EASTERN UNIVERSITY, SRI LANKA

FIRST EXAMINATION IN SCIENCE - 2007/2008

SECOND SEMESTER (PROPER)

(August/September 2009)

PH 102 PHYSICAL OPTICS I

Time: 01 hour.

Answer ALL Questions

1. Light is treated as waves in Physical Optics. Write down the phenomena that can be explained by treating light as waves. What do you mean by Interference of light? State the conditions necessary for the interfering fringes to be visible in an interference experiment.

   A parallel beam of monochromatic light of wave length 5460 Å incident upon a Fresnel bi-prism that has the apex angle 1°45′ and refractive index 1.5. Straight parallel interfering fringes were observed in a screen which was placed 80 cm apart from the bi-prism. The distance between the source and the bi-prism is 20 cm.

   (a) Draw a suitable diagram for this experiment.
   (b) Write down the path difference and find an expression for the optical phase difference for the two interfering beams.
   (c) Hence find the fringe width for the above experiment.

2. Explain what is meant by fringes of equal thickness by drawing a clear labeled diagram.

   An equi-convex lens is placed on a flat plate in a Newton's ring experiment. The refractive index of the glass is 1.5 and the focal length of the lens is 1 m. The wave length of the light used is 589 nm.

   (a) Draw a simple diagram to show how a single beam is divided to produce interfering pattern in Newton's ring arrangement.
   (b) Find the order of the bright ring of radius 20mm.
   (c) How many bright rings would be produced if the water of refractive index 1.33 is poured between the lens and the flat plate?