

Exam 2: Tuesday, April 25, 2006
Study Guide

Topics Covered

Chapter 18: DC Circuits

Sections: 18.1 – 18.5

- Using Ohm's Law
- Resistors in series and parallel (need to know how to find Req)
- Be able to reduce a complicated resistor network to one single resistor
- Kirchhoff's Rules for complex circuits
- Be able to apply Kirchhoff's rules to solve for the currents
- Power dissipated by a resistor
- Charging and discharging a capacitor
- RC circuits
- Time constant
- Qualitative circuit behavior

Chapter 19: Magnetism

Sections: 19.1-19.8 (except for Ampere's Law in section 19.7)

- Magnets and Magnetic fields
- Magnetic force on a moving charge in a magnetic field
- Magnetic force on a current in a magnetic field
- Right hand rule for the direction of the force
- Torque on a loop of current
- Motion of a particle in a B-field
- Velocity selector
- Mass spectrometer
- B-field of a current carrying wire
- Right hand rule for finding the direction of the B-field created by the wire
- Force between two parallel conductors

although from ch.20 and 21, you should remember that:

- Electric charges and changing B-fields are sources of E-fields
- Moving electric charges and changing E-fields are sources of B-fields
- changing E and B-fields propagate as electromagnetic waves
- these wave propagate at the speed of light
- light is a form of electromagnetic wave

Chapter 22: Reflection and Refraction

Sections: 22.1 – 22.4, 22.7

- Ray model for light rays
- Reflection
- Refraction
- Index of refraction
- Snell's law
- Dispersion
- Total internal reflection
- Critical angle

Chapter 23: Mirrors and Lenses

Sections: 23.1 – 23.3, 23.6, 23.7, also conceptual aspects of 23.4

- Flat mirrors
- Object distance and image distance
- Concave and convex spherical mirrors
- Be able to draw ray diagrams to locate images for spherical mirrors
- focal length
- mirror equation $1/d_o + 1/d_i = 1/f = 2/R$
- Lenses: converging and diverging
- Be able to draw ray diagrams for lenses to locate images
- Real and virtual images
- Magnification

Equations you are expected to know and understand:

$$V = IR \text{ (Ohm's Law)}$$

$$R_{eq} = R_1 + R_2 + R_3 + \dots \text{ series resistors}$$

$$1/R_{eq} = 1/R_1 + 1/R_2 + 1/R_3 \dots \text{ parallel resistors}$$

$$P = IV \text{ (power consumed by a resistor)}$$

$$\text{Kirchhoff's rules: } I_1 = I_2 + I_3, \text{ Sum of } \Delta(V) \text{ around closed} = 0$$

$$F = qvB\sin(\theta) \text{ or } F = ILB\sin(\theta)$$

$$\text{angle of incidence} = \text{angle of reflection (law of reflection)}$$

$$n_1\sin(\theta_1) = n_2\sin(\theta_2) \text{ Snell's Law}$$

$$\sin(\theta_c) = n_2/n_1$$

$$M = h_i/h_o = -d_i/d_o$$

$$1/d_o + 1/d_i = 2/R = 1/f \text{ (know the sign conventions for using these for mirrors and lenses)}$$

Things you should already know:

$$\Delta(K.E) + \Delta(P.E) = 0 \text{ (conservation of energy)}$$

$$F = qE \text{ (electric force)}$$

$$\Delta(P.E) = q \cdot \Delta(V)$$