S	S
CO3.	S	M	S	M	M	M
CO4.	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 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

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 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 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; L-Low

Syllabus

Unit I

Electronic Devices:

17 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

17 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 th Edition

2	B.LTheraja	Basic Electronics-Solid State (Unit I and II)	S.Chand & Company Ltd	2009	5 th Edition
3	Gupta Kumar	Handbook of Electronics(Unit II)	Pragati Prakashan	2007	34 th Revised Edition
4	Dennis Roddy &John Coolen	Electronic Communication (Unit IV)	PHI	1995	4 th edition
	George Kennedy & Bernard Devis	Electronic Communication systems (Unit IV)	Tata McGraw-Hill	2005	28 th Reprint
5	Millman and Halkias	Integrated Electronics (Unit II)	Tata Mc Graw Hill	2005	41 st Reprint
6	Subir Kumar Sarkar	Optical Fibers and Fiber Optic Communication Systems (Unit V)	S.Chand &Co	2001	2 nd edition

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 nd Edition
2	R S Sedha	Applied Electronics	S.Chand	2004	24 th reprint

Pedagogy

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

Course Designer:

1. Dr. P. Meena

E Resources

1. <https://youtu.be/NPqLUFN9tAE>
2. <https://youtu.be/I2nrBITEVIs>
3. <https://youtu.be/qhXZuVFhVzo>
4. <https://youtu.be/WYKsYvLJ7HE>
5. <https://youtu.be/OPvs7A554Rw>
6. https://youtu.be/LXzvN_8qmgQ
7. <https://youtu.be/1fgw-ONIAcc>
8. https://youtu.be/xMvb_druL18
9. https://youtu.be/mHvV_Tv8HDQ
10. https://youtu.be/x_APePdrfQ
11. <https://youtu.be/JkhRKvOPuHw>
12. https://youtu.be/3_2k4fYtbpo
13. <https://youtu.be/NJ0ZivKfLD8>
14. <https://youtu.be/IILf49pDeQc>

PS21C06	SOLID STATE PHYSICS	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 Outcome

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

CLO number	CLO Statement	Knowledge Level
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 outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
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 st Edition
2	Pillai .S.O	Solid state Physics (Unit IV &V)	New age International Private Limited	2011	6 th 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 th Edition
2	Gupta and Kumar	Solid state Physics	K.Nath & Co	1992	8 th edition
3	Arthur Beiser	Concepts of Modern Physics	Tata McGrew Hill	2008	6 th edition
4	Dekker	Solid state Physics	Macmillan & Co limited	1967	1 st edition

Pedagogy

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

Course Designer

1. Dr. B.Punithaveni

E Resources

1. https://youtu.be/SpainlpL_SYI
2. https://youtu.be/mGWF_YtW71o
3. <https://youtu.be/Z0Ks3wjFnrk>
4. <https://youtu.be/nJ-SqT-0vgs>
5. https://youtu.be/w0_J4xqtW7A
6. <https://youtu.be/i5VykZxXjzc>
7. <https://youtu.be/MZS9SBRfI4o>
8. <https://youtu.be/v72AQhCtixI>
9. <https://youtu.be/4IUoAwWmYsc>
10. <https://youtu.be/Mz314lyi1f0>
11. <https://youtu.be/PDgvNPMxrsY>
12. <https://youtu.be/4IcXvmnVolc>
13. <https://youtu.be/2xOAb68agy0>

PS21E01	MATHEMATICAL PHYSICS	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 Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO 1	Remember the basic concepts and knowledge on mathematical methods	K1
CLO 2	Understand the various techniques in solving physical problems on Vectors, Matrices, differential equations, Complex numbers and functions.	K2
CLO 3	Apply the acquired knowledge on various analytical techniques to obtain the solution for complex physics problems	K3
CLO 4	Analyse and interpret the solutions obtained by mathematical methods	K4

