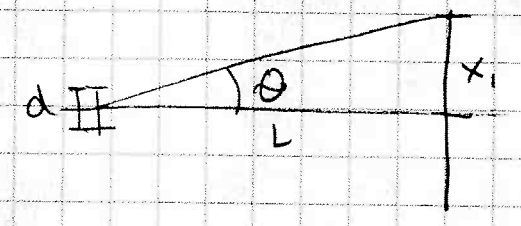
P #D

Ch 24

$d = 3.45 \times 10^{-6}$ m
$L = 1.5$ m



$m = 1$
$\lambda_1 = 650$ nm $= 650 \times 10^{-9}$ m
$\lambda_2 = 450$ nm $= 450 \times 10^{-9}$ m

a) Find θ: $d \cdot \sin\theta = m \cdot \lambda$

$(3.45 \times 10^{-6}\text{ m}) \cdot \sin\theta = (1)(650 \times 10^{-9}\text{ m})$

$\theta = 10.86°$

Find x: $\tan\theta = \frac{x}{L}$ so $\tan(10.86°) = \frac{x}{(1.5\text{ m})}$

$$\boxed{x_{Red} = .29\text{ m}}$$

b) Find θ: $d \cdot \sin\theta = m \cdot \lambda$

$(3.45 \times 10^{-6}\text{ m}) \cdot \sin\theta = (1)(450 \times 10^{-9}\text{ m})$

$\theta = 7.5°$

Find x: $\tan\theta = \frac{x}{L}$ so $\tan(7.5°) = \frac{x}{(1.5\text{ m})}$

$$\boxed{x_{Blue} = .20\text{ m}}$$

(Note that both angles are actually small enough to use small θ approximation)