

Name:

Physics 2130: Example Final Exam

Real Final Date 16 December 2003

Part 1: 12 multiple choice questions on Chapters 23-25 worth 2.5 points each.

1. A concave mirror forms a real image at 25.0 cm from the mirror surface along the principal axis. If the corresponding object is at a 10.0-cm distance, what is the mirror's focal length?
 - a. 1.43 cm
 - b. 16.7 cm
 - c. 12.4 cm
 - d. 7.14 cm
2. An object is placed at a distance of 30 cm from a thin convex lens along its axis. The lens has a focal length of 10 cm. What are the values, respectively, of the image distance and magnification?
 - a. 60 cm and 2.0
 - b. 15 cm and 2.0
 - c. 60 cm and -0.50
 - d. 15 cm and -0.50
3. An object is placed at a distance of 50 cm from a thin lens along the axis. If a real image forms at a distance of 40 cm from the lens, on the opposite side from the object, what is the focal length of the lens?
 - a. 22 cm
 - b. 45 cm
 - c. 90 cm
 - d. 200 cm
4. In an ideal case rays coming from an object toward a lens or mirror should be reasonably close to the optic axis. To the extent that this condition is not completely met, which one of the following effects occurs?
 - a. spherical aberration
 - b. mirages
 - c. chromatic aberration
 - d. light scattering

5. Two narrow slits are 0.025 mm apart. When a laser shines on them, bright fringes form on a screen that is a meter away. These fringes are 3.0 cm apart. What is the separation between the second order bright fringe and the central fringe?
- a. 8.6 cm
 - b. 6.0 cm
 - c. 5.3 cm
 - d. 2.6 cm
6. What wavelength monochromatic source in the visible region (390 to 710 nm) can be used to constructively reflect off a soap film ($n = 1.46$) if the film is 240 nm thick?
- a. 467 nm
 - b. 562 nm
 - c. 587 nm
 - d. 480 nm
7. Light of wavelength 610 nm is incident on a slit of width 0.20 mm and a diffraction pattern is produced on a screen that is 1.5 m from the slit. What is the distance of the second dark fringe from the center of the bright fringe? ($1 \text{ nm} = 10^{-9} \text{ m}$)
- a. 0.68 cm
 - b. 0.92 cm
 - c. 1.2 cm
 - d. 1.4 cm
8. Sunlight reflected from a smooth ice surface is completely polarized. Determine the angle of incidence. (n of ice = 1.309)
- a. 25.60°
 - b. 47.89°
 - c. 52.62°
 - d. 56.26°

9. A telescope has an objective lens with a focal length of 100 cm and an eyepiece of focal length 3.0 cm. What is the magnification of the telescope?
- a. 30
 - b. 33
 - c. 60
 - d. 180
10. Tripling the focal length in a telephoto lens, while keeping the aperture size constant, will change the f-number by what factor?
- a. 1/9
 - b. 1/3
 - c. 3
 - d. 9
11. A magnifying lens with a focal length of 10 cm has what magnification when the viewing eye is relaxed?
- a. 7.14
 - b. 2.5
 - c. 3.0
 - d. 3.5
12. A binary star in the constellation Orion has an angular separation between the stars of 10^{-5} radians. Assuming a wavelength of 500 nm, what is the smallest aperture (diameter) telescope that will just resolve the two stars? (1 nm = 10^{-9} m)
- a. 3.0 cm
 - b. 4.2 cm
 - c. 6.1 cm
 - d. 12.6 cm

Part 2: 28 multiple choice questions on Chapters 1-14,22 worth 2.5 points each. These questions are taken from the six example and real hour exams given during the semester.