

Phys 214 – Answers that were omitted in University Physics and Modern Physics

Chapter 35

- 35.1 a) 2.50 m b) 1.00 m, 4.00 m
 35.3 0.75 m, 2.00 m, 3.25 m, 4.50 m, 5.75 m, 7.00 m, 8.25 m
 35.5 a) 2.0 m b) constructively
 c) 1.0 m; destructively
 35.9 0.83 mm
 35.11 590 nm
 35.13 12.6 cm
 35.15 1200 nm
 35.17 a) $m = 19, 39$ bright fringes
 b) $m = \pm 19, \theta = \pm 73.3^\circ$
 35.19 a) $0.750I_0$ b) 80 nm
 35.21 1670 rad
 35.23 a) 0.888 mm b) 0.444 mm
 35.25 71.4 m
 35.27 114 nm
 35.29 0.0235°
 35.31 a) $\Delta T = 56$ nm b) i) 2180 nm
 ii) 198.5 nm; 11.0 wavelengths
 35.33 a) 514 nm; green b) 603 nm; orange
 35.35 $0.11 \mu\text{m}$
 35.37 0.570 mm
 35.39 1.82 mm
 35.41 $n = 1.730$
 35.43 $27.3^\circ, 66.5^\circ$
 35.45 $n = 1.57$
 35.47 b) constructive: $r_2 - r_1 = (m + \phi/2\pi)\lambda$,
 $m = 0, \pm 1, \pm 2, \pm 3, \dots$;
 destructive: $r_2 - r_1 = \left(m + \frac{1}{2} + \phi/2\pi\right)\lambda$,
 $m = 0, \pm 1, \pm 2, \pm 3, \dots$
 35.49 a) $\sqrt{x^2 + (y+d)^2} - \sqrt{x^2 + (y-d)^2} = m\lambda$
 c) $\sqrt{x^2 + (y+d)^2} - \sqrt{x^2 + (y-d)^2} = \left(m + \frac{1}{2}\right)\lambda$
 35.51 $6.8 \times 10^{-5} (C^\circ)^{-1}$
 35.53 $\lambda/2d$, independent of m
 35.55 b) 72 cm
 35.57 $n = 1.42$
 35.59 a) pattern moves down the screen
 b) $I = I_0 \cos^2\left[\left(\pi/\lambda\right)(d\sin\theta + (n-1)L)\right]$
 c) $d\sin\theta = m\lambda - (n-1)L$
 35.61 14.0

Chapter 36

- 36.1 506 nm
 36.3 $m_{\max} = 113$; 226 dark fringes
 36.5 ± 45.4 cm
 36.9 $\pm 16.0^\circ, \pm 33.4^\circ, \pm 55.6^\circ$
 36.11 $0.920 \mu\text{m}$
 36.13 a) 10.8 mm b) 5.4 mW
 36.15 a) 6.75 mm b) $2.43 \times 10^{-6} \text{ W/m}^2$
 36.17 a) 668 nm b) $9.36 \times 10^{-5} I_0$
 36.19 a) $\pm 13.0^\circ, \pm 26.7^\circ, \pm 42.4^\circ, \pm 64.1^\circ$
 b) $I = 2.08 \text{ W/m}^2$
 36.21 a) 3 b) 2
 36.23 a) $\pm 0.0627^\circ$ b) $0.249I_0$ c) $0.0256I_0$
 36.25 cases (i), (iii): slits 1 and 3 and slits 2 and 4;
 case (ii): slits 1 and 2 and slits 3 and 4
 36.27 $a = 1.50 \times 10^4$ nm in width;
 $d = 4.50 \times 10^4$ nm in separation
 36.29 a) 4790 b) $19.0^\circ, 40.7^\circ$ c) no
 36.31 a) yes b) 13.3 nm
 36.33 $23.3^\circ, 52.3^\circ$
 36.35 $10.5^\circ, 21.3^\circ, 33.1^\circ$
 36.37 a) $R = 17,500$ b) yes
 c) i) 587.8170 nm ii) 587.7834 nm
 iii) $587.7834 \text{ nm} < \lambda < 587.8170 \text{ nm}$
 36.39 0.232 nm
 36.41 a) 0.461 m
 36.43 1.9 m
 36.45 92 cm
 36.47 1.45 m
 36.49 a) Hubble: 77 m; Arecibo: 1.1×10^6 m
 b) 1500 km
 36.51 no
 36.53 a) i) 25.6° ii) 10.2° iii) 5.1° b) i) 60.0°
 ii) 23.1° iii) 11.5°
 36.55 2.07
 36.57 a) 1.80 mm b) 0.798 mm
 36.59 $\Delta\theta_{\pm} = \frac{2\lambda}{dN}$
 36.61 b) for $3\pi/2$: any two slits separated by one
 other slit; for the other cases: any two slits
 separated by three other slits
 36.65 513 nm
 36.67 second order
 36.69 c) ± 2.6 rad
 36.71 492 km