**SOLUTION TO SIMILAR PROBLEMS**

**Chapter 37: WAVE OPTICS**

Q No: 1, 2, 3, 12, 29, 31, 35, 59

1. A laser beam is incident on two slits with a separation of 0.200 mm, and a screen is placed 5.00 m from the slits. An interference pattern appears on the screen. If the angle from the center fringe to the first bright fringe to the side is 0.181°, what is the wavelength of the laser light?



2. Light of wavelength 530 nm illuminates a pair of slits separated by 0.300 mm. If a screen is placed 2.00 m from the slits, determine the distance between the first and second dark fringes.



3. Light of wavelength 620 nm falls on a double slit, and the first bright fringe of the interference pattern is seen at an angle of 15.0° with the horizontal. Find the separation between the slits.



12. A riverside warehouse has several small doors facing the river. Two of these doors are open as shown in Figure P37.12. The walls of the warehouse are lined with sound-absorbing material. Two people stand at a distance *L* = 150 m from the wall with the open doors. Person A stands along a line passing through the midpoint between the open doors, and person B stands a distance *y* = 20 m to his side. A boat on the river sounds its horn. To person A, the sound is loud and clear. To person B, the sound is barely audible. The principal wavelength of the sound waves is 3.00 m. Assuming person B is at the position of the first minimum, determine the distance *d* between the doors, center to center.





29. A thin film of oil (*n* = 1.25) is located on smooth, wet pavement. When viewed perpendicular to the pavement, the film reflects most strongly red light at 640 nm and reflects no green light at 512 nm. How thick is the oil film?



31. A possible means for making an airplane invisible to radar is to coat the plane with an antireflective polymer. If radar waves have a wavelength of 3.00 cm and the index of refraction of the polymer is *n* = 1.50, how thick would you make the coating?



35. An air wedge is formed between two glass plates separated at one edge by a very fine wire of circular cross section as shown in Figure P37.35. When the wedge is illuminated from above by 600-nm light and viewed from above, 30 dark fringes are observed. Calculate the diameter *d* of the wire.





59. In a Newton’s-rings experiment, a plano-convex glass (*n* = 1.52) lens having radius *r* = 5.00 cm is placed on a flat plate as shown in Figure P37.59. When light of wavelength *λ* = 650 nm is incident normally, 55 bright rings are observed, with the last one precisely on the edge of the lens. (a) What is the radius *R* of curvature of the convex surface of the lens? (b) What is the focal length of the lens?

