

class 22 Ch 36 28, 29, 33, 37, 44, 63

28)  $d = \frac{1}{350} 10^{-3} \text{ m}$  seek  $\theta$  for  $m=1, 3$  &  $\lambda = .38 \mu\text{m}$  &  $.75 \mu\text{m}$

$m=1$   $\sin \theta = \frac{\lambda}{d} = \frac{.38 \cdot 350}{1000 \mu\text{m}} = .133 \rightarrow 7.6^\circ$   
 $= \frac{.75 \cdot 350}{1000} = .263 \rightarrow 15.2^\circ$

$m=3$   $\sin \theta = \frac{3\lambda}{d} = 3 \times \frac{.38 \cdot 350}{1000} = .4 \rightarrow 23.5^\circ$   
 $3 \times \frac{.75 \cdot 350}{1000} = .788 \rightarrow 51.9^\circ$

29)  $\lambda = \frac{d \sin \theta}{m} = \frac{1 \times 10^{-2}}{5000} \cdot 13.5 = 467 \text{ nm}$  ;  $\sin \theta = \frac{2\lambda}{d} = .467 \Rightarrow \theta = 27.8^\circ$

33)  $\Delta \lambda = .178 \text{ nm} = \frac{588}{N}$   $N = 3300 \text{ slits}$   
 $\frac{3300}{1.2} = 2750 \frac{\text{slits}}{\text{cm}}$

37)  $\theta = \frac{1.22 \lambda}{d} = \frac{\text{small angle } \frac{1}{2} \text{ dia}}{R} = \frac{\text{dia}}{2 \cdot 4.5 \text{ m}} \Rightarrow .92 \text{ m} = \text{dia}$   
 $\uparrow 7.4 \mu\text{m}$

44)  $\text{dia} = \frac{f}{4} = \frac{135 \text{ mm}}{4} = .0338 \text{ m}$   
 $\sin \theta \approx \theta = \frac{1.22 \lambda}{\text{dia}} = \frac{.55 \times 10^{-6}}{11.5 \text{ m}}$   
 $\text{size} = .23 \text{ mm}$

$\text{size} = 1.26 \text{ mm}$

63)  $d \sin \theta = \lambda$   
 $\frac{1.53 \times 10^{-3}}{2.5 \text{ m}} = .6328 \mu\text{m} \rightarrow d = 1.03 \text{ mm}$

$m=7$  missing  $\Rightarrow \frac{\beta}{2} = 7$   
 still shall order  
 $a \sin \theta = \lambda$   
 $a = \frac{\lambda}{7 \cdot \frac{1.53 \times 10^{-3}}{2.5}} = .148 \text{ mm}$