**Course objectives:**  
To provide the concept and knowledge of physics with the emphasis of present day application. The background of physics corresponding to Proficiency Certificate Level is assumed.

1. **Oscillation(7 hours)**
   1. Mechanical Oscillation: Introduction
   2. Free oscillation
   3. Damped oscillation
   4. Forced mechanical oscillation
   5. EM Oscillation: Free, Damped and Forced Electromagnetic oscillation
2. **Wave motion(2 hours)**
   1. Waves and particles
   2. Progressive wave
   3. Energy, power and intensity of progressive wave
3. **Acoustics(3 hours)**
   1. Reverberation
   2. Sabine's Law
   3. Ultrasound and its applications
4. **Physical Optics(12 hours)**
   1. **Interference**
      1. Intensity in double slit interference
      2. Interference in thin films
      3. Newton's rings
      4. Hadinger fringes
   2. **Diffraction**
      1. Fresnel and Fraunhoffer’s diffraction
      2. Intensity due to a single slit
      3. Diffraction grating
      4. X-ray diffraction, X-ray for material test
   3. **Polarization**
      1. Double refraction
      2. Nichol prism, Wave plates
      3. Optical activity, Specific  rotation

1. **Geometrical Optics(3 hours)**
   1. Lenses, combination of lenses
   2. Cardinal points
   3. Chromatic aberration

1. **Laser and Fiber Optics(4 hours)**
   1. **Laser production**
      1. He-Ne laser
      2. Uses of laser
   2. **Fiber Optics**
      1. Self focusing
      2. Applications of Optical fiber
2. **Electrostatics(8 hours)**
   1. Electric charge and Force
   2. Electric field and Potential
   3. Electrostatic potential energy
   4. Capacitors, Capacitor with dielectric
   5. Charging and Discharging of a capacitor
3. **Electromagnetism(11 hours)**
   1. **Direct Current:** Electric current
      1. Ohm's law, Resistance and Resistivity
      2. Semiconductor and Superconductor
   2. **Magnetic Fields:**
      1. Magnetic force and Torque
      2. Hall effect
      3. Cyclotron, Synchrotron
      4. Biot-Savart law
      5. Ampere’s circuit law, Magnetic fields straight conductors
      6. Faraday’s laws, Induction and Energy transformation, Induced field
      7. LR circuit, Induced Magnetic field
      8. Displacement current

1. **Electromagnetic Waves(5 hours)**
   1. Maxwell’s equations
   2. Wave equations, Speed
   3. E and B fields
   4. Continuity equation
   5. Energy transfer
2. **Photon and Matter Waves(5 hours)**
   1. Quantization of energy
   2. Electrons and Matter waves
   3. Schrodinger wave equation
   4. Probability distribution
   5. One dimensional potential well
   6. Uncertainty principle
   7. Barrier tunneling

**References:**

1. Fundamentals of Physics: Halliday, Resnick, Walker (Latest Edition)
2. A text book of Optics: Brij Lal and Subrahmanyam (Latest edition)
3. Modern Engineering Physics: A. S.Basudeva
4. Engineering Physics: R. K.Gaur and S. L.Gupta
5. Waves and Oscillation: Brij Lal and Subrahmanyam

**Evaluation Scheme:**  
There will be questions covering all the chapters in the syllabus. The evaluation scheme for the question will be as indicated in the table below:

|  |  |  |
| --- | --- | --- |
| **Chapter** | **Hours** | **Mark distribution\*** |
| 1 | 7 | 10 |
| 2,3 | 5 | 5 |
| 4 | 12 | 15 |
| 5 | 3 | 5 |
| 6 | 4 | 5 |
| 7,8 | 19 | 30 |
| 9 | 5 | 5 |
| 10 | 5 | 5 |
| Total | 60 | 80 |

**\*Note: There may be minor deviation in mark distribution.**