

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI
COURSE PLAN June - November 2024

Department : **PHYSICS**
Name/s of the Faculty : **Dr. BELINA XAVIER & Ms. CHRISTY PREETHA. A**
Course Title : **PROPERTIES OF MATTER AND SOUND**
Course Code : **23PH/MC/PS14**
Shift : **I**

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Acquire knowledge on Stress and Strain, three moduli of elasticity, bending of beams, fundamental principles and theories of surface tension and viscosity of liquids, characteristics of wave motion, and the basic concepts of acoustics and ultrasonics.	K1
CO2	Describe the elastic behaviour of solids, the physical properties of liquids that impact fluid motion, and how sound travels through a medium.	K2
CO3	Apply the theoretical concepts to determine bending moment, elevation, and depression in a beam due to different types of loading, optimum reverberation time and illustrate real life examples for surface tension, viscosity of fluids, vibrations in strings, and Doppler effect in Sound.	K3
CO4	Deduce expressions related to elasticity of solids, fluid dynamics, simple harmonic motion, acoustics, and ultrasonics.	K4
CO5	Evaluate and solve problems related to properties of solids and fluids, behaviour of waves, simple harmonic oscillators, and designing an acoustically good auditorium.	K5

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jun 24 – 26, 2024 (Day Order 4 - 6)	1 & 4	Elasticity 1.1 Elasticity – Stress – Strain Waves and Oscillations 4.1 Wave motion	K1 – K5	3	1-5	Lecture, Power point presentation	Quiz
Jun 27 – July 4, 2024 (Day Order 1 - 6)		Elasticity 1.2 Hooke's law - different moduli of elasticity - Poisson's ratio - relation between the elastic moduli Waves and Oscillations 4.1 Characteristics of wave motion	K1 – K5	5	1-5	Lecture, Power point presentation, Problem solving	Quiz, Problem solving in groups
July 5 – 12, 2024 (Day Order 1 - 6)	1 & 4	1.1 Bending of beams – expression for the bending moment - depression of the loaded end of a cantilever 4.1 longitudinal and transverse wave motion – Simple Harmonic Motion - Equation of a simple harmonic wave	K1 – K5	5	1-5	Lecture, Power point presentation, Problem solving	Quiz, Problem Test

<p>July 15 – 23, 2024 (Day Order 1 - 6)</p>	<p>1 & 4</p>	<p>1.1 depression at the midpoint of a beam loaded at the middle (non-uniform bending) - experiment to determine Young's modulus 'E'(using pin and microscope) Elevation at the midpoint of a beam (uniform bending) - experiment to determine young's modulus 'E' (using scale and telescope).</p> <p>4.1 Differential equation of wave motion – Composition of two SHM of equal periods acting at right angles – Lissajous figures and its uses</p>	<p>K1 – K5</p>	<p>5</p>	<p>1-5</p>	<p>Lecture, Power point presentation, Problem solving</p>	<p>Quiz, Problem Test, Assignment</p>
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<p>July 24 – 31, 2024 (Day Order 1 - 6)</p>	<p>1 & 4</p>	<p>1.2 Torsion - expression for torque per unit twist - work done in twisting a wire Torsional oscillation of a body – expression for time period – determination of rigidity modulus ‘G’ by torsion pendulum (Dynamic torsion method). 4.2 Velocity and frequency of transverse waves along stretched strings - Law of transverse vibration of strings</p>	<p>K1 – K5</p>	<p>5</p>	<p>1-5</p>	<p>Lecture, Power point presentation, Problem solving</p>	<p>Problem solving in groups</p>
<p>Aug 1 – 5, 2024 (Day Order 1 - 3)</p>	<p>2 & 4</p>	<p>2.1 Surface tension Surface tension - explanation of surface tension based on molecular theory 4.2 Harmonics - Melde’s experiment – Standing waves</p>	<p>K1 – K5</p>	<p>2</p>	<p>1-5</p>	<p>Lecture, Power point presentation, Problem solving</p>	<p>Problem solving in groups, seminar</p>
<p>Aug 6 – 10, 2024</p>	<p>C.A. Test - I</p>						

Aug 12 – 14, 2024 (Day Order 4-6)	2 & 4	2.1 Work done in increasing the surface area - work done in blowing a bubble 4.2 Beats – Doppler effect	K1 – K5	3	1-5	Lecture, Problem solving	Questioning on content taught, Problem solving in groups
Aug 16 – 23, 2024 (Day Order 1-6)	2 & 5	2.1 Angle of contact - pressure difference across a liquid surface – excess pressure inside a curved liquid surface Acoustics and Ultrasonics 5.1 Acoustics – Reverberation	K1 – K5	5	1-5	Lecture, Problem solving	Questioning on content taught, Problem solving in groups
Aug 27 – Sep 3, 2024 (Day Order 1-6)	2 & 5	2.2 Experimental determination of surface tension and interfacial surface tension by drop weight method – Jaeger’s method 5.1 Sabine’s reverberation formula – determination of absorption coefficient	K1 – K5	5	1-5	Lecture, Problem solving	Questioning on content taught
Sep 4 – 11, 2024 (Day Order 1-6)	2 & 5	2.2 Quincke’s method - Variation of surface tension with temperature 5.1 factors affecting the acoustics of buildings –	K1 – K5	5	1-5	Lecture, Problem solving	Questioning on content taught

Sep 12 - 20, 2024 (Day Order 1-6)	3 & 5	Fluid Dynamics 3.1 Viscosity - coefficient of viscosity - Poiseuille's formula for the flow of liquid through a capillary tube – corrections to Poiseuille's formula - Poiseuille's method for determining coefficient of viscosity of a liquid (variable pressure head) 5.1 Requisites for good acoustics	K1 – K5	5	1-5	Lecture, Problem solving	Questioning on content taught, Problem solving in groups, seminar
Sep 23 - 26, 2024 (Day Order 1-4)	3 & 5	3.1 Terminal velocity and Stokes' formula – Stokes' method for the coefficient of viscosity of highly viscous liquids Ostwald's viscometer 5.2 Ultrasonics (introduction)	K1 – K5	3	1-5	Lecture, Problem solving	Questioning on content taught, Problem solving in groups, seminar
Sep 27 – Oct 3, 2024	C.A. Test - II						
Oct 4 – 5, 2024 (Day 5 & 6)	3 & 5	3.1 variation of viscosity with temperature and pressure 5.2 production of ultrasonic waves - Piezoelectric generator	K1 – K5	2	1-5	Lecture, Problem solving	Questioning on content taught, seminar

<p>Oct 7 - 15, 2024 (Day Order 1 to 6)</p>	<p>3 & 5</p>	<p>3.2 Fluid motion - Stream line flow and turbulent flow - critical velocity - Reynold's number - Bernoulli's principle and equation</p> <p>5.2 – Detection of ultrasonic waves - Application of ultrasonic waves</p>	<p>K1 – K5</p>	<p>5</p>	<p>1-5</p>	<p>Lecture, Problem solving</p>	<p>Questioning on content taught, seminar, Assignment</p>
<p>Oct 16 - 22, 2024 (Day Order 1 to 6)</p>	<p>3 & 5</p>	<p>3.2 Euler's continuity equation for unidirectional flow</p> <p>5.2 Application of ultrasonic waves (contd.)</p>	<p>K1 – K5</p>	<p>5</p>	<p>1-5</p>	<p>Lecture, Problem solving</p>	<p>Seminar</p>
<p>Oct 23 - 24, 2024 (Day Order 1 to 2)</p>	<p>REVISION</p>						