Mapping with Programme 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

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 th Edition
2	Satyaprakash	Mathematical Physics	Sultan Chand & Sons	2016	6 th Revised Edition
3	H.K. Dass	Mathematical Physics	S.Chand and Co	2014	7 th Edition
4	Gupta S.P	Statistical Methods	S.Chand and Co	1998	31 st 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 nd Edition
2	N.P. Bali	Statistics	Laxmi Publications	2020	4 th Edition
3	S.S.Rajput	Mathematical Physics	Pragati Pragasam, Meerut	2019	11 th 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
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>

PS20CP3	CORE PRACTICALS III	Category	L	T	P	Credit
		III	-	-	6 Hrs/Week	

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 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
CLO5.	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

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. μ 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

PS21C07	OPTICS AND SPECTROSCOPY	Category	L	T	P	Credit
		III	73	2	-	5

Preamble

This course provides students with a working knowledge of optical physics, including diffraction, interference, polarisation and spectroscopy, laser physics. This paper aims to impart a detailed knowledge in Optics & Spectroscopy.

Course Learning Outcomes

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

CO Number	CLO Statement	Knowledge Level
CLO1	List the basic ideas in image formation and the defects involved.	K1
CLO2	Understand the central concepts and basic formalisms of interference, diffraction, polarisation and basics of spectroscopy.	K2
CLO3	Use of tools needed to formulate problems in optics and spectroscopy.	K3
CLO4	Gain Fundamental knowledge in lasers, holography and Raman effect.	K2,K3
CLO5	To impart knowledge related to the concepts of spectroscopy.	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

Syllabus

Unit I

15 Hrs

Geometrical Optics

Spherical aberration in lenses – reducing spherical aberration –Coma – Aplanatic lens- Oil immersion objective- Astigmatism –Curvature – Distortion – Dispersion – Angular and Chromatic dispersion – Combination of prisms to produce (i) dispersion – without deviation (ii) deviation without dispersion – Achromatism in lenses – Achromatic combination of lenses –(i) in contact (ii) and separated by a distance –Eye pieces-Ramsden’s and Huygen’s eyepiece.

Unit II**Interference****15 Hrs**

Interference in thin films due to reflected and transmitted light – Fringes due to wedge shaped films – Newton's rings- Determination of wavelength of light- Refractive index of liquid– Michelson's interferometer- Applications – Determination of Wavelength, Thickness of a thin transparent films, Refractive index of gases – Fabry-Perot Interferometer – Antireflection coatings – Interference filters

Unit III**Diffraction****14 Hrs**

Rectilinear propagation of light- Zone plate- action and construction- comparison with convex lens-Fraunhofer diffraction – Diffraction at single slit, double slit, Diffraction grating

Polarization

Double refraction – Huygen's explanation in uniaxial crystals – production and detection of plane, circular and elliptically polarized light – Optical activity – Fresnel's explanation – Laurent's half shade polarimeter.

Unit IV**Quantum Optics Lasers****14 Hrs**

Spontaneous and Stimulated emission – Einstein's A & B coefficients, Population Inversion - Metastable states - Optical pumping- Modes of resonators and coherence length, Ruby & He – Neon lasers

Holography

Basic principle-Making a Hologram-Reconstruction of the image from the Hologram-Mathematical theory-Applications of Holography-Holographic Interferometry & Microscopy

Unit V**Spectroscopy****15 Hrs**

Photoelectric effect-Laws of Photoelectric Emission-Einstein's photoelectric equation - Compton effect - X ray spectra- Continuous and Characteristic spectra – Moseley's law – Application – Molecular spectra – Spectra of diatomic molecules – Pure rotation spectra-Vibration, rotation spectra- Selection rules- Raman effect – Experimental study – Raman effect in solids and gases Explanation of Raman effect – Application of Raman effect in a molecular spectra

Text Books

S. No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	Brijlal and Subramaniam	A Text Book of Optics (Units I, II & III)	S. Chand & Co	2006	23 rd Edition
2	Murugesan. R	Modern Physics (Unit IV & V)	S. Chand & Co	2013	17 th edition
3	P.K. Chakrabarti	Geometrical and Physical Optics (Unit V)	New Central Book Agency	2005	3 rd edition

ReferenceBooks

S. No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	R. Murugesan	Optics and Spectroscopy	S. Chand & Co	2012	8 th edition

