Physics 256 Assignment 6

Due: Wednesday, October 24th, 2012 4:00 pm in the drop box Physics or electronically

72 marks diagrams to scale

1) For an incident angle of 30 deg below the normal on a prism with apical angle of 50 deg and n=1.5, trace the refraction through the prism (including the angles of incidence and refraction at each surface) and calculate the angle of deviation. **4 marks**

2) a) For a prism with a 30 deg apical angle and with n=1.6, calculate the incident ray angle for which the minimum angle of deviation occurs. What is the minimum angle of deviation? **6 marks**

b) If we create a prism of unknown material with a known apical angle of 30 deg and the minimum angle of deviation of light is 16 deg, what is the refractive index of the material for the incident wavelength? **3 marks**

3) a) What is the thin prism angular deviation for a glass prism with a 4 deg apical angle and n=1.5? **2 marks**

b) If highlite glass (n=1.7) is used with the same apex, what is the angle of deviation? **2 marks**

4) a) A prism has a refractive index of 1.62 for red light and 1.64 for blue light. For an apical angle of 30deg, determine the minimum angular deviation for each of the colours and their angular spread. **Angular spread is the difference in angle between the two exiting rays. 4 marks**

b) Now use the approximation for a small apical angle. **3 marks**

5) a) I am 5 ft 2 in tall with my eyes 5 ft from the floor. I am looking into a vertical mirror. How far above the floor can the bottom edge of the mirror be and I can still see the image of my foot? **Hint: draw a ray which must enter the eye and come from the foot. Then figure out how this ray changes as its height on the mirror changes. 4 marks**

b) In a) above, sketch a ray from my toe, seen by me and sketch the vertical image of my body in the mirror. **4 marks**

6) Two mirrors: 4.8. Reflect the ray from both mirrors. **7 marks I have posted a construction of images seen in two mirrors.**

7) 5.48b) Two mirrors Look at the image formed by each mirror and the image that will be formed from light that reflects from both mirrors. **6 marks for the images** Draw at least 1 sample ray for each of the 3 images formed. **6 marks for rays.**

8) Spherical mirror: 5.53. Quantify the magnification, say whether it is upright or inverted and real or virtual image **6 marks**

9) Spherical mirror: 5.58. The ray diagram should have the object, image, mirror and at least 2 rays. **15 marks**