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### Institute for NET/JRF, GATE, IIT-JAM, JEST, TIFR and GRE in PHYSICAL SCIENCES

#### **Content-Waves and Oscillations**

- 1. Differential Equation for Simple Harmonic Oscillator
- 1.1 Hook's Law
- 1.2 Energy of Simple Harmonic Motion
- 1.3 Mass Loaded Spring System
- 1.4 Simple Pendulum
- 1.5 Compound Pendulum
- 1.6 The Torsional Pendulum
- 2. Damped and Forced Oscillators
- 2.1 Damped Harmonic Oscillation
- 2.2 Forced Oscillations and Resonance
- 3. Superposition of Two or more Simple Harmonic Oscillations
- 3.1 Superposition of Two Collinear Harmonic Oscillations
  - 2.1.1 Addition of Two S.H.M having Equal Frequencies
  - 2.1.2 Addition of Two S.H.M having Different Frequencies
- 3.2 Superposition of Two Perpendicular Harmonic Oscillations
  - 2.2.1 Addition of Two SHM having Equal Frequencies
  - 2.2.2 Addition of Two SHM having Different Frequencies (Lissajous Figures)
- 4. Wave Motion
- 4.1 Traveling Waves
- 4.2 Stationary Waves
- 4.3 Longitudinal Waves
- 4.4 Transverse Waves
- 4.5 Phase Velocity
- 4.6 Group Velocity
- 5. Doppler Effect
- 5.1 Doppler Effect in Sound Waves
- 5.2 Doppler Effect in Light

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#### **Content-Optics**

#### 1. Geometric Optics

- 1.1 Fermat's Principle
- 1.2 Refraction and Reflection by spherical surfaces
- 1.3 Thin Lens
  - 1.3.1 The Principal Foci and Focal Lengths of a Lens
  - 1.3.2 The Newton Formula
  - 1.3.3 Magnification

#### 2. Interference of Light

- 2.1 Young's double slit Experiment
- 2.2 Displacement of Fringes by the introduction of a thin Lamina Sheet

## 3. Diffraction of Light

- 3.1 Fraunhofer's diffraction at a single slit
- 3.2 Fraunhofer's Diffraction at a Double Slit
- 3.3 Diffraction Grating
- 3.4 Rayleigh criterion and resolving power
  - 3.4.1 Rayleigh's Criterion of Resolution
  - 3.4.2 Resolving Power of a Grating
  - 3.4.3 Difference between Dispersive Power and Resolving Power

#### 4. Polarization of Light

- 4.1 Production of Plane Polarized Light
  - 4.1.1 Polarization by Reflection
  - 4.1.2 Polarization by Refraction
  - 4.1.3 Polarization by selective absorption
  - 4.1.4 Polarization by Double Refraction
  - 4.1.5 Polarization by Scattering

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- 4.2 Malus Law
- 4.3 Superposition of Two Disturbances and Production of Polarized Wave
  - 4.3.1 Superposition of Two Waves with Parallel Electric Field
  - 4.3.2 Superposition of Two Waves with Mutually Perpendicular Electric field
- 4.4 The Phenomenon of Double Refraction
- 4.5 Half wave plate and Quarter wave plate
- 4.6 Wollaston Prism
- 4.7 Wollaston Prism
- 4.8 Analysis of Polarized Light

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