Final: * Weds 18 May at 10 am - noon

* In lecture class room

Exam covers: Entire semester

Bring: Calculator
Four single side 3"x5" coods

Review: Previous finals
2017 All questions
2018 All questions

This review covers only material from Ch 33, 34,35 and standing waves Chapter 33,1-D 33,4, 33.6, 33.8

Constructive interference: $\Delta \Gamma = 0, \pm \lambda, \pm 2\lambda, \pm 3\lambda, ...$

Destructive interference: $\Delta \Gamma = \pm \lambda_z + \frac{3\lambda_z}{2} \pm \frac{5\lambda_z}{2}$

Double slit /grapag dockf bright ma = dsinem ym=mal

Single shit dort a sinOp = pr p= =1,=2...

Circular W = 2.44 NL/D

Standing waves (fixed onds) $\frac{1}{2}$ $\lambda_n = \frac{2L}{n}$ $f_n = n\frac{V}{2L}$

@ Qniz1 70%-0

Additional Optics Exercises

262 Diffraction grating: number of fringes

A diffraction grating has slits that are 2500 nm apart.

- a) Light with wavelength 650 nm is incident on the grating. How many bright fringes will be observed?
- b) What adjustment to the wavelength of the light incident on the grating would add two more bright fringes? Explain your answer.

Answer: a)
$$dsine_{m} = m\lambda$$
 $m = 0, \pm 1, \pm 2...$
 $sine_{m} = m\frac{\lambda}{d}$
 $= m\frac{650}{2500} = 0.26m$

We need $|sine_{m}| \le 1 = 0 m = 0, \pm 1, \pm 2, \pm 3$

So there are seven possibilities.

b) We would need $m = 4$ to be possible.

So $|sine_{m}| = 4\frac{\lambda}{d} \le 1 = 0 \quad \lambda \le \frac{d}{4} = 625nm$

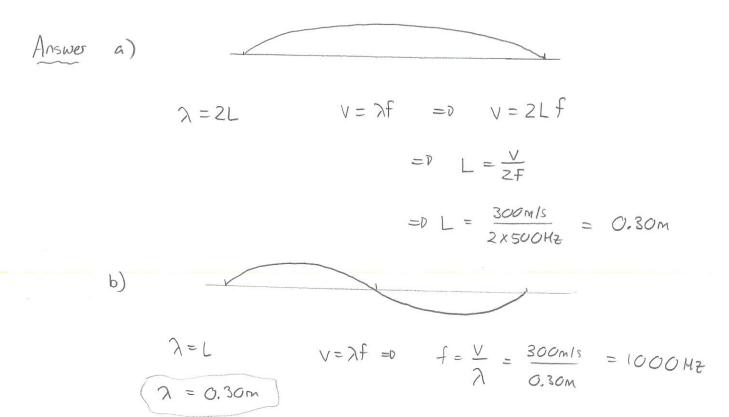
So the wavelength would need to drop below 625nm

Quiz 2 80% - 100%

263 Standing waves on a string with fixed ends

A string with both ends fixed is stretched so that the speed of waves on the string is $300 \,\mathrm{m/s}$. The frequency of the fundamental (n=1) is $500 \,\mathrm{Hz}$.

- a) Determine the length of the string.
- b) Sketch the second harmonic (n = 2) and use this to determine its wavelength and frequency.



Ch 34

Low of reflection

Ray tracing

$$\frac{1}{s} + \frac{1}{s'} = \frac{1}{f} \qquad m = \frac{h'}{h} \qquad m = -\frac{s'}{s}$$

$$m = \frac{h'}{h}$$

$$M = -\frac{S'}{S}$$

$$\frac{1}{f} = \left(\frac{n_z}{n_1} - 1\right) \left(\frac{1}{R_1} - \frac{1}{R_z}\right)$$

Quiz3 75%

264 Converging lens: upright image

An object is placed left of a converging lens with focal length f. How far from the lens (in terms of f) must the object be placed so that the lens produces an upright image which is three times as large as the object?

$$M = 3 = -\frac{s'}{s} = 0$$
 $s' = -3s$

$$\frac{1}{s} + \frac{1}{s'} = \frac{1}{f} = 0$$
 $\frac{1}{s} + \frac{1}{-3s} = \frac{1}{f}$

$$= 7 \qquad \frac{3-1}{3s} = \frac{1}{f}$$

$$=0$$
 $\frac{2}{38} = \frac{1}{5}$ $=0$ $S = \frac{2}{8}f$