Assignment # 8

Optics II

Chapter 34: Geometric Optics

Important Concepts and Formulas

Lateral Magnification: $m = \frac{y^{|}}{y}$

Object-image relationship, spherical mirror: $\frac{1}{S} + \frac{1}{S^{|}} = \frac{2}{R}$

Lens Formula: $\frac{1}{S} + \frac{1}{S^{|}} = \frac{1}{f}$

$D = \frac{f}{f-number}$

Question 1:

A common telephoto lens for a 35-mm camera has a focal length of 200 mm; its f-stops range from $\frac{f}{2.8}$ to $\frac{f}{22}$.

(a) What is the corresponding range of aperture diameters?
(b) What is the corresponding range of image intensities on the film?

Question 2:

(a) A candle 4.85 cm tall is 39.2 cm to the left of a plane mirror. Where is the image formed by the mirror, and what is the height of this image?
(b) A concave mirror has a radius of curvature of 34.0 cm. What is its focal length? If the mirror is immersed in water (refractive index 1.33), what is its focal length?

Question 3:

A coin is placed next to the convex side of a thin spherical glass shell having a radius of curvature of 18.0 cm. Reflection from the surface of the shell forms an image of the 1.5-cm-tall coin that is 6.00 cm behind the glass shell. Where is the coin located? Determine the size, orientation, and nature (real or virtual) of the image.

Question 4:

Describe the image formation by concave and convex mirror with the help of four principle rays when object is placed at different location

(a) Beyound center of curvature C
(b) St center of curvature C
(c) Between center of curvature and focus F
(d) At focus point F
(e) Between focus point F and vertex V.