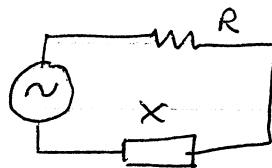


MORE TEST QUESTIONS (FOR FINAL).

1. In the circuit shown X is an unknown reactance. What can you say about X if on doubling the frequency the impedance Z a) increases, b) reduces. Why?



2. What is the depth of a pool of water as perceived by a person standing at the edge and looking straight down. [ $n_{\text{water}} = 1.33$ ].

3. Show that when openings and obstacles are large with respect to the wavelength of light, geometrical optics is appropriate.

4. Two slits each of width  $w$  are  $d$  apart. If  $w \ll d$  one observes only an interference pattern. Why?

5. In 2-slit interference the first ~~maximum~~ <sup>minimum</sup> occurs when  $d \sin \theta_1 = \frac{\lambda}{2}$ . In single slit diffraction the first minimum is at  $d \sin \theta_1 = \lambda$ . Why the difference?

6. Show that for two incoherent sources, the total intensity is just the sum of the two intensities.

7. Show that a current carrying loop placed in a uniform  $\vec{B}$  field behaves exactly like a bar magnet.

8. How would you use a convergent lens to produce an enlarged, upright image.

9. If you use the lens of Prob 8 to produce an enlarged inverted image, where would you locate the object? why?

10. The picture

shows

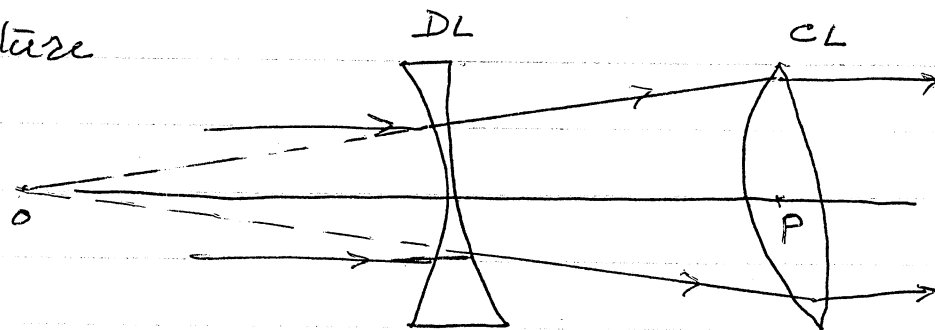
the

paths

of light

through a DL-CL combination. Prove that

$OP = f$  the focal length of the CL.



11. Light of wavelength

600nm is incident

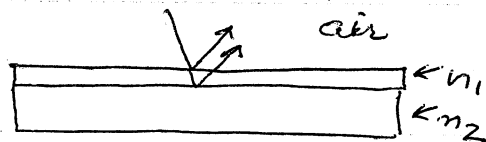
as shown on a plate of refractive index

which has a thin covering of refractive

index ( $n_1 < n_2$ ). What should be the minimum

thickness of the cover so that reflectivity

is very low.



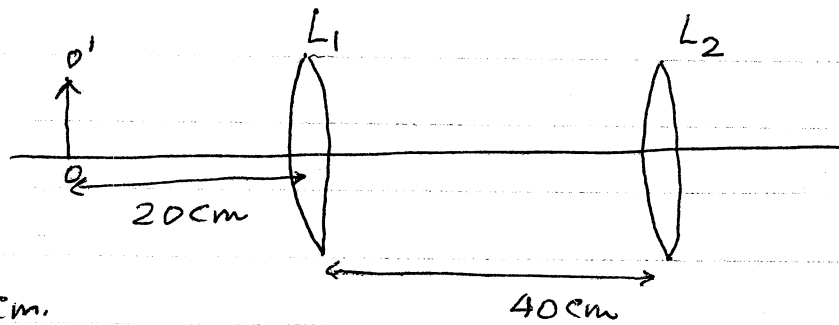
- ( Prove that the interference pattern for two slits consists of equally spaced, equal intensity fringes:

$$\text{Spacing} = \frac{D\lambda}{d}, \quad d = \text{slit separation}$$

$$D = \text{slit-screen distance}$$

$$I_{\text{max}} \propto 4E_m^2$$

13. In the diagram both lenses have  $f = 10\text{cm}$ .



- ( Locate the position and size of the final image? Is it upright or inverted?

14. What happens to the frequency of a wave as it goes from one medium into another? Why?

15. Complete the Equation

$$y = \sin(x - vt)$$

and explain the meaning of the additional parameters.