

School of Basic and Applied Sciences

Forensic Science
ETE - Jun 2023

Time : 3 Hours

Marks : 100

Sem II - C1UD220B - Advanced Physics

Your answer should be specific to the question asked

Draw neat labeled diagrams wherever necessary

1. Draw and explain the Rayleigh criterion for resolved, just resolved, and not resolved positions. K1 CO1 (5)
2. Explain the concept of transverse magnification in optics and how it is related to the size of the object and the image produced by a lens. K1 CO1 (5)
3. With neat ray diagram explain spherical aberration in lens. K2 CO1 (5)
4. When sunlight falls on the surface of the water at an angle of 53° , the reflected light is found to be completely plane polarized. Find the angle of refraction and refractive index of the liquid. K3 CO2 (10)

OR

- A tube of sugar solution 20 cm long is placed between crossed Nicol's and illuminated with light of wavelength 6000 \AA . If the optical rotation produced is 13° and the specific rotation is $65^\circ \text{ d/gm/cm}^3$, determine the strength of the solution. K3 CO2 (10)
5. Compare the quarter-wave plate and half-wave plate with their expressions. K4 CO2 (10)
 6. Describe an eyepiece and write its advantage over a single lens. K2 CO2 (10)
 7. Calculate the thickness of a calcite plate which would convert plane polarized light into circularly polarized light. The principal refractive indices are $\mu_o = 1.658$, $\mu_e = 1.486$ at the wavelength of light used, 5980 \AA . K3 CO2 (10)
 8. Explain the defects astigmatism, coma and curvature. Also explain how they may be minimized. K3 CO3 (15)
 9. Deduce the expression of interference of light due to thin film and find the conditions of maxima and minima. Interpret the interference patterns of reflected and transmitted monochromatic light are complementary. K4 CO3 (15)
 10. Compare lateral and longitudinal spherical aberration in lenses. Mention two methods in detail for minimizing spherical aberration. K4 CO3 (15)

OR

- Give the construction and working of a Ramsden eyepiece. How are chromatic and spherical aberrations minimized in this eyepiece. Indicate in a diagram the position of the cardinal points. Make the necessary calculations. K4 CO3 (15)