Pedagogy

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

CourseDesigner

1. Mrs. S.Subanya

PS21C08	QUANTUM MECHANICS	Category	L	T	P	Credit
		III	73	2	-	5

Preamble

The aim of this course is to make students acquire sufficient knowledge in Properties of matter waves, Wave equation, Schrodinger equation and applications, Operator formalism.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1.	Recognize basic terms in Quantum Mechanics.	K1
CLO2.	Understand the basic principles of quantum particles.	K2
CLO3.	Apply basics to construct and solve one particle equations	K3
CLO4.	Ability to design and construct particle equations in the free and bound states as well as to analyze and interpret the results.	K4
CO5.	To understand the fundamentals and concepts in operator formalism	K5

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

Syllabus

Unit I

15 Hrs

Emergence of quantum concepts

Inadequacies in Classical Physics - Quantum Theory of Light (Review)-Matter waves- De Broglie Hypothesis- Davisson -Germer Experiment-G. P. Thomson experiment-Wave-Particle Duality-Wave description of Particles by Wave Packets- Group and Phase Velocities and their relation- Heisenberg's uncertainty principle (physical significance- Elementary proof, Uncertainty Relations) - Gamma ray microscope -Non-Existence of electrons in the nucleus.

Unit II**15 Hrs****Elements of Quantum Mechanics**

Basic Postulates and Formalism- Schrödinger Time-independent Wave Equation (Stationary States)- Time dependent wave equation - Wave function for a free particle - Properties - Interpretation -Requirements of wave function – Normalization - Linearity and Superposition– Probability Current Density - Definition of an operator in Quantum mechanics - Eigen value and Eigen value equation -Expectations value – Ehrenfest's theorem

Unit III**Eigen Value Problem****14 Hrs**

Free particle - Particle in an infinitely deep 1D potential well - Step potential –Barrier Potential problem - Barrier penetration and tunnel effect (α -emission)–One dimensional rectangular potential well-Harmonic oscillator (one-dimension)

Unit IV**14 Hrs****Schrodinger equation in three dimensions**

Particle in an infinitely deep three dimensional quantum well- Schrodinger's equation in spherical polar co-ordinate system –Construction of Schrodinger equation for Hydrogen atom-Importance of one electron Schrodinger equation.

Unit V**15 Hrs****Operator Formalism**

Linear operator –Hermitian operator (Condition and examples) - Operators for momentum, kinetic energy and total energy –Hermitian character of Hamiltonian operator-Commutator - commuting and non-commuting operators – commutation relation between position and momentum, Hamiltonian - Orbital Angular momentum operator – commutation relation between L_x , L_y , L_z and L - Ladder Operators L^+ and L^- - Commutation relation between L and position.

Text Books

S. No	Authors	Title of the Book	Publishers	Year	Edition
1	S.P.Singh, M.K. Bagde and Kamal Singh.	Quantum Mechanics	S. Chand & Co.	1983	2 nd Edition
2	Sathya Prakash	Quantum Mechanics	Kedarnath & Ramnath Co	2007	New Edition
3	R. Shankar	Principles of Quantum Mechanics	Springer	2010	2 nd edition
4	G. Aruldas	Quantum Mechanics	PHI	2013	2 nd Edition

Reference Books

S. No	Authors	Title of the Book	Publishers	Year	Edition
1	R.Eisberg& R. Resnick	Quantum Physics Of Atom,Molecules, Solids, Nuclei & Particles	John Wiley	2006	2 nd edition
2	Keith Gibbs	Advanced Physics	Cambridge University Press	1991	2 nd Edition
3	KAIL Wijewardena Gamalath – Landau,L.D., and LifshitzE.M.,	Introduction to Vector spaces in Physics	Pergamon, NY	1974	1 st edition
4	R. Shankar	Principles of Quantum Mechanics	Springer	2010	2 nd edition
5	F. Schwabl	Quantum Mechanics	Springer	1995	4 th edition

Pedagogy

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

Course Designer:

1. Dr.G.Praveena

PS21C09	ATOMIC AND NUCLEAR PHYSICS	Category	L	T	P	Credit
		III	73	2	-	5

Preamble

The aim of this course is to provide a coherent and concise coverage of traditional atomic and nuclear physics.

