Instructor(s): *Z. Qiu*

PHYSICS DEPARTMENT

PHY2005, Spring 2015   EXAM III   March 25, 2015

Name (print, last first): _____   Signature: _____

On my honor, I have neither given nor received unauthorized aid on this examination.

YOUR TEST NUMBER IS THE 5-DIGIT NUMBER AT THE TOP OF EACH PAGE.

(1) **Code your test number on your answer sheet (use lines 76–80 on the answer sheet for the 5-digit number)**. Code your name on your answer sheet. **DARKEN CIRCLES COMPLETELY**. Code your UFID number on your answer sheet.

(2) Print your name on this sheet and sign it also.

(3) Do all scratch work anywhere on this exam that you like. **Circle your answers on the test form.** At the end of the test, this exam printout is to be turned in. No credit will be given without both answer sheet and printout.

(4) **Blacken the circle of your intended answer completely, using a #2 pencil or <u>blue</u> or <u>black</u> ink**. Do not make any stray marks or some answers may be counted as incorrect.

(5) **The answers are rounded off. Choose the closest to exact. There is no penalty for guessing. If you believe that no listed answer is correct, leave the form blank.**

(6) Hand in the answer sheet separately.

Physical Constants:

$g = 9.8 \text{ m/s}^2$	$m_e = 9.11 \times 10^{-31} \text{ Kg}$	$m_p = 1.67 \times 10^{27} \text{ Kg}$
$e = 1.6 \times 10^{-19} \text{ C}$	constant k in Coulomb's Law: $k = 8.99 \times 10^9 \text{ Nm}^2/\text{C}^2$	
$\mu_o = 4\pi \times 10^{-7} \text{ N/A}^2$	$\varepsilon_o = 8.85 \times 10^{-12} \text{ C}^2/\text{Nm}^2$	

1. At a distance of 2.0×10^{12}m from a star, the radiation from the star is 540 W/m^2, what is the intensity at 1.0×10^{13}m from the star?

   (1) 21.6 W/m^2 (2) 10.8 W/m^2 (3) 35.0 W/m^2 (4) 31.5 W/m^2 (5) 540 W/m^2

2. An oil film floats on a water surface. The indices of refraction for water and oil, respectively, are 1.333 and 1.256. A ray of light is incident on the air-to-oil surface at an angle of 56.0°with the normal then goes into water. What is the angle the light ray making with the normal direction in water?

   (1) 38.5°   (2) 45.1°   (3) 32.3°   (4) 42.0°   (5) 49.7°

3. If red light of frequency 4.68×10^{14} Hz from a monochromatic source is incident upon the surface of fused quartz ($n = 1.56$) at an angle of 60°, what is the wavelength of the ray refracted within the quartz?

   (1) 410 nm   (2) 292 nm   (3) 560 nm   (4) 874 nm   (5) 640 nm

4. A camera is placed at the bottom of an oil tank partially filled with oil (index of refraction n=1.26). At what angle to the vertical must the camera point if it is to see the side markers just above the surface of oil?

   (1) None of the others   (2) 58.2°   (3) 30.0°   (4) 63.1°   (5) 77.5°

5. An object is held at a distance of 32 cm from a convex mirror creating an image that is 1/3 the object size. What is the focal length of the mirror?

   (1) −16.0 cm   (2) −8.0 cm   (3) −12.0 cm   (4) −24 cm   (5) 32 cm

6. A magnifying glass with 6.0-cm focal length is used to look at an object. Where should the object be placed if the image is to be 25 cm from the lens?

   (1) 4.8 cm   (2) 8.7 cm   (3) 25 cm   (4) 12.5 cm   (5) none of the others

7. Two thin lenses with focal lengths 5.0 cm and 6.0 cm are placed in contact in an orientation so that their optic axes coincide. Determine the standard magnification when the combination is used as a magnifier?

   (1) 9.1   (2) 5.0   (3) 4.3   (4) 7.3   (5) 15

8. An object is placed at a distance of 40 cm from a thin lens along the axis. If a real image forms at a distance of 20 cm from the lens, on the opposite side from the object, what is the focal length of the lens?

   (1) 13.3 cm   (2) 22.7 cm   (3) 45.4 cm   (4) 60.0 cm   (5) 10.7 cm

9. Two thin lenses with 15.0-cm focal lengths are mounted at opposite ends of a 45.0-cm long tube. An object is located 67.5 cm from one end of the tube. How far from the opposite end is the final image?

   (1) 36.0 cm   (2) 25.0 cm   (3) 55.5 cm   (4) 63.2 cm   (5) 48.0 cm

10. You try to look at yourself in a silvered ball of diameter 80 cm from outside when you are 2.0 m away. Where is your image?

    (1) virtual and located 18.1 cm inside the ball.
    (2) real and located 18.1 cm outside the ball.
    (3) virtual and located 36.7 cm inside the ball.
    (4) real and located 36.7 cm outside the ball
    (5) real and located 8.0 cm inside the ball.