CORE-Course title: **PROPERTIES OF MATTER AND SOUND**

Course Code*				
Credits	**3**			
Hours / Cycle	**4 hours/week**			
Category	**Part** **Core/ Theory**			
Semester	**I**			
Year of Implementation	**From the academic year June 2023 onwards**			
Course Structure	Theory	Tutorial	Practical	Total Hours
	54	6	-	60
Course Objectives	On completing this course, the student will be able to 1. Understand the concept of elasticity and derive expression for different modulus of elasticity. 2. Gain basic knowledge on surface tension and viscosity. 3. Understand the concept related to wave motion and study in detail the basic concepts and applications of Acoustics, musical note and Ultrasonics.			

Course Outcome(s)**	**PSO Addressed**	**(K1 to K6)**
CO1: To recall and revise the basic concept of elasticity, Surface tension, viscosity, Simple Harmonic motion and wave motion.	PSO3, POS2	K1
CO2: To exemplify and discuss concepts such as bending of beams, molecular theory of surface tension, simple harmonic motion, oscillations, resonance, waves in gas and acoustics.	PSO3, PSO2	K2
CO3: To apply concepts of properties of matter and sound and recognise their applications.	PSO3, PSO4	K3
CO4: To analyse and discuss principles and basic equations and apply in problems of different levels.	PSO3, PSO4	K4
CO5: To evaluate concepts of moduli of elasticity, properties of materials, simple harmonic motion and acoustics using various experimental techniques.	PSO3, PSO2	K5

SYLLABUS

UNIT	CONTENT	Hours	COs	Bloom's Taxonomy Level
I	**ELASTICITY:** Moduli of elasticity - Hooke's law-Poisson's ratio - Bending of beams: bending moment- Cantilever-Uniform and non-uniform bending - Expression for couple per unit twist - Work done in twisting – Rigidity modulus by dynamic torsion method: Torsional pendulum.	14	CO1 to CO5	K1 to K5
II	**SURFACE TENSION AND VISCOSITY:** Surface tension – definition – Molecular Theory of Surface tension-surface energy-- Determination of ST by drop weight and Quincke's method - Variation of ST with temperature – Surfactants Streamlined and turbulent flows -Viscosity - Poiseuille's equation - Determination of coefficient of viscosity by Poiseuilles'method – Reynold's number.	13	CO1 to CO5	K1 to K5
III	**SIMPLE HARMONIC MOTION:** Simple Harmonic Motion – Examples of SHM – Mass spring system – Composition of two S.H.Ms in a straight line and at right angles- Lissajous's figures- Free and Damped oscillations – Logarithmic decrement - Forced vibrations and resonance – Sharpness of Resonance**.**	13	CO1 to CO5	K1 to K5
IV	**WAVE MOTION:** Longitudinal and transverse waves – Longitudinal waves in gas – Newton's formula – Laplace's correction- Velocity of sound waves – Factors affecting the velocity of sound – Transverse vibrations in a stretched string – Melde's string	10	CO1 to CO5	K1 to K5
V	**ACOUSTICS:** Reverberation time – Absorption coefficient – Sabine's reverberation formula – Factors affecting acoustics in Auditorium. Musical sound and noise – Characteristics of musical sound – Musical scale. Ultrasonics - Production using Piezo electric crystal - Applications in NDT, Medical diagnostics (qualitative study).	10	CO1 to CO5	K1 to K5

Prescribed Books/Text Books

1. Elements of properties of matter – D.S. Mathur – S. Chand & Co., 2004.
2. Properties of matter – R. Murugesan – S. Chand & Co., 2004.
3. Properties of matter – Brijlal and Subramanian S. Chand & Co., 2006.
4. D.R.Khanna and R.S. Bedi, Textbook of Sound, Atmaram and sons (1969)
5. N.Subrahmanyam and BrijLal, A Text Book of Sound,Vikas Publishing House - Second revised edition (1995)
6. Brijlal and N. Subramaniam, Waves and Oscillations ,2nd revised edition,Vikas publishing house Ltd,(2000),New Delhi.

Reference Books

1. Fundamentals of General Properties of Matter by H.R.Gulati, S. Chand & Co., NewDelhi (1982).
2. Fundamental of Physics, D. Hallidary , Resnick and J Walker, 6th Edition, Wiley, New York 2001

Suggested Reading

GENERAL PROPERTIES OF MATTER BY B BROWN

Web Resources

1.https://www.encyclopedia.com/science/news-wires-white-papers-and-books/properties-matter
2. https://spark.iop.org/properties-matter-home-experiments