Course Learning Outcomes

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

Mapping with Programme Learning Outcomes

CLO Number	CLO Statement	Knowledge Level
CLO1	Acquire knowledge of the fundamental physics underpinning atomic and nuclear physics	K1
CLO2	Understand the concepts and potential applications of atomic and nuclear physics	K2
CLO3	Apply general considerations of quantum physics to atomic and nuclear system	K3
CLO4	Analyse production and decay reactions for fundamental particles	K4
CLO5	Expand and evaluate the theoretical predictions for nuclear reactions.	K5

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

S- Strong; M-Medium; L-Low

Syllabus

Unit I : Atomic structure:

15 Hrs

Rutherford's experiment on scattering of alpha particles-theory of alpha particle scattering- Experimental verification- Bohr model of the atom-Effect of nuclear motion on atomic spectra - evidences in favour of Bohr's theory-critical potentials-atomic excitation – Experimental determination of critical potential : Frank and Hertz experiment- Sommerfeld's relativistic atom model – Vector atom model- Quantum numbers associated with the Vector atom model, Coupling Schemes.

Unit II : Optical Spectra and electronic structure:

15 Hrs

Pauli's exclusion principle - Some examples of electronic configuration with their modern symbolic representation - Magnetic moment due to orbital and spin motion – Stern Gerlach Experiment – Optical spectra- Fine structure of sodium D line- Zeeman effect- Experimental arrangement, Expression for Zeeman Shift- Quantum mechanical explanation of the normal

Zeeman effect-Anomalous Zeeman effect- Stark effect.

Unit III

15 Hrs

Nuclear Models

Introduction to nucleus - Models of Nuclear structure - Liquid Drop model, Semi empirical mass formula, Shell model, Magic Nos.

Particle accelerators and detectors

Linear accelerators, Cyclotron, Betatron, GM counter, Ionisation chamber

Radioactivity

Natural radioactivity- properties of alpha, beta and gamma rays, Geiger – Nuttal Law, Gamow’s theory of α - decay, β - ray spectra, magnetic Spectrograph, origin of line and continuous spectra, Neutrino theory of β – decay, k- electron capture, Gamma ray – introduction, Origin, nuclear isomerism, internal conversion, Mossbauer effect.

Unit IV

14 Hrs

Artificial Transmutation of Elements

Discovery of Artificial Transmutation – Rutherford’s Experiment , Bohr’s theory of nuclear disintegration, Q – value equation- nuclear reactions, energy balance in nuclear reactions.

Nuclear Transmutation

Transmutation by (i) Alpha Particles (ii) Protons (iii) Deutrons (V) Neutrons, Scattering cross section, and its determination.

Artificial radioactivity

Discovery-preparation of radio elements-applications of radio isotopes.

Unit V

14 Hrs

Nuclear fission and fusion

Nuclear fission , energy released in fission,chain reaction, Atom bomb, nuclear reactor , Breeder reactor, Nuclear fusion , Source of Stellar energy ,thermonuclear reactions, transuranic elements.

Elementary Particles:

Introduction , classification of elementary particles, four fundamental interactions, Elementary particle quantum numbers , conservation laws & Symmetry ,Quark model.

Books for Study

S. No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	Murugesan R	Modern Physics	S.Chand & Co	1994	9 th Edition

Books for References

S. No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	H.Semat and J.R.Albright	Introduction to Atomic and Nuclear Physics	Chapman and Hall Ltd	1972	5 th Edition
2	S.N. Ghoshal	Atomic and Nuclear Physics	S. Chand & company	1900	1 st edition
3	C.L.Arora	Atomic and Molecular Physics	S Chand & company Ltd	1999	1 st edition

4	Beiser	Concepts of Modern Physics	Tata McGraw Hill Publishers	2002	6 th Edition
5	Roy R.R& Nigam	Nuclear physics	Wiley Eastern Ltd	2017	5 th edition
6	Kenneth S Krane	Modern Physics	John Wiley and Sons,	2012	3 rd Edition

Pedagogy

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

Course Designers:

