

Exam I

- 16-1 Static Electricity; Electric Charge and Its Conservation
- 16-2 Electric Charge in the Atom
- 16-3 Insulators and Conductors
- 16-4 Induced Charge; the Electroscope
- 16-5 Coulomb's Law
- 16-6 Solving Problems Involving Coulomb's Law and Vectors
- 16-7 The Electric Field
- 16-8 Field Lines
- 16-9 Electric Fields and Conductors

~~*16-10 Gauss's Law~~

~~*16-11 Electric Forces in Molecular Biology: DNA Structure and Replication~~

~~*16-12 Photocopy Machines and Computer Printers Use Electrostatics~~

- 17-1 Electric Potential Energy and Potential Difference
- 17-2 Relation Between Electric Potential and Electric Field
- 17-3 Equipotential Lines
- 17-4 The Electron Volt, a Unit of Energy
- 17-5 Electric Potential Due to Point Charges

~~*17-6 Potential Due to Electric Dipole; Dipole Moment~~

- 17-7 Capacitance

~~17-8 Dielectrics~~

- 17-9 Storage of Electric Energy

~~*17-10 Cathode Ray Tube: TV and Computer Monitors, Oscilloscope~~

~~*17-11 The Electrocardiogram (ECG or EKG)~~

- 18-1 The Electric Battery
- 18-2 Electric Current
- 18-3 Ohm's Law: Resistance and Resistors
- 18-4 Resistivity
- 18-5 Electric Power
- 18-6 Power in Household Circuits

~~18-7 Alternating Current~~

~~*18-8 Microscopic View of Electric Current~~

~~*18-9 Superconductivity~~

~~*18-10 Electrical Conduction in the Human Nervous System~~

- 19-1 EMF and Terminal Voltage
- 19-2 Resistors in Series and in Parallel
- 19-3 Kirchhoff's Rules
- 19-4 ~~EMFs in Series and in Parallel; Charging a Battery~~
- 19-5 Circuits Containing Capacitors in Series and in Parallel
- 19-6 RC Circuits—Resistor and Capacitor in Series

~~19-7 Electric Hazards~~

~~*19-8 Ammeters and Voltmeters~~

Exam II

- 20-1 Magnets and Magnetic Fields
- 20-2 Electric Currents Produce Magnetic Fields
- 20-3 Force on an Electric Current in a Magnetic Field; Definition of **B**
- 20-4 Force on an Electric Charge Moving in a Magnetic Field
- 20-5 Magnetic Field Due to a Straight Wire
- 20-6 Force Between Two Parallel Wires
- 20-7 Solenoids and Electromagnets
- ~~*20-8 Ampère's Law~~
- ~~*20-9 Torque on a Current Loop; Magnetic Moment~~
- ~~*20-10 Applications: Galvanometers, Motors, Loudspeakers~~
- ~~*20-11 Mass Spectrometer~~
- ~~*20-12 Ferromagnetism: Domains and Hysteresis~~

- 21-1 Induced EMF
- 21-2 Faraday's Law of Induction; Lenz's Law
- 21-3 EMF Induced in a Moving Conductor
- 21-4 Changing Magnetic Flux Produces an Electric Field
- ~~21-5 Electric Generators~~
- ~~*21-6 Back EMF and Counter Torque; Eddy Currents~~
- 21-7 Transformers and Transmission of Power
- ~~*21-8 Applications of Induction: Sound Systems, Computer Memory, the Seismograph~~
- ~~*21-9 Inductance~~
- ~~*21-10 Energy Stored in a Magnetic Field~~
- ~~*21-11 LR Circuit~~
- ~~*21-12 AC Circuits and Impedance~~
- ~~*21-13 LRC Series AC Circuit~~
- ~~*21-14 Resonance in AC Circuits~~

- 22-1 Changing Electric Fields Produce Magnetic Fields; Maxwell's Equations
- 22-2 Production of Electromagnetic Waves
- 22-3 Light as an Electromagnetic Wave and the Electromagnetic Spectrum
- 22-4 Measuring the Speed of Light
- *22-5 Energy in EM Waves
- ~~*22-6 Momentum Transfer and Radiation Pressure~~
- *22-7 Radio and Television; Wireless Communication

- 23-1 The Ray Model of Light
- 23-2 Reflection; Image Formation by a Plane Mirror
- 23-3 Formation of Images by Spherical Mirrors
- 23-4 Index of Refraction
- 23-5 Refraction: Snell's Law
- 23-6 Total Internal Reflection; Fiber Optics
- 23-7 Thin Lenses; Ray Tracing
- 23-8 The Thin Lens Equation; Magnification
- ~~*23-9 Combinations of Lenses~~
- ~~*23-10 Lensmaker's Equation~~

