St. Xavier's College (Autonomous), Ahmedabad

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

FACULTY OF SCIENCE

DEPARTMENT OF PHYSICS & ELECTRONICS

PH

Minor 1: Basic Physics – I	4Cr	100 Marks

Course Title & Code	Credit Distribution of The Course				Marks	Eligibility Criteria	Prerequisite(s) of the Course
	Cr	Lectures hrd	Tutorial hrs	Practical hrs			
PH 1101 Introductory Basic Physics-I	2	12x1	3x1		50	10+2	Science Stream Math-Group
	2			14x2	50		

Unit-1

- Perform the basic algebra operation of vectors and differential operation of vectors, gauging of curved line and surface with vectors, and calculate the values.
- Understand the gradient of scalar field and the divergence and curvilinear coordinates
- Understand of the Gauss theorem, Stokes theorem and their applications.

Unit-2

- Understanding of sound waves, production, control, transmission, reception and its effects, also in an auditorium.
- Learning of ultrasonic wave production and their applications.

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: Magneostriction 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

　　　　　(Addision 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

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   **Credit of Course: 2 Cr**

Set A

Analysis of errors
Least square method
Moment of Inertia of Flywheel 　■ To find out the moment of inertia of flywheel
Damping Coefficient of Simple Pendulum 　■ To find out the damping coefficient of simple pendulum.
Measurement of frequency of Tuning fork using Resonator 　■ To find out the frequency of an unknown tuning fork, also find out the end-correction for the resonator
Melde's Experiment: Law-I: P/L and Law-II: P^2T 　■ To verify the Melde's law 1 and law 2 for a given tuning fork.
Vibration Magnetometer 　■ To verify the magnetic moments of a given 2 bar magnets.

Set B

Liquid Lens
- Measurement of refractive index of given liquid (Glycerin) using lens.

PN Junction Characteristics
- To verify the characteristics and lode line of a given PN junction diode.

Half-wave Rectifier
- To verify the diode as a half wave rectifier with and without filter circuit further calculate the ripple factor.

Series Resonance
- To determine the frequency of ac source using series resonance circuit with varying capacitance value.

Study of Step-down Transformer
- To determine the efficiency, turn ratio and the copper losses of the given step-down transformer.

Stefan's Constant
- To verify the Stefan Boltzmann's 4th power law using bulb and dc power source.