

ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY, Guwahati

Course Structure and Syllabus - Physics (Even semester)

MODULE 1: Mechanics (17 Lectures)

Conservative & non-conservative forces, Central forces, Conservation of angular momentum, Non-inertial frames of reference; Rotating co-ordinate system- Centripetal and Coriolis acceleration. (6 Lectures)

Harmonic Oscillator, damped harmonic motion – over-damped, critically damped and under damped oscillators; forced oscillation and resonance. (5 Lectures)

Elasticity, Hooke's law, factors affecting elasticity, Poisson's ratio, Relations in elasticity, twisting couple on a wire, bending of beams with symmetric cross-section, Cantilever. (6 Lectures)

MODULE 2: Fluid Mechanics (5 Lectures)

Bernoulli's Theorem and its important applications, Viscosity, Co-efficient of Viscosity, Streamline and Turbulent flow, Reynolds Number, Critical velocity, Poiseuille's equation for flow of liquid through a tube, Motion of a Rigid body in a viscous medium, Rotational viscometer.

MODULE 3: Acoustics (6 Lectures)

Decibel level of sound, Weber–Fechner law, Reverberation & Reverberation time, Sabine's formula for reverberation time (Derivation not required), Absorption co-efficient, Factors affecting acoustics of buildings and their remedies, Acoustic design of a hall. Production and properties of ultrasonic waves, Applications of Ultrasonic.

MODULE 4: Optics (3 Lectures)

Aberration in lenses, Spherical and Chromatic Aberration, Method of minimization of Spherical and Chromatic Aberration.

MODULE 5: Nanomaterials and Advanced materials (7 Lectures)

Introduction to Nanomaterials, Properties of Nanomaterials, Potential Well and Quantum Confinement (qualitative), Types of Nanomaterials and their applications. (4 Lectures)

Advanced materials: Shape memory alloys and Biomaterials. (3 Lectures)

Text Books:

1. Engineering Physics – V. Rajendran (Tata McGraw Hill education Pvt. Limited)
2. Engineering Physics – D.K. Bhattacharya and Poonam Tandon (Oxford University Press)

Reference Books:

1. Elements of Properties Matter – D.S. Mathur (S. Chand and Company Pvt. Limited)
2. Applied Physics for Engineers – Neeraj Mehta (PHI Learning Pvt. Limited)

List of Experiments:

1. To find the value of the modulus of rigidity of the material of a rod by using: Vertical Twisting apparatus / Horizontal Twisting apparatus.
2. To find the Moment of Inertia of a given body by using the Moment of Inertia Table.
3. To find the coefficient of viscosity of water by capillary flow method.
4. To find the refractive index of the material of a prism using a spectrometer (by finding the angle of the prism and the angle of minimum deviation of the prism).
5. To find the specific heat of a given liquid by the method of cooling.
6. To find the ratio of two low resistances by using a potentiometer.
7. To find the average resistance of the Meter Bridge wire by Carey Foster's method.
8. To find the refractive index of water by using a convex lens and a mirror.
9. Determination of Planck's constant.
10. To find the velocity of ultrasonic waves in a given liquid.

Text Books:

1. A Text Book on Practical Physics – K.G. Mazumdar and B. Ghosh (Sreedhar Publishers).
2. A Text book of Practical Physics - Samir Kumar Ghosh (New Central Book Agency).