

EASTERN UNIVERSITY, SRI LANKA

SECOND EXAMINATION IN SCIENCE - 2002/2003

SECOND SEMESTER

(MARCH/APRIL 2004)

REPEAT

PH 203 PHYSICAL OPTICS II

Time: 01 hour.

Answer ALL Questions

1. (i) Distinguish Fraunhofer diffraction and Fresnel diffraction
- (ii) Describe Fraunhofer diffraction produced by a multiple N number of slit of width b and separation d and derive an expression for the intensity distribution of light, by considering the electric field of light. Assume that intensity of diffraction by a single slit is

$$a^2 = A_0^2 \left(\frac{\sin \beta}{\beta} \right)^2$$

where

$$\beta = \frac{\pi b \sin \theta}{d}$$

- (iii) Hence obtain the conditions for minimas and maximas in the intensity distribution and plot a graph of intensity distribution for $N = 5$ and $d = 2b$.
2. (i) What is a *Zone Plate* and how it is made?
- (ii) Explain how a zone plate acts like a convergent lens having multiple foci by deriving an expression for its focal length.
- (iii) A point source is placed at a distance of 40cm in front of a Zone plate of focal length 20cm for light of wave length 5000\AA . Consider the first zone and find the distance of the screen that should be placed to get the diffraction effects and find the radius of the first zone.



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