EASTERN UNIVERSITY, SRI LANKA

SECOND EXAMINATION IN SCIENCE - 2004/2005

PHYSICAL OPTICS II - PH 203

Answer **ALL** questions
Time: 1 hour

1. (a) Distinguish between Fraunhofer and Fresnel diffraction.

   (b) Describe Fraunhofer diffraction produced by a multiple N numbers of slit of width b separation d and derive an expression for the intensity distribution of light, by considering the electric field of light. Assume the intensity of diffraction by a single slit is

$$I = I_0 \left(\frac{\sin \beta}{\beta} \right)^2, \quad \text{where} \quad \beta = \frac{\pi b}{\lambda} \sin \theta$$

   (c) Hence obtain the conditions for minimas and maximas in the intensity distribution and plot a graph of intensity distribution for $N = 6$ and $d = 3b$.

2. What do you understand by the resolving power of an optical instrument? Discuss the concepts of resolved images, just resolved images and not resolved images.

   (a) Write down the equation for resolving power of telescope and identify its symbols.

   (b) A telescope of aperture 3 cm is focused on a window at 80 m distance fitted with a wire mesh of spacing 2 mm. Will the telescope be able to observe the wire mesh? Assume the effective λ as 5.5×10^{-5} cm.