1. Dr. B.Punithaveni

PS21E04	MICROPROCESSOR	Category	L	T	P	Credit
			88	2	-	5

Preamble

This course deals with the basic concepts of microprocessor, programming instructions and interfacing concepts.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1.	Basic ideas on microprocessor, memory and I/O devices	K1
CLO2.	Be familiar with the basic concepts of microprocessor architecture and interfacing	K2
CLO3.	To impart skills in the programming instruction sets of microprocessor	K2
CLO4.	Apply the programming instructions to perform simple programs using microprocessor	K3
CLO5.	Finding solution for real time applications	K4

Mapping with Programme Learning Outcomes

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

S- Strong ; M-Medium ; L-Low

Syllabus

Unit I

18 Hrs

Microprocessors–Microprocessor instruction set and Computer Languages – Microprocessor Architecture and its operations – Memory – Input and Output devices – Review: Logic devices for interfacing – 8085 MPU – Memory Interfacing.

Unit II

17Hrs

The 8085 Programming Model – Instruction Classification – Instruction and Data format - How to write, Assemble and Execute a simple program – Overview of 8085 instruction Set-Addressingmodes

Unit III**17Hrs**

Programming Techniques: Looping , counting and indexing – Additional data transfer and 16 bit Arithmetic instructions – Logical Operations: Rotate and Compare – Stack and Subroutines- BCD to binary –binary to BCD conversion-binary to ASCII and ASCII to Binary code conversion.

Unit IV**18Hrs**

8085 interrupts – 8255A Programmable peripheral interface –Block diagram – Mode 0: Simple Input or Output – BSR Mode – Mode1: Input or Output with Handshake – Mode2: Bidirectional Data transfer- Interfacing keyboard and Seven segment display – 8254 programmable interval timer – Block diagram – Programming the 8254 – 8254 as a counter - Modes.

Unit V**18Hrs**

8259A programmable interrupt controller – Block diagram – Interrupt operations –Priority modes and other features - DMA Controller – Basic concepts in serial I/O – Software controlled asynchronous serial I/O – 8251A Programmable Communication Interface.

TextBooks

S. No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	Ramesh S.Gaonkar	Microprocessor Architecture, Programming and Applications with the8085	Penram International Publications	2000	4 th Edition

ReferenceBooks

S. No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	Douglas V. Hall	Microprocessors and digital systems	McGraw Hill	1983	1 st edition
2	Mohammad Refiguzzaman	Microprocessor and microcomputer based system Design	Universal bookstall	1990	2 nd edition

Pedagogy

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

Course Designer

1. Dr.J.Balavijayalakshmi

ADVANCED LEARNERS' COURSE II
EXPERIMENTAL TECHNIQUES & DATA ANALYSIS -PAPER- II

Subject Code: PS16AC4

Credits:*5

Objective: To make the students understand the concepts of data acquisition systems, data conversion, the principles of working of input and output devices, displays, amplifiers, Electronic measuring and testing instruments.

Unit – I

Data Acquisition and Conversion

Introduction – Signal conditioning of the inputs – Single channel data acquisition systems – Multi channel data acquisition system – Data conversion – Digital of Analog converter – Analog to Digital converter – Multiplexer and Sampling hold circuits.

Unit II

Input – Output Devices and Displays

Introduction – Analog display and recorder – Graphic recorder – Optical oscillograph – self balancing potentiometer – X-Y recorder – Magnetic recorder – Digital input – output devices – Punched card-paper type – output equipments – Line printer – Digital tape recording – Disk files and floppy disk.

Unit III

Electronic Measuring Instruments:

Q-meter- Vector impedance meter- Digital frequency meter – Digital voltmeter – Phase meter- RF power and voltage measurement –Power factor meter – Vector voltmeter.

Unit –IV

Amplifiers:

Instrumentation amplifiers,- isolation amplifiers-chopper amplifiers – voltage to frequency and frequency to voltage converters – frequency multipliers – logarithmic amplifiers.

