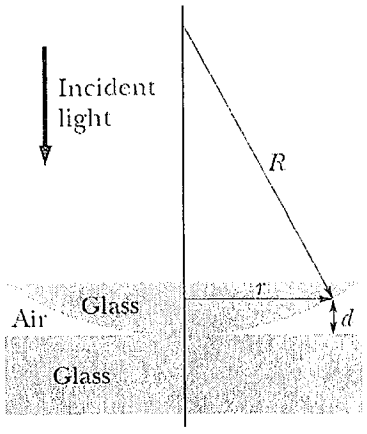
Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
200 level 2nd semester Examination – Dec 18/ Jan 19
SCT 253-1 Physical Optics

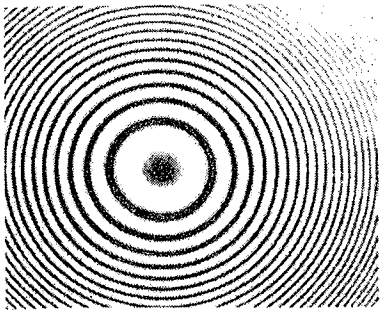
Uva Wellassa University

Instructions to candidates
Duration: One (01) Hour
Number of questions: Two (02) Essay Questions
Mark allocation: 200 marks
Answer all questions
Scientific calculators are allowed

1. Figure 1 (a) shows a lens with radius of curvature ***R*** lying on a flat glass plate and illuminated from above by light with wavelength λ. Figure 1 (b) shows that circular interference fringes appear, associated with the variable thickness d of the air film between the lens and the plate.
   a. Find the radii r of the interference maxima assuming $r/R << 1$. (40 Marks)
   b. If the radius of curvature ***R*** of the lens is 5.0 m and diameter of the lens is 20 mm,
      i. How many bright rings are produced? Assume that λ= 589 nm. (30 Marks)
      ii. How many bright rings would be produced if the arrangement were immersed in water (n = 1.33)? (30 Marks)



(a)



(b)

Figure 01

(41)

2. A simple terrestrial telescope consists of a converging objective lens and a diverging eyepiece at opposite ends of the telescope tube. For distant objects, the tube length is equal to the objective focal length minus the absolute value of the eyepiece focal length.

(a) Does the user of the telescope see a real or virtual image? (20 Marks)

(b) Where is the final image? (40 Marks)

(c) If a telescope is to be constructed with a tube of length 20.0 cm and a magnification of 6.00, what are the focal lengths of the objective and eyepiece? (40 Marks)