

Course Content for Physics-II

1. Faculty: FPS
2. Course Code: PHY002
3. Course Title: Physics-II
4. Number of Credits: 4 (3+1)
5. Course objectives: The students are exposed to applied laboratory techniques, critical thinking, independent and team learning and are provided with research opportunities. Related educational materials are used to support teachers in the classroom and promote hands-on learning experiences for students. B.Sc. (H) in Physics is one of the undergraduate programmes that comes under the Department of Physics is designed to introduce the students to modern methods and principles of Physical science. The Programme enables a student to understand basic facts as well as new concepts in Physics while retaining the exciting aspects of Physics to develop interest in the study of Physics as a discipline. The sole focus of this programme is to provide a broad domain of knowledge with a view to produce quality graduates and researchers. The course is designed to give an insight to the student about the general properties of Matter and enables them to apply this knowledge to practical life where each and every thing in surrounding is made up of matter only. This course is an essential part of Physics Study. The course contains information about all types of modulus of Elasticity and also deals with peculiar properties of fluids viz. surface tension and viscosity and their applications.
6. Minimum prerequisites for taking this course, if any: Higher secondary education qualified from any government-approved education board
7. Course structure with units, if applicable:

Module I: Elasticity

Hooke's Law Stress - Strain Diagram - Elastic moduli – Relation between elastic constants – Poisson's Ratio - Expressions for Poisson's ratio in terms of elastic constants - Work done in stretching and twisting a wire - Twisting couple on a cylinder, Rigidity modulus by static torsion - Torsional pendulum – Rigidity modulus and moment of inertia.

Module II: Bending of beams

Cantilever - Expression for bending moment - Expression for depression - Cantilever oscillations - Expression for time period, Experiment to find Young's modulus - Non uniform bending, Experiment to determine Young's modulus by Koenig's method, Uniform bending - Expression for elevation, Experiment to determine Young's modulus using microscope.

Module III: Fluids

Surface Tension: Definition and dimensions of surface tension, Excess of pressure over curved surfaces - Application to spherical and cylindrical drops and bubbles, Variation of Surface tension, with temperature, Jaegar's method, Viscosity: Co-efficient of viscosity and its dimensions - Rate of flow of liquid in a capillary tube – Poiseuilles's formula, Experiment to determine co-efficient of viscosity of a liquid, Variation of viscosity of a liquid with temperature, Applications of viscosity.

8. Reading Suggestions:

- Mechanics (Berkeley) Physics Course I: Charles Kittle, Walter D. Knight, M. Alvin and A.
- Ruderman (Tata McGraw Hill) (1981).

- Mechanics: H.S. Hans and S.P. Puri (Tata McGraw Hill) (2003). Classical Mechanics – J. Goldstein (Narosa Publ. House).
- Introduction to Classical Mechanics - R. G. Takwale and P. S. Puranik (Tata McGraw-Hill).
- John W. Jewett & Raymond A. Serway (2017). Physics for Scientists and Engineers. Cengage India Private Limited
- Jacob Millman & Charistos C. Halkias (2017). Integrated Electronics. Mc-Graw Hill.
- Eugene Hecht (2019). Optics. Pearson.
- A Textbook of Quantum Mechanics – P. M. Mathews and K. Venkatesan.

2. Assessment Criteria:

- Quiz-1: 10%
- Quiz-2: 10%
- Lab assignments: 20%
- Mid-Semester Examination: 20%
- End-Semester Examination: 40%

Physics Lab-II
Course code: PHY311

List of Experiments:

1. To study graphically the stress to strain relationship of vertical oscillations of a known load.
2. To determine the frequency of an electrically maintained tuning fork by Melde's method.
3. To determine the stopping potential of different filters and Planck's constant.
4. To determine the Moment of Inertia of a Flywheel.
5. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
6. To determine the Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
7. To verify hook's law and establish a relation between stress and strain.
8. Determine the surface tension of a given liquid at room temp using stalgmometer by drop number method