

**Department of Physics**  
**Assam Engineering College**

**Syllabus for B.Tech 2<sup>nd</sup> Semester:**  
**(CE, ME, ChE, IPE)**

<b>Module No</b>	<b>Subtitle of the Module</b>	<b>Topics in the Module</b>	<b>No. of Lectures</b>
<b>I</b>	<b>Mechanics</b>	Conservative & non-conservative forces, Central forces, Conservation of angular momentum, Non-inertial frames of reference; Rotating co-ordinate system- Centripetal and Coriolis acceleration.	6
		Harmonic Oscillator, damped harmonic motion over-damped, critically damped and under damped oscillators; forced oscillation and resonance	5
		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
<b>II</b>	<b>Fluid Mechanics</b>	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.	7
<b>III</b>	<b>Acoustics</b>	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.	6
<b>IV</b>	<b>Optics</b>	Aberration in lenses, Spherical and Chromatic Aberration, Method of minimization of Spherical and Chromatic Aberration.	3
	<b>Quantum Mechanics</b>	Wave nature of particles, Uncertainty principle, Wave function and wave packets, Time dependent & time independent Schrodinger equation, Solution of Schrödinger's equation for one dimensional problem: Particle in a box.	5
<b>V</b>	<b>Nanomaterials and Advanced materials</b>	Introduction to Nanomaterials, Properties of Nanomaterials, Potential Well and Quantum Confinement (qualitative), Types of	4

		Nanomaterials and their applications.	
		Advanced materials: Shape memory alloys and Biomaterials.	3

**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 (Barton's apparatus).
2. To find the Moment of Inertia of a given body by using the Moment of Inertia Table.
3. 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).
4. To find the specific heat of a given liquid by the method of cooling.
5. To find the ratio of two low resistances by using a potentiometer.
6. To find the average resistance of the Meter Bridge wire by Carey Foster's method.
7. To find the refractive index of water by using a convex lens and a mirror.

**Text Books:**

1. A Text Book on Practical Physics – K.G. Mazumdar and B. Ghosh (Sreedhar Publishers).

**Course Outcomes:**

**CO1:** Students will be able to apply the fundamentals of mechanics to solve simple Engineering problems.

**CO2:** Students will be able to learn the basic principles of Fluid Mechanics along with their applications.

**CO3:** Students will be able to apply the principles of Acoustics to different Engineering complexities.

**CO4:** Students will be able to learn and analyze the different types of aberration in lenses along with their minimization.

**CO5:** Students will be able to learn the basic fundamentals of nanomaterials and advanced materials.

**Programme outcomes:**

- 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.