Exam III

- 24-1 Waves Versus Particles; Huygens' Principle and Diffraction
- *24-2 Huygens' Principle and the Law of Refraction
- 24-3 Interference—Young's Double-Slit Experiment
- 24-4 The Visible Spectrum and Dispersion
- 24-5 Diffraction by a Single Slit or Disk
- 24-6 Diffraction Grating
- ~~*24-7 The Spectrometer and Spectroscopy~~
- 24-8 Interference by Thin Films
- ~~*24-9 Michelson Interferometer~~
- 24-10 Polarization
- ~~*24-11 Liquid Crystal Displays (LCD)~~
- ~~*24-12 Scattering of Light by the Atmosphere~~

- 25-1 Cameras, Film and Digital
- 25-2 The Human Eye; Corrective Lenses
- 25-3 Magnifying Glass
- 25-4 Telescopes
- ~~*25-5 Compound Microscope~~
- ~~*25-6 Aberrations of Lenses and Mirrors~~
- 25-7 Limits of Resolutions; Circular Apertures
- 25-8 Resolution of Telescopes and Microscopes; the λ Limit
- 25-9 Resolution of the Human Eye and Useful Magnification
- ~~*25-10 Specialty Microscopes and Contrast~~
- ~~*25-11 X Rays and X-Ray Diffraction~~
- ~~*25-12 X-Ray Imaging and Computed Tomography (CT Scan)~~

- 26-1 Galilean–Newtonian Relativity
- 26-2 Postulates of the Special Theory of Relativity
- 26-3 Simultaneity
- 26-4 Time Dilation and the Twin Paradox
- 26-5 Length Contraction
- *26-6 Four-Dimensional Space–Time
- 26-7 Relativistic Momentum and Mass
- 26-8 The Ultimate Speed
- 26-9 $E = mc^2$; Mass and Energy
- 26-10 Relativistic Addition of Velocities
- 26-11 The Impact of Special Relativity

- 27-1 Discovery and Properties of the Electron
- 27-2 Planck's Quantum Hypothesis; Blackbody Radiation
- 27-3 Photon Theory of Light and the Photoelectric Effect
- 27-4 Energy, Mass, and Momentum of a Photon
- ~~*27-5 Compton Effect~~
- ~~27-6 Photon Interactions; Pair Production~~
- 27-7 Wave–Particle Duality; the Principle of Complementarity
- 27-8 Wave Nature of Matter
- ~~*27-9 Electron Microscopes~~
- 27-10 Early Models of the Atom
- 27-11 Atomic Spectra: Key to the Structure of the Atom
- 27-12 The Bohr Model
- ~~27-13 de Broglie's Hypothesis Applied to Atoms~~

Final Exam

- 28-1 Quantum Mechanics—A New Theory
- 28-2 The Wave Function and Its Interpretation; the Double-Slit Experiment
- 28-3 The Heisenberg Uncertainty Principle
- ~~*28-4 Philosophic Implications; Probability versus Determinism~~
- 28-5 Quantum-Mechanical View of Atoms
- 28-6 Quantum Mechanics of the Hydrogen Atom; Quantum Numbers
- 28-7 Complex Atoms; the Exclusion Principle
- 28-8 The Periodic Table of Elements
- ~~*28-9 X-Ray Spectra and Atomic Number~~
- ~~*28-10 Fluorescence and Phosphorescence~~
- *28-11 Lasers
- ~~*28-12 Holography~~

- *29-1 Bonding in Molecules
- *29-2 Potential-Energy Diagrams for Molecules
- *29-3 Weak (van der Waals) Bonds
- *29-4 Molecular Spectra
- *29-5 Bonding in Solids
- *29-6 Band Theory of Solids
- *29-7 Semiconductors and Doping
- *29-8 Semiconductor Diodes
- *29-9 Transistors and Integrated Circuits

- 30-1 Structure and Properties of the Nucleus
- 30-2 Binding Energy and Nuclear Forces
- 30-3 Radioactivity
- 30-4 Alpha Decay
- 30-5 Beta Decay
- 30-6 Gamma Decay
- 30-7 Conservation of Nucleon Number and Other Conservation Laws
- 30-8 Half-Life and Rate of Decay
- 30-9 Calculations Involving Decay Rates and Half-Life
- 30-10 Decay Series
- 30-11 Radioactive Dating
- ~~*30-12 Stability and Tunneling~~
- ~~30-13 Detection of Radiation~~