Unit –V

General purpose electronic Test Equipment:

Oscilloscope : Basic principles – CRT features – Basic principles of signal displays – Block diagram of oscilloscope – Simple CRO – Vertical amplifier – Horizontal deflecting system –Delay line in triggered sweep – CRT connection – Dual beam CRO – Dual beam oscilloscope –Storage oscilloscope measurement of frequency, capacitance, inductance and Voltage wave analysers and Spectrum analysers.

Books for Study:

S. No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	Hefnick .A.O and W.D. Cooper	Modern Electronic Instrumentation and Measurement Techniques (Unit III)	Prentice Hall India Publications	1978	1 st edition
2	C.S. Rangan, G.R. Sharma and VSV Mani	Instrumentation Devices and Systems (Unit I,II,IV, V)	Tata McGraw Hill Publications	1983	2 nd edition

PS20CP4	CORE PRACTICALS IV	Category	L	T	P	Credits
			-	-	6 Hrs/Week	4

Preamble

This course helps the student to acquire practical knowledge in making use of the 8085 ALP and its logical operation also develops the program writing skills using C language. The concepts that are learnt in the lecture sessions will be translated to the laboratory sessions, thus providing a hands-on learning experience.

Course Outcomes

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

CLO Number	CO Statement	Knowledge Level
CLO1.	Define the primary functions of 8085 ALP programming	K1
CLO2.	Understand the theoretical concepts and their physical significance	K2
CLO3.	Apply the theory to find the solutions of practical problems	K3
CLO4.	Analyze the problem studied through analytical calculation	K4,K5
CLO5	Acquire problem solving skills and to create more problems based on physical concepts	K6

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	S	S
CLO5	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

List of Experiments (Any 16)

1. 8085 ALP for 8 bit addition using Memory and register
2. 8085 ALP for 8 bit subtraction using Memory and register
3. 8085 ALP for 8 bit multiplication and division
4. 8085 ALP using control instructions (Increment/Decrement & Rotate)
5. 8085 ALP for finding the biggest and smallest element in the array
6. 8085 ALP to sort the array in ascending and descending order
7. 8085 ALP for BCD to Binary conversion
8. 8085 ALP for Binary to BCD conversion
9. 8085 ALP for Binary to ASCII conversion
10. 8085 ALP for ASCII to Binary conversion.
11. RS and D Flip Flops using NAND gates
12. Thevenin Theorem
13. Norton's Theorem
14. High/ Low/ Band Pass filter
15. Construction of basic gates using Diodes and Transistor
16. Solving Simple Boolean equation using ICs.
17. Half Wave and Full Wave rectifier
18. Obtain the energy of various atoms namely H, O and N in their neutral, cationic and anionic states.
19. Obtain the energy of diatomic molecules such as H₂, O₂ and NaCl by varying their interatomic distances.

Demonstration and practical sessions

Pedagogy:

Course Designers:

1. Dr. N. Priyadharsini
2. Dr. G. Praveena

PS21SB02	NON-CONVENTIONAL ENERGY RESOURCES	Category	L	T	Field Work/P	Credit
		-	42	21	21	2

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 Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1.	Familiarize with the basics of renewable energy sources	K1
CO2.	Understand the generation of power from non conventional energy sources available in the geographical region.	K2
CO3.	Apply and demonstrate the acquired knowledge through hands on training.	K3
CO4.	Analyse the environmental aspects of solar, wind and biomass energy resources and their prospects and limitations.	K4

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1.	S	M	M	M	S	S
CO2.	M	S	S	M	M	S
CO3.	S	M	S	S	S	S
CO4.	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)

1. 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 rd Edition
3.	Subhas P Sukhatme	Solar energy	Tata McGraw Hill	1996, 2nd 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
2. Dr.G.Magesh

Resources of E-content

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

Internal Pattern:

Model (50 marks converted to 25 marks) - 25 Marks

Field visit report - 25 Marks

Project - 50 Marks

Total 100 marks

Portions:

Model - UNIT – 1, UNIT – 2 & UNIT – 3.

Question paper pattern for Model:

Section – A (Paragraph Answer 4 out of 6) - 4 X 5 = 20 Marks

Section – B (Essay type 3 out of 5) - 3 X 10 = 30 Marks

Total 50 Marks