

Year & Sem: P2S1	Course Code: P213	Course Name: Physics	No. of Credits: 4	L-T-P: 2-2-1
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Syllabus

UNIT-1: FLUIDS

Density and Pressure- What is pressure, Specific gravity, Pressure and Pascal's principle (part 1), Pressure and Pascal's principle (part 2), Pressure at a depth in a fluid, Finding height of fluid in a barometer. **Buoyant Force and Archimedes' Principle-** What is buoyant force, Archimedes principle and buoyant force, Buoyant force example problems.

UNIT-2: FLUID DYNAMICS

Fluid Dynamics- What is volume flow rate, Volume flow rate and equation of continuity, What is Bernoulli's equation, Bernoulli's equation (part 1), Bernoulli's equation (part 2), Bernoulli's equation (part 3), Bernoulli's equation (part 4), Bernoulli's example problem, , Viscosity and Poiseuille flow, Turbulence at high velocities and Reynold's number, Venturi effect and Pitot tubes, Surface Tension and Adhesion.

UNIT-3: ELECTROMAGNETIC WAVES AND INTERFERENCE

Introduction to electromagnetic waves- Light: Electromagnetic waves, the electromagnetic spectrum and photons, Electromagnetic waves and the electromagnetic spectrum, Polarization of light, linear and circular. **Interference of electromagnetic waves-** Constructive and Destructive interference, Young's double slit introduction, Young's double slit equation, Young's double slit problem solving, Diffraction grating, Single slit interference, More on single slit interference, Thin Film Interference part 1, Thin Film Interference part 2.

UNIT-4: GEOMETRIC OPTICS

Reflection and refraction- Specular and diffuse reflection, Specular and diffuse reflection 2, Refraction and Snell's law, Refraction in water, Snell's law example 1, Snell's law example 2, Total internal reflection, Dispersion. **Mirrors-** Virtual image, Parabolic mirrors and real images, Parabolic mirrors 2, Convex parabolic mirrors, Derivation of the mirror equation, Mirror equation example problems. **Lenses-** Convex lenses, Convex lens examples, Concave lenses, Object image and focal distance relationship (proof of formula), Object image height and distance relationship, Thin lens equation and problem solving, Multiple lens systems, Diopters, Aberration, and the Human Eye.

UNIT-5: HEAT

Temperature, kinetic theory, and the ideal gas law- Thermodynamics part 1: Molecular theory of gases, Thermodynamics part 2: What is the ideal gas law, Ideal gas law, Thermodynamics part 3: Kelvin scale and Ideal gas law example, Thermodynamics part 4: Moles and the ideal gas law, Thermodynamics part 5: Molar ideal gas law problem, What is the Maxwell-Boltzmann distribution, Maxwell Boltzmann distribution. **Specific heat and heat transfer-** Specific heat and latent heat of fusion and vaporization, What is thermal conductivity, Thermal conduction, convection, and radiation, Thermal conduction, Thermal conductivity of metal and wood, Intuition behind formula for thermal conductivity.

UNIT-6: THERMODYNAMICS

Laws of thermodynamics- Macrostates and microstates, Quasistatic and reversible processes, What is the first law of thermodynamics, First law of thermodynamics / internal energy, More on internal energy, Work from expansion, What are PV diagrams, PV-diagrams and expansion work, Proof: $U = (3/2)PV$ or $U = (3/2)nRT$, Work done by isothermic process, Carnot cycle and Carnot engine, Proof: Volume ratios in a Carnot cycle, Proof: S (or entropy) is a valid state variable, Thermodynamic entropy definition clarification, Reconciling thermodynamic and state definitions of entropy, Entropy intuition, Maxwell's demon, More on entropy, Efficiency of a Carnot engine, Carnot efficiency 2: Reversing the cycle, Carnot efficiency 3: Proving that it is the most efficient.

Practicals:

- 1) Focal length of Convex lens,
- 2) Focal length of concave mirror,
- 3) Sonometer,
- 4) Refractive index of glass slab,
- 5) Minimum Deviation angle of prism,

References:

- 1) www.khanacademy.org
- 2) www.wikipedia.com
- 3) University Physics with Modern Physics (Hugh D. Young, Roger A. Freedman and A. Lewis Ford)
- 4) Fundamentals of Physics by H. C. Verma.
- 5) Principles of Physics by Halliday , Resnick and Walker