Course Syllabi: UPH001 Physics-I (L : T : P :: 3 : 1 : 2)

1. **Course number and name:** UPH001; Physics-I

2. **Credits and contact hours:** Credits: 4.5; Hours: 6

3. **Text book, title, author, and year**

- *David, J. G., Introduction to Electrodynamics, Pearson Education (2003).*
- *Ghatak, A., Optics, Tata McGraw Hill Publishing Co. Ltd, New Delhi (2006).*
- *Beiser, A., Concept of Modern Physics, Tata McGraw Hill Publishing Co. Ltd, New Delhi (2003).*
- *RajendranBaldev Raj and Palanichary P.V., Science & Technology of UltrasonicsIst Edition, Narosa Publications (2007).*
- *Schiff L. I., Quantum Mechanics, 3rd Edition MC- Graw Hill, (2007)*
- *Chattopadhyay D. and Rakshit P.C., Practical Physics, 7th Edition, New Central Book Agency (2002)*

   a. Other supplemental materials
      - Nil

4. **Specific course information**

   a. Brief description of the content of the course (catalog description)

   Sound Waves: Introduction, Reverberation, Eyring's Formula, Absorption Coefficient, Conditions for Good Acoustical Design, Production and Detection of Ultrasonic Waves and Their Applications.
   Electromagnetic Waves: Introduction, Maxwell's Equations in Differential and Integral Forms, Concept of Displacement Current, Electromagnetic Wave Equations for Free Space, Conducting and Dielectric Medium, Poynting Theorem, Concept of Wave Guides.
   Light: Interference: Thin Films, Wedge-Shaped Films, Non-Reflecting Films, Newton Rings, Michelson Interferometer, Diffraction: Single, Double and Multiple Slits, Dispersive and Resolving Powers. Polarization, Its Production, and Detection.
   Quantum Mechanics: Origin of Quantum Hypothesis, De-Broglie Hypothesis of Matter Waves, Uncertainty Principle, Wave Function and Wave Mechanics, Schrodinger Equation: Steady State Form, Quantum Mechanical Operators, Expectation Value, One Dimensional Solutions: Zero Potential, Step Potential, Potential Barrier and Potential Well.
   Laser: Basic Concepts, Laser Properties, Laser Systems: Ruby, Nd:YAG, He-Ne, Excimer, and Semiconductor Lasers.

5. **Specific goals for the course**

   After the completion of the course, the students will be able to:
   - Mechanical vibrations and their applications as well as acoustics and their use in design of a hall.
   - Ultrasonic waves, Lasers as well as Interference, diffraction, and polarization and their industrial applications.
   - Maxwell's equations and their applications in deducing several important parameters in different media.
   - Quantum mechanics and its engineering applications.

6. **Brief list of topics to be covered**
    - Sound waves
    - Electromagnetic waves
    - Light
    - Laser
    - Quantum mechanics