

## Important Topics for Physics 106 Final Exam Review

### **Chapter 14: Sound**

- Calculating the speed of sound
- Resonance
- Standing waves in strings
- Standing waves in air columns
- Doppler effect
- Beat frequency

### **Chapter 15: Electric Forces and Electric Fields**

- Properties of electric charges
- Insulators and conductors
- Coulomb's Law
- Superposition Principle
- Electric Field
- Conductors in equilibrium
- Electric flux and Gauss's Law

### **Chapter 16: Electrical Energy and Capacitance**

- Electric potential energy
- Potential difference and electric potential
- Equipotential surfaces
- Capacitance and capacitors
- Capacitors in series and parallel
- Energy stored in a capacitor
- Batteries and emf

### **Chapter 17: Current and Resistance**

- Electric Current
- Resistance, resistivity, and Ohm's Law
- Power dissipated in a resistor

### **Chapter 18: Direct-Current Circuits**

- emf
- Resistors in series and parallel
- Kirchhoff's Rules
- RC circuits

### **Chapter 19: Magnetism**

- Magnets and magnetic fields
- Force on a current carrying conductor
- Torque on a current loop and electric motors
- Motion of a charged particle in a magnetic field
- Magnetic fields due to currents: wires, loops, and solenoids
- Magnetic force between two parallel conductors
- Ampere's Law

## **Chapter 20: Induced Voltages and Inductance**

- Induced emf and magnetic flux
- Faraday's Law of Induction
- Lenz's Law
- Motional emf
- Generators
- Self-inductance
- RL Circuits
- Energy stored in a magnetic field

## **Chapter 21: Alternating-Current Circuits and Electromagnetic Waves**

- Resistors, capacitors, and inductors in an AC circuit
- Capacitive reactance, inductive reactance, and impedance
- RLC series circuits: phase, power, and resonance
- Relation between rms and maximum currents and voltages
- Transformers
- Properties of electromagnetic waves
- The electromagnetic spectrum
- Doppler effect for electromagnetic waves

## **Chapter 22: Reflection and Refraction of Light**

- Geometric optics: the Law of Reflection and Snell's Law of Refraction
- Dispersion and prisms
- Total internal reflection

## **Chapter 23: Mirrors and Lenses**

- Reflection from mirrors (flat, concave, convex) – image distance and magnification
- Refraction at a single surface – image distance and magnification
- Thin Lenses – ray diagrams, image distance, and magnification

## **Chapter 24: Wave Optics**

- Double slit interference
- Thin film interference and phase change due to reflection
- Diffraction – single slit and gratings
- Polarization of light

## **Chapter 25: Optical Instruments**

- The eye and corrective lenses
- Magnifying lenses, microscopes, and telescopes

## **Chapter 26: Relativity**

- Speed of light
- Time dilation
- Length contraction

## **Chapter 27: Quantum Physics**

- Blackbody radiation
- Photoelectric effect and Compton effect
- deBroglie wavelength
- Heisenberg Uncertainty Principle

### **Chapter 27: Atomic Physics**

- Atomic Spectra and the Bohr Model
- Quantum numbers and the Pauli Exclusion Principle

### **Chapter 28: Nuclear Physics**

- Properties of nuclei
- Binding energy
- Radioactivity and half-life
- Radioactive decay: alpha, beta, and gamma decay
- Balancing nuclear reactions
- Absorbed dose and effective dose