

EASTERN UNIVERSITY, SRI LANKA

FIRST EXAMINATION IN SCIENCE - 2002/2003

FIRST SEMESTER

(JUNE/JULY 2003)

REPEAT

PH 102 Physical Optics I

Time: 01 hour.

Answer ALL Questions



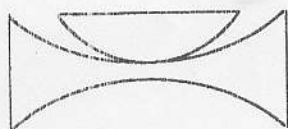
1. A thin transparent film of varying thickness and a refractive index n can produce interference by division of amplitude. Derive an expression for the phase difference produced by the interfering beams in the above case.

An air filled wedge between two plane glass plates is illuminated by a diffuse source of light of wave length $600nm$. Fringes are produced by the reflected light on the air wedge, spaced $5mm$ apart.

- (i) Find the angle α between the glass plates
- (ii) Find happens to the fringes if a liquid with refractive index 1.33 fills the wedge?
- (iii) what happens if n approaches the refractive index of the glass?

2. Newton's rings are formed by the division of amplitude.

- (i) Explain how the rings are formed using a detailed diagram.
- (ii) Derive an expression for the phase difference of the interfering beams.



A plano-convex lens of radius of curvature $100cm$ is placed on a plano-concave lens with the convex side down on the concave surface as shown in the above figure. The lenses are illuminated from above with green light of wave length $550nm$. If the 20 th dark ring, seen in the direction of the incident light, has a radius of $20mm$, what is the radius of the curvature of the concave lens surface?