EASTERN UNIVERSITY, SRI LANKA

SECOND EXAMINATION IN SCIENCE – 2012/2013

FIRST SEMESTER (April/May 2015)

PH 203PHYSICAL OPTICS-II

(4)

ne: 01 hour.

swer ALL Questions

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01. (a) Distinguish *Fraunhofer diffraction* from *Fresnel diffraction.*

The intensity distribution of a Fraunhofer diffraction pattern due to a slit is given by

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

where, $\beta = \frac{\pi b}{\lambda}\sin\theta$. The symbols have their usual meanings. Obtain the conditions for minimum, principal maximum and secondary maxima of the intensity distribution and schematically plot the intensity pattern.

(b) A coherent Laser light of wavelength 633 nm is incident on a single slit of width 0.02 cm at the observation screen is 240 cm from the slit. Calculate,

(i) Width of the central bright fringe.

(ii) Width of the bright fringe between 3^{rd} and 4^{th} order minima.

(iii) Intensity in terms of I_0 of the bright fringe in (ii) above.

02. Explain how diffraction causes limitation in the resolution of optical instruments and hence introduce *Raleigh criterion* for the limits of resolution.

Describe the two categories of optical instruments giving three examples for each. Explain the *Resolving Power* of these two categories of instruments?

The two blinking lights on both wings of an aeroplane are 8 m apart. When the aeroplane is flying very far, these two lights are seen as one. Explain why? What should be the limiting distance for the observer to differentiate these two lights? Assume the pupil diameter of the human eye when looking at night sky is 3 mm and the wavelength of light of aeroplane bulbs is 6×10^{-5} m.