

Branch Name:	Electrical Engineering
Program Code:	ET109
Course Name:	PHYSICS
Course Code:	1ET1000102
Pre-requisite Course:	Physics majors are expected to have a basic understanding of calculus, physics and chemistry.

Course Objectives:

- CO1. To understand the semiconducting property and its application in engineering
CO2. To understand the ultrasonic waves and its crucial application in various field
CO3. To know Condensed matter physics ideas with a focus on super conductors and an ability to understand a Laser system and photonics.
CO4. A knowledge of concepts like nonlinear optics and A knowledge of the concepts of nanoscale phenomenon.
CO5. To comprehend the use of modern engineering materials and magnetic materials.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)								
Lecture	Tutorial	Practical	Credit	Theory				Practical				Total
				University Assessment		Continuous Assessment		University Assessment		Continuous Assessment		
				Min.	Max.	Min.	Max.	Min	Max.	Min.	Max.	
3	-	2	4	28	70	12	30	-	-	08	20	120

Sr. No	Course Contents (Topic)	Total Hours	Weightage (%)
1.	SI UNITS & MEASUREMENTS: Explain Physical Quantities and their units. Measure given dimensions by using appropriate instruments accurately. Calculate error in the measurement Solve numerical based on above outcomes FORCE AND MOTION: List Newton's laws of motion Differentiate among various forces in nature Define inertia, momentum and impulse of force State Newton's laws of motion Solve numerical problems based on above topics	06	10
2.	SEMICONDUCTOR PHYSICS: Band theory of Solids Classification of solids on based of Band theory Energy band structure of conductors, insulator and semi conduction types of diodes (simple diode, Zener diode, varactor diode, LED Solar cells, photovoltaic cell, Photo Conductivity, Hall effects.	05	10

3.	ACOUSTIC AND ULTRASONIC ACOUSTIC: Introduction, Classification and Characteristics of sound, Sabine's formula for reverberation (Without Derivations), Introduction of Absorption coefficient Sound absorbing materials, Factors affecting the acoustics of building and their remedies ULTRASONIC: Properties of ultrasound, Generation of ultrasound by (1) piezoelectric method and (2) magnetostriction method, Methods for Ultrasound Velocity measurement Applications of ultrasound: Industry, Medicine	07	15
4.	SUPERCONDUCTIVITY: Superconductivity, General Properties of superconductors, Types of Superconductors, High Temperature superconductors, Applications: Magnets, Josephson effect, SQUID, Maglev, other	05	10
5.	FIBER OPTICS: Introduction and principle of Optical Fiber, Advantages of Optical Fiber, Total Internal Reflection, Numerical Aperture and Acceptance angle, Modes of Propagation, Types of Optical Fiber, Applications of optical fiber	05	15
6.	MODERN PHYSICS: X-rays: Origin of x-ray, production, properties and applications Introduction, Characteristics of laser radiation, Introduction to LASER: Einstein's theory, Properties of LASER. Population inversion and pumping. Production of LASER: Nd-YAG laser, CO2 laser. Applications of LASER	05	10
7.	NANO TECHNOLOGY: Nanoscale, Surface to volume ratio and Surface effects on Nanomaterials, Electron confinement, Nanomaterials and Nanotechnology, properties and Applications of Nanomaterials, Advantages and Disadvantages of Nanomaterials, Synthesis of Nanomaterials. Carbon Nanotubes: Introduction, Structure, Fabrication, Properties and applications	06	15
8.	ENGINEERING MATERIALS: SHAPE MEMORY ALLOYS Introduction, Synthesis, Properties and Applications METALLIC GLASSES Introduction, Synthesis, Properties and Applications ENERGY MATERIALS Solar cells, Fuel cells (H2O2, Lithium cell), Ultra-capacitors MAGNETIC MATERIALS: Definitions: Magnetic moment, Magnetic dipole, Magnetic Field strength, Magnetic flux density, Intensity of magnetization, Magnetic dipole moment, Magnetic Field intensity, Magnetic permeability, magnetic susceptibility, Bohr magneton. Classification of Magnetic Materials on the basis of magnetic moment Magnetic Recording and Readout Storage of magnetic data.	06	15

Text Books:

1. G Vijayakumari Engineering Physics, 7th & 2nd edition Vikas-Publication
2. Engineering Physics by V. Rajendran: Tata McGraw-Hill Education

Reference Books:

1. Sears and Zemansky University Physics Pearson Publication
2. Fundamental of Physics – Halliday, Resnick & Walker; John Wiley & Sons, Inc.
3. Concepts of modern physics by Arthur Beiser
4. Engineering Physics by V. Rajendran: Tata McGraw-Hill Education.
5. University Physics with Modern Physics by Young, Freedman & Lewis Ford
6. Engineering Physics - Gaur R.K. and Gupta S.L

List of Open-Source Software/learning website:

1. <http://www.howstuffworks.com/> -- Tech stuff
2. <http://www.sciencefairadventure.com/>
3. <https://www.bragitoff.com/>
4. <https://vlab.amrita.edu/>
5. <http://vlabs.iitb.ac.in/vlab/labsps.html>
6. <https://www.vlab.co.in/broad-area-physical-sciences>

LAB/Practical:

1. Characteristics of P-N Junction Diode
2. Characteristics of Zener Diode
3. Characteristics of Light Emitting Diode
4. Optical Fiber Communication using analog link
5. Numerical Aperture of Various Optical Fiber Cable
6. Study the temperature dependence of resistance of a semiconductor by four probe method
7. To find Ultrasonic velocity in given liquid medium by ultrasonic interferometer
8. To Determine Hall Co-efficient & Mobility of Semiconductor by Hall Effect.
9. Characteristics of a solar cell.
10. To determine the young's modulus of elasticity of the material of a sample beam by bending.
11. Hysteresis Loop of a Magnetic Material
12. Determine dielectric constant of Solid Materials.
13. Determine the wavelength of the laser light by diffraction grating method

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Describe the measurement and instrumentation and its applications and learn and to apply concepts of measurement and instrumentation to Industry and real life	2 Understanding, 5 Evaluate
CLO2	Learn to apply concepts of solid-state electronics in information and Technology. and learn the idea of optoelectronic devices and their importance in the advancement of technologies.	2 Understanding, 3 Applying, 4 Analyze
CLO3	Learn the idea of superconductivity and importance in advancement of technologies.	2 Understanding, 3 Applying

CLO4	Describe the laser systems and their applications and identify the applications of lasers and photonics	3 Applying, 2 Understanding
CLO5	Learn and apply concepts of nano systems.	1 Remembering, 2 Understanding
CLO6	Learn the concepts related to different properties of the magnetic materials and Advance engineering Material.	2 Understanding, 3 Applying

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	L	H		M	L	L		H				H				
CLO2	H	M	M	L	M	M	M					M				
CLO3	M	L			L	H	L		L		L					
CLO4	H	H	M		M	H			M	L						
CLO5			H	H	M		H					L				
CLO6	H	M	L	H	L				M			M				

H: High, M: Medium, L: Low