

Comprehensive Exam #5

- I. Mechanical Waves and Sound
 - A. Graphical Analysis of Waves
 - 1. Amplitude vs. position
 - 2. Amplitude vs. time
 - B. Standing Waves
 - 1. Vibrating strings
 - 2. Air columns- open at both ends or open at one end/closed at other
 - C. Other General Wave Characteristics
 - 1. Energy and power
 - 2. Intensity and decibels
 - 3. Interference and diffraction
 - 4. Doppler shift
- II. Geometrical Optics
 - A. Reflection/Refraction at a boundary
 - 1. Refracted values of f , λ and v
 - 2. Total internal reflection
 - B. Image formation and classification with mirrors
 - 1. Ray Tracing
 - 2. Algebraic Analysis
 - 3. Special cases- flat mirror, make-up mirror and anti-theft mirror
 - C. Image formation and classification with thin lenses
 - 1. Ray Tracing
 - 2. Algebraic Analysis
 - 3. Special cases- magnifying glass
- III. Physical Optics
 - A. Single slit
 - B. Double slits
 - C. Diffraction Grating
 - D. Historical figures
 - 1. Newton vs. Huygens
 - 2. Young, Fresnel and Young & Fresnel
 - 3. Maxwell and Hertz

This test will consist of eight problem sets containing 5 questions with each set. Three of the five questions will be numerical in nature requiring the use of a calculator. The other two questions will be conceptual requiring knowledge of physics that is more verbally analytical in nature. You will be given 45 minutes to give answers to your best five sets leaving three complete sets blank. Failure to comply will result in a penalty.