

Branch Name:	Computer Engineering / Information Technology / Artificial Intelligence and Data Science / Information and Communication Technology / Artificial Intelligence and Machine Learning / Electronics and Communication Engineering
Program Code:	ET103 / ET105 / ET108 / ET107 / ET114 / ET116
Course Title:	Applied Physics
Course Code:	2ET1000103T
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 phenomena
CO5. To comprehend the use of modern engineering materials and magnetic materials.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
					3	3	-	-	3	24	60	16	

Course Contents:

Unit No	Topic	Total Hours	Weightage (%)
1	Solid State Physics: Free electron theory, Density of states and energy band diagrams, Kronig-Penny model (to introduce origin of band gap), Energy bands in solids, E-k diagram, Direct and indirect bandgaps, Types of electronic materials: metals, semiconductors, and insulators, Density of states, Occupation probability, Fermi level, Effective mass, and phonons	7	15
2	Semiconductor: Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Zener diode, varactor diode, LED Solar cells, photovoltaic cell, Photo Conductivity, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices, Hall effects	7	20
3	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	6	15
4	SUPERCONDUCTIVITY: Superconductivity, General Properties of superconductors, Types of Superconductors, Applications: Magnets, Josephson effect, SQUID, Maglev, other	7	15
5	Theory Modern Physics: Introduction, Characteristics of laser radiation, Introduction to LASER: Einstein's Theory and Properties of LASER. Population inversion and pumping. Production of lasers: Nd-YAG laser, CO2 laser. Applications of LASER, 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, and Applications of optical fiber	6	15
6	NANO Material: 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, and synthesis of nanomaterials 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 magnetron. Recording and Readout Storage of magnetic data.	7	20

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>

Course Learning Outcomes (CLO):

CLO	Description	Bloom's Taxonomy Level
CLO1	Learn to apply concepts of solid-state electronics in information and Technology.	2 Understanding, 5 Evaluate
CLO2	To learn the idea of optoelectronic devices and their importance in the advancement of technologies.	2 Understanding, 3 Applying 4 Analyse
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.	2 Understanding, 3 Applying

Mapping of CLO with PO and PSO

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										
CLO2	H	M	M	L	M	M	M									
CLO3	M	L				H	L									
CLO4	H	H	M		M	H										
CLO5			H	H			H									
CLO6	H	M	L	H	L	H										

H: High, M: Medium, L: Low