

EASTERN UNIVERSITY, SRI LANKA

SECOND EXAMINATION IN SCIENCE 2005/06 (AUG-SEP. 2007)

FIRST SEMESTER

REPEAT

PH 203 – PHYSICAL OPTICS II



Time: 01 hour.

Answer ALL Questions.

1. What is meant by diffraction of light? Distinguish Fraunhofer diffraction from Fresnel diffraction. Define Huygen's principle.

A single slit having width b is illuminated by light of wavelength λ produces an intensity pattern on a screen that is placed opposite to the slit at a distance L . The intensity on the screen produced by the slit is given by,

$$I = I_0 \left(\frac{\sin \beta}{\beta} \right)^2$$

where the symbols have their usual meanings.

- Show that $I = I_0$ at $\theta = 0$.
- Obtain the condition for dark fringes.
- Show that the condition for bright fringes is when $\tan \beta = \beta$.
- Sketch the suitable graph for $y = \beta$ and $y = \tan \beta$ on the same scale of graph.
- Explain, how the values of β for the secondary maxima can be found by using above graph.

2. What is meant by "Resolving Power"? Define the limit of resolution and the resolving power of an instrument. Explain resolved images, just resolved images and not resolved images.

- Write down the equation for resolving power of telescope and identify its symbols.
- Two closely spaced blue light circles with center to center separation $2mm$ are tried to resolve using a telescope. If the diameter of the eye is $1.5mm$ what is the minimum viewing distance at which any dots cannot be distinguished? Assume that the wavelength of the blue light is $400nm$.