



- Understanding of interference due to transmitted light, Newton's ring, Haidinger fringes etc
- Understanding of optical system and cardinal points, construction of image using cardinal points, two thin lenses system and its cardinal points.

#### **Unit-4**

- Understanding of thermal equilibrium, concept of temperature, thermometer and measurement, heat engine Carnot's cycle, Carnot theorem and corollary, etc
- Understanding of Zeroth law and first law, Kelvin Plank statement, Clausius statement.

#### **Unit 1: Vector Analysis**

**Credit of Course: 1 Cr**

**Lecture 12 Hrs**

**Tutorial 3Hrs**

Vector Algebra, Differential Calculus, Integral Calculus, Curvilinear Coordinates, The Dirac Delta Function

**Text Book:** Introduction to Electrodynamics | Fourth Edition |

By David J. Griffiths Pearson's Publications

**Articles no:** 1.1, 1.2, 1.3, 1.4, 1.5.

**Reference Book:** Mathematical methods in Physical Sciences

By M.L. Boas:

**Articles no:** 6.1 to 6.11

#### **Unit 2: Acoustic and Ultrasonic Waves**

**Credit of Course: 1 Cr**

**Lecture 12 Hrs**

**Tutorial 3Hrs**

**Traveling Waves:** Speed of propagation of waves in a stretched string longitudinal waves in a bar, Plane waves in a fluid, transmission of energy by a traveling wave.

**Sound waves:** Introduction, Intensity & intensity level, Loudness & pitch radiation from a piston, diffraction, radiation efficiency of a sound source.

**Ultrasonic Waves:** Magnetostriction method, Piezo-electric oscillator, Piezo-electric detectors, Measurement of velocity of ultrasonic waves, diffraction effect & its applications, Stereophonic sound.

**Text Book:** Mechanics, Wave motion & Heat by Francis Weston Sears  
(Addison Wesley Publication)

**Articles no:** 16.3 to 16.6, 18.1, 18.2, 18.3, 18.6, 18.7

**Text Book:** A text book on oscillations, waves & Acoustics by M. Ghosh, D. Bhattacharya (S. Chand)

**Article no:** 23.1 to 23.6

### **Unit 3: Ray and Wave Optics**

**Credit of Course: 1 Cr**

**Lecture 12 Hrs**

**Tutorial 3Hrs**

**Fermat's principle and its applications:** Fermat's principle of least time, laws at reflection, laws of refraction. Interference in thin films: Thin film, Plane parallel film, Interference due to transmitted light, Haidinger fringes, variable thickness (wedge-shaped) film, Newton's ring.

**Text book:** The Text Book of Optics by Subramanyam and Brijlal: Articles:

**Articles no:** 2.1, 2.2, 2.5, 2.6, 15.1, 15.2, 15.3, 15.4, 15.5, 15.6

**Optical system and cardinal Points:** Introduction, cardinal points, Construction Of the image using cardinal points, A system of two thin lenses. Cardinal Points of a coaxial system of two thin lenses

**Text Book:** The Text Book of Optics by Subramanyam and Brijlal:

**Articles no:** 5.1, 5.2, 5.3, 5.10

### **Unit 4: Thermodynamics and Thermoelectricity**

**Credit of Course: 1 Cr**

**Lecture 12 Hrs**

**Tutorial 3Hrs**

Scope of thermodynamics, Thermal Equilibrium and zeroth law. Concept of temperature, Thermometers and measurement of temperature. Conversion of work into heat and vice versa. Mathematical formulation of first law. Heat engine; Kelvin-Planck statement of second law. Refrigerator; Clausius statement of second law. Carnot Cycle: Carnot's Theorem and Corollary. Thermodynamic temperature scale. Seebeck effect, Peltier effect, Thomson effect, Total emf in a thermocouple.

**Text book:** Heat and Thermodynamic By Zemansky and Dittman (7<sup>th</sup> Edition)

Article no: 1.4,1.5,1.6,1.7,4.4,6.1,6.6,6.7,7.4,7.5

**Text Book:** Magnetism and Electricity by D.N. Vasudeva

**Articles no:** 18.1 to 18.10

# St. Xavier's College (Autonomous), Ahmedabad

Syllabus of Semester – I to be implemented from the Academic Year 2023-24.

## DEPARTMENT OF PHYSICS & ELECTRONICS

**DSC 2: Physics Laboratory & Experiential Laboratory 4Cr      100 Marks**

Course Code & Title	Credit Distribution of The Course				Eligibility Criteria	Prerequisite(s) of the Course (if any)
	Cr	Regular Lab	Experiential Lab	Activities		
PH 1502L Physics Laboratory	4	2Cr	2Cr	1 Scientific Report	10+2 recognized board	
				1 Presentation	Science Stream Math-Group	

### Learning Objectives:

At the end of this course, students will be able to

- Perform the basic experiments on physics principle and also get aware about the possibilities of errors. Two experiments are on errors and how to minimize the errors.
- Make students capable to connect the elementary circuits of experiments and take their observations.
- Perform experiments that require learning mechanical setup for the experiments.

### Learning Outcomes:

At the end of this course, students will be able to

- Demonstrate few experiments independently.
- Identify the errors in experiments and in capacity to rectify it up to certain extent.

## Laboratory Experiments Set A

Credit of Course: 2 Cr

1	Analysis of errors
2	Least square method
3	Moment of Inertia of Flywheel <ul style="list-style-type: none"><li>To find out the moment of inertia of flywheel</li></ul>
4	Damping Coefficient of Simple Pendulum <ul style="list-style-type: none"><li>To find out the damping coefficient of simple pendulum.</li></ul>
5	Measurement of frequency of Tuning fork using Resonator <ul style="list-style-type: none"><li>To find out the frequency of an unknown tuning fork, also find out the end-correction for the resonator</li></ul>
6	Melde's Experiment: Law-I: $P/L$ and Law-II: $P^2T$ <ul style="list-style-type: none"><li>To verify the Melde's law 1 and law 2 for a given tuning fork.</li></ul>
7	Vibration Magnetometer <ul style="list-style-type: none"><li>To verify the magnetic moments of a given 2 bar magnets.</li></ul>

## Set B

1	Liquid Lens Measurement of refractive index of given liquid (Glycerin) using lens.
2	PN Junction Characteristics To verify the characteristics and Iode line of a given PN junction diode.
3	Half-wave Rectifier To verify the diode as a half wave rectifier with and without filter circuit further calculate the ripple factor.
4	Series Resonance To determine the frequency of ac source using series resonance circuit with varying capacitance value.
5	Study of Step-down Transformer To determine the efficiency, turn ratio and the copper losses of the given step-down transformer.
6	Stefan's Constant To verify the Stefan Boltzmann's 4 <sup>th</sup> power law using bulb and dc power source.
7	Measurement of Capacitance To find the value of capacitance $C_A$ , $C_B$ of capacitors A and B, and the resultant value of their capacitance in series and parallel connection.

## **Experiential Laboratory:**

**Credit of Course: 2 Cr**

### **Learning Objectives:**

At the end of this course, students will be able to

- Understand the problem and self learning for setting up the entire experiment in team of 2/3 students.
- Execute the aim/task independently for a basic but twisted experiment that assigned.
- Find out the possible errors and its possibilities.

### **Learning Outcomes:**

At the end of this course, students will be able to

- Set up a new experiment and make possible in capacity to demonstrate the assigned physics principle and measure few physical quantities independently.
- Also calculate errors in the measured results independently.
- Learn the way of presenting the same experiment and submit in the form of scientific report.