

**UNIVERSITY OF MADRAS**  
**U.G. DEGREE COURSES**  
**SYLLABUS WITH EFFECT FROM 2020-2021**

**BPS-CSA01**

**ALLIED PHYSICS-I (THEORY)**

(For B.Sc., Mathematics, Chemistry and Computer Science students)

Lecture:60 Hours

Tutorial:15 Hours

Credits:3

**Course Objective:**

This paper introduces the students to the basic concepts of Elasticity, Rotational motion, Heat and thermodynamics, Sound, Optics, Atomic and Nuclear Physics

**Learning Outcome:**

On the successful completion of the course, students will be able to

- Explore the fundamental concepts of physics
- Import knowledge about the importance of material properties, heat, sound, optics, atomic and nuclear physics.
- Understand the energy involved in nuclear reaction
- Carry out the practical by applying these concepts
- Get depth knowledge of physics in day today life

**UNIT I: Properties of Matter**

Young's modulus – Rigidity modulus – Bulk modulus – Poisson's ratio (definition alone) – Bending of beams – Expression for Bending Moment – Determination of Young's Modulus – Uniform and Non-Uniform bending.

Expression for Couple per unit twist – Work done in twisting a wire – Torsional oscillations of a body– Rigidity modulus of a wire and M.I. of a disc by Torsion Pendulum.

**UNIT II: Viscosity**

Viscosity – Viscous force – Co-efficient of Viscosity – Units and Dimensions – Poiseuille's formula for co-efficient of viscosity of a liquid – determination of co-efficient of viscosity using burette and comparison of Viscosities - Bernoulli's theorem – Statement and proof – Venturi meter – Pitot tube.

**UNIT III: Conduction, Convection and Radiation**

Specific heat Capacity of Solids and Liquids – Dulong and Petit's law – Newton's law of Cooling – Specific Heat Capacity of a Liquid by Cooling – Thermal Conduction –Coefficient of Thermal Conductivity by Lee's disc Method.

Convention Process – Lapse Rate – Green House Effect – Black Body Radiation – Planck's Radiation Law – Rayleigh Jean's Law, Wien's Displacement Law – Stefan's Law of Radiation. (No Derivations).

**UNIVERSITY OF MADRAS**  
**U.G. DEGREE COURSES**  
**SYLLABUS WITH EFFECT FROM 2020-2021**

**UNIT IV: Thermodynamics**

Zeroth and I Law of Thermodynamics – II law of Thermodynamics – Carnot's engine and Carnot's cycle – Efficiency of a Carnot's Engine – Entropy – Change in Entropy in Reversible and Irreversible Process – Change in entropy of a perfect gas – Change in Entropy when Ice is converted into steam.

**UNIT V: Optics**

Interference – Conditions for Interference Maxima and Minima – Air Wedge – Thickness of A Thin Wire – Newton's Rings – Determination of Wavelength Using Newton's Rings.  
Diffraction – Difference Between Diffraction and Interference – Theory of Transmission Grating – Normal Incidence – Optical Activity – Biot's Laws – Specific Rotatory Power – Determination of Specific Rotatory Power Using Laurent's Half Shade Polarimeter.

**BOOKS FOR STUDY:**

1. Properties of matter, Brijlal and Subramanyam, Eurasia Publishing co., New Delhi, III Edition 1983
2. Element of properties of matter, D.S.Mathur, S.Chand & Company Ltd, New Delhi, 10<sup>th</sup> Edition 1976
3. Heat and Thermodynamics, Brijlal &Subramanyam, S.Chand& Co, 16<sup>th</sup> Edition 2005
4. Heat and Thermodynamics, D.S. Mathur, Sultan Chand& Sons, 5<sup>th</sup> Edition 2014.
5. Optics and Spectroscopy, R.Murugesan, S.Chand and co., New Delhi, 6<sup>th</sup> Edition 2008.
6. A text book of Optics, Subramanyam and Brijlal, S. Chand and co., New Delhi, 22<sup>nd</sup> Edition 2004.
7. Optics, Sathya Prakash, Ratan Prakashan Mandhir, New Delhi, VII Edition 1990.