ST. XAVIER'S COLLEGE (AUTONOMOUS), AHMEDABAD-9
FACULTY OF SCIENCE

DEPARTMENT OF PHYSICS & ELECTRONICS

SEMESTER – I

SYLLABUS

OF

BSc PHYSICS (HONOURS)

BASED ON UNDERGRADUATE CURRICULUM FRAMEWORK
(NEP – 2020)

(Effective from Academic Year 2023)

Curriculum Framework for Semester – I

Course	Title	Content		Credit
DSC-1 (Theory)	PHMC111C Introduction to Classical Physics	U1	Vector Analysis	4
		U2	Oscillations and Waves	
		U3	Optics	
		U4	Fourier series and Matrices	
DSC-2 (Laboratory)	PHMC111L Physics and Experiential Lab-I	14 Physics Experiments		4
		Experiential Lab: 1 hands on experiment.		
Minor-1 (Theory + Lab)	PHMN111C Basic Physics-I	U1	Vector Analysis	2
		U2	Oscillations and Waves	
		U3 U4	14 experiments as mentioned in syllabus	2
Minor-1 (Theory + Lab)	ELMN111C Basic Electronics-I	U1	Diodes and Their Applications	2
		U2	Number systems and Codes	
		U3 U4	14 experiments as mentioned in syllabus	2
SEC	PHSE111C Basic Skill in Electronics: Soldering Testing Fabrication	U1		2
		U2	Laboratory Component	
MDC	MDC 206C Astronomy for Beginners	U1	Intr. to Astronomy and Observations in Astronomy	4
		U2	Principles and Tools for Observations in Astronomy	
		U3	Celestial Objects and Their Nature	
		U4	Field Trip/Project/Stargazing	
AEC	Ability Enhancement Course	(To be offered by the concerned subject Department)		2
VAC	Value Added Course	(To be chosen from a basket of courses)		2
Total Credits				**22**

* DSC: Discipline Specific Core

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Syllabus of Semester–I to be implemented from the Academic Year **2025-26.**

DEPARTMENT OF PHYSICS & ELECTRONICS

Minor Course: Basic Physics-I

Course Code & Title	Credit Distribution of The Course				Eligibility Criteria	Prerequisite(s) of the Course (if any)
	Cr	Lecture hrs	Tutorial hrs	Activity/Case study analysis		
PHMN111C: Basic Physics- I	2	12x2	3x2		10 + 2 from a recognized board	Science Stream Math-Group

Learning Objectives:

LO1	Learning the algebraic, differential, and integral operations of vectors, gauging of curved lines and surfaces with vectors. Understanding the gradient, divergence and theorems like the Gauss and Stokes. Finally the the curvilinear coordinate system.
LO2	Understand phenomena encountered in day-to-day life, which require knowledge of wave motion, simple harmonic motion and Lissajous figures.

Course Outcomes:

CO1	Understands vector algebra and a few fundamental theorems.
CO2	Understanding of sound waves, production, control, transmission, reception and its effects

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, **David J. Griffiths** (4^{TH} Edition): 1.1, 1.2, 1.3, 1.4, 1.5

Unit 2: Oscillations and Waves

Credit of Course: 1 Cr **Lecture 12 Hrs** **Tutorial 3Hrs**

Review of ordinary differential equations: first and second order linear differential Equations – Definitions, methods of solving, and examples. Simple harmonic oscillator: Differential equation for the simple harmonic oscillator and its general solution; Superposition of two or more simple harmonic oscillators; Lissajous figures; damped and forced oscillators; resonance. Wave Equation; traveling and standing waves in one-dimension; energy density and energy transmission; concepts of group velocity and phase velocity. Sound Waves: propagation of sound waves in different media; energy transport in sound waves; Doppler effect.

Text Book:

- A textbook of oscillation, waves and acoustics, **M. Ghosh and D. Bhattacharya**: 2.2-2.11, 3.1-3.7, 8.9, 8.13
- Mechanics, wave motion and heat, **Francis Weston Sears:** 16.3-16.6

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DEPARTMENT OF PHYSICS & ELECTRONICS

Minor Course: Basic Physics-I

Course Code & Title	Credit Distribution of The Course			Eligibility Criteria	Prerequisite(s) of the Course (if any)
	Cr	Laboratory Hrs per week	Activity/Case study analysis		
PHMN111C: Basic Physics-I	2	4		10 + 2 from a recognized board	Science Stream Math-Group

Learning Objectives:

LO1	Learn the physical principles underlying thermal radiation, oscillations, magnetism, optics, electronics, and mechanics.
LO2	Acquire hands-on experience in using laboratory instruments like the vibration magnetometer, transformer, rectifier circuits, and flywheel.
LO3	Practice accurate data collection, analysis using methods such as least squares fitting, and error estimation techniques.
LO4	Investigate mechanical and electrical resonance phenomena (Melde's experiment, series resonance) and their practical significance.
LO5	Examine I–V characteristics of p–n junction diodes and understand concepts of rectification and load line analysis.

Course Outcomes:

CO1	Demonstrate the ability to perform experiments based on mechanics, optics, and thermal physics (e.g., simple pendulum, moment of inertia, Stefan's constant).
CO2	Analyze and interpret experimental results to extract physical parameters like capacitance, resonant frequency, and diode characteristics.
CO3	Apply the method of least squares and error analysis to validate experimental data and assess its reliability.
CO4	Operate and troubleshoot basic electronic components such as diodes, transformers, and rectifiers in circuit configurations.
CO5	Correlate theoretical concepts with experimental outcomes and communicate scientific findings effectively in written and oral formats.

B.Sc. (PHYSICS) SEMESTER -I PHMC111L (Practical)

01	Stefan's Constant
02	Melde's Experiments
03	Resonator
04	Vibration Magnetometer
05	Study of Transformer
06	Value of Capacitance
07	Series Resonance
08	Half Wave Rectifier
09	M I of Flywheel
10	Method of Least Square Fitting
11	Analysis of Error
12	Simple Pendulum
13	I-V Characteristics of P-N Junction and Load Line
14	Liquid Lens

Course Outcomes

Learning Objectives: