COURSE CONTENT

APPLIED PHYSICS LAB

I Semester: CE / CSD / CSM / ECE / EEE / ME

II Semester: CSE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24X0071	Basic Science	0	0	3	1.5	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

Prerequisites: Intermediate

Course Overview:

The Applied Physics Laboratory course is designed to provide students with practical, hands-on experience through experiments covering multiple areas of physics. The laboratory work includes experiments in electrical systems, electromagnetism, and optoelectronics, enabling learners to connect theoretical principles with real-world applications. This course strengthens conceptual understanding and develops experimental skills, helping students apply fundamental physics concepts to modern technological systems and devices.

Course Objectives: The student will try to

1. Capable of handling instruments related to the Hall effect and photo electric effect Experiment understands their measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap.
3. Apply the analytical techniques & graphical analysis for Stewart Gees, LCR &RC
4. Understanding the method of least squares fitting.
5. To develop intellectual communication skills through discussion on basic principles o scientific concepts in a group.

Course Outcomes: After Completion of the Course, Students should be able to

1. Demonstrate the Planck's constant using Photo electric effect and identify the Material whether it is n-type or p-type by Hall experiment.
2. Illustrate quantum physics in semiconductor devices and optoelectronics.
3. Understand the properties for dielectric materials.
4. Compare the variation of magnetic field and behavior of hysteresis curve.
5. Interpret data analysis.

List of Experiments:

1. Determination of work function and Planck's constant using photo electric effect.
2. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
3. Characteristics of series and parallel LCR circuits.
4. V-I characteristics of a p-n junction diode and Zener diode.
5. Input and output characteristics of BJT (CE, CB & CC configurations).
6. V-I and L-I characteristics of light emitting diode (LED) and LASER.
7. V-I Characteristics of solar cell.
8. Determination of Energy gap of a semiconductor.
9. To determine the time constant of R-C circuit.
10. Determination of Acceptance Angle and Numerical Aperture of an optical fiber.

11. Understanding the method of least squares–Torsional pendulum as an example.
12. Determination of magnetic field induction along the axis of a current carrying coil.

List of Experiments: (Any 2 experiments are to be performed)

1. To calculate the concentration of charge carriers in the sample using Hall effect -NITK, Surathkal Virtual Lab.
2. To draw hysteresis (B-H curve) of a specimen in the form of a transformer and to determine its hysteresis loss - IIT Kanpur Virtual Lab.
3. To calculate the beam divergence and spot size of the given laser beam - Amritha Viswa Vidya Peetham Virtual Lab
4. To study various crystals structures - Amritha Viswa Vidya Peetham Virtual Lab

ELECTRONIC RESOURCES

1. Kittel, Charles, and Paul McEuen. Introduction to solid state physics. John Wiley & Sons, 2018. https://ph1-nitk.vlabs.ac.in/exp/hall-effect/references.html.
2. Kasap S O., Principles of Electronic Materials and Devices, 3rd Ed, Mcgraw Hill, 2006). https://bop2-iitk.vlabs.ac.in/exp/hysteresis-loss/references.html.
3. Koechner, Walter. Solid-State Laser Engineering. Berlin: Springer, 2006. https://lo-amrt.vlabs.ac.in/exp/laser-beam-divergence/references.html.
4. Pillai, SO. Solid State Physics, City: New Age Publications (Academic), India, 2005. https://ssp-amrt.vlabs.ac.in/exp/crystal-structure/references.html
5. https://youtu.be/Ujx68vgBk9w?si=c4k9V0aZvn9D46Dc
6. https://youtu.be/rOhTZ5D_nGI?si=mN_eVtpLP7d4HNyA

MATERIALS ONLINE:

1. Course template
2. AP Lab Manual
3. Open-ended experiments