Mid-West University

Examinations Management Office

End Semester Examinations 2081

Bachelor level/ B. Sc. / 5th Semester — Full Marks: 60

Time: 3 hours — Pass Marks: 30

Subject: Optic (PHY451)

Candidates are required to give their answer in their own words as far as Practicable. The figures in the margin indicate full marks.

Group – A

Attempt all long questions **[4x6 = 24]**

1. Define zone plate with its theory. Shows that a zone plate has multiple foci. Compare the zone plate with plate with a convex lense.
2. Explain the construction and working of Laurent's half shade polarimeter.
   A 200 mm long tube containing 48 cm^3 of sugar solution produces an optical rotation of 11^0 when placed in a saccharimeter. If the specific rotation of sugar solution is 66^0, calculate the quantity of sugar contained in the tube in the form of a solution.
3. Describe the construction of Michelson's interferometer. How can the instrument be used to determine the difference between the wavelengths of two D-lines of sodium?

OR

Define eyepiece and Give the construction and necessary theory of Huygen's eyepiece.

4. State and explain the construction of a nicol prism and show that it can be used as a polarizer and analyzer.

Group – B

Attempt all numerical questions. **[6x4= 24]**

5. Explain Rayleigh criterion for resolution and determine the resolving power of the microscope.
6. The object glass of a telescope is an achromat of focal length 90cm. if the magnitudes of the dispersive powers of the two lenses are 0.024 and 0.036, calculate their focal lengths.
7. Diffraction pattern of a single slit of width 0.5 cm is formed by a lens of focal length 40cm. calculate the distance between the first dark and the next bright fringe from the axis. Wavelength of light used is 4890 Å.
8. Quartz has refractive indicies 1.553 and 1.544. Calculate the thickness of quarter wave plate for sodium light of wavelength 5890Å.
9. Calculate the values of Cauchy's constant A and B for crown glass and flint glass , Given
   $\mu_C = 1.514$ $\mu_F = 1.524$
   $\lambda_C = 6563\ A^0$ $\lambda_F = 4862\ A^0$

10. A beam of monochromatic light of wavelength 5.82 x10^{-7}m falls normally on a glass wedge with the wedge angle of 20 seconds of an arc. If the refractive index of glass is 1.5, find the number of dark fringes per cm of the wedge length.

OR

When the movable mirror of Michelson interferometer is shifted by 0.0589 mm, a shift of 200 fringes is observed. Find the wavelength of the light used.

Answer in brief *Any Six* questions. **[6x2= 12]**

11. Explain about Brewster's law.
12. Explain recording of holography?
13. Distinguish between diffraction at a single slit and double slit.
14. Distinguish between circular and elliptical polarized light.
15. The central fringe produced by Lloyd's single mirror is black why?
16. Describe the spherical aberrations of a single surface.
17. Explain about dispersive power of a prism.
18. Describe the combination of prism.

The End