

Unit II

4. (a) Evaluate Fourier Coefