CH152 PHYSICS FOR CHEMICAL ENGINEERING LABORATORY

L	T	P	C	Int	Ext
-	-	2	1.0	40	60

Semester I [First Year]

COURSE OUTLINE:

* This laboratory course provides hands-on training in fundamental physics through experiments spanning optics, mechanics, electricity, and magnetism, using standard measurement instruments and apparatus.
* It matters because it develops precise measurement, error-analysis, and data-interpretation skills that are essential for any engineering discipline and cannot be acquired through lecture-based learning alone.
* Students learn to connect theoretical physics concepts with observable, measurable phenomena, reinforcing the Engineering Physics theory course taken in the same semester.
* It provides the measurement and instrumentation base needed for higher-semester courses in Chemical Process Instrumentation, Materials Science, and Process Control in the Chemical Engineering programme.

COURSE OBJECTIVES:

1. To develop the ability to set up and operate standard physics laboratory instruments used for mechanical, optical, electrical, and magnetic measurements.
2. To train students in accurate data collection, graphical representation, and error/uncertainty analysis of experimental observations.
3. To enable students to correlate experimental results with the underlying theoretical principles of physics.
4. To develop competence in the use of modern measurement techniques and instrumentation relevant to engineering practice.
5. To inculcate scientific temper, laboratory safety practices, and accurate technical reporting of experimental work.

COURSE OUTCOMES:

After the successful completion of the course,students are able to

CO	Course Outcome	RBTL
CO1	identify, assemble, and correctly operate physics laboratory apparatus and instruments for a given experiment.	Understand (BL2
CO2	apply relevant physical laws and mathematical relations to determine physical quantities from experimental measurements.	Apply (BL3)
CO3	analyze experimental data, including estimation of errors and uncertainties, and represent results graphically.	Analyze (BL4)
CO4	evaluate experimental outcomes by comparing them against theoretical/standard values and justifying deviations.	Evaluate (BL5)
CO5	design and independently carry out a physics experiment to investigate a given phenomenon, and compile the procedure, results, and inferences into a comprehensive laboratory report.	Create (BL6)

CO - PO / PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1	-	2	2	-	1	1	1	-	1	-	-
CO2	3	2	-	2	2	-	-	1	1	-	1	-	-
CO3	2	3	1	3	2	-	-	1	2	-	1	-	-
CO4	2	3	1	2	2	1	1	1	2	-	2	-	-
CO5	2	2	2	3	3	1	1	2	3	1	3	-	-

EXPERIMENTS:

1. Newton's Rings - determination of the wavelength of sodium light.
2. Determination of the wavelength of laser light using a plane diffraction grating.
3. Determination of thickness of a thin paper foil using a wedge-shaped air film and travelling microscope.
4. Lissajous' Figures - Calibration of function generator.
5. Photocell - Characteristic curves and determination of Stopping Potential.
6. Variation of magnetic field along the axis of a circular current carrying coil.
7. Photovoltaic cell - Determination of Fill factor.
8. Determination of A.C. supply frequency - Sonometer.
9. Determination of Numerical Aperture (NA) & acceptance angle of an optical fiber.
10. Series LCR Resonance circuit - Determination of Q factor.
11. Determination of Rigidity Modulus of a given wire using Torsional Pendulum.
12. Determination of the dispersive and resolving power of a plane transmission grating.
13. Demonstration of Bravais Lattices, Atomic Packing Factor of SC, BCC and FCC Using Models.
14. Determination of Acceleration due to gravity using Compound Pendulum.
15. Determination of resistivity and energy gap of a semiconductor - Four probe method.

LEARNING RESOURCES:

REFERENCE BOOK(s):

1. B.L.Worsnop and H. T. Flint, Advanced Practical Physics for Students, Asia Publishing House, New Delhi.
2. Y.Aparna and K.Venkateswara Rao, Engineering Physics Laboratory Manual, Suryabharathi Publications, Hyderabad.

WEB RESOURCES:

1. NPTEL - Engineering/Applied Physics video lectures: https://nptel.ac.in
2. Virtual Labs (MHRD/MoE Initiative) - Physical Sciences Lab simulations: https://vlab.co.in
3. MIT Open Course Ware - Physics courses (Optics, Quantum Physics, Solid State Physics): https://ocw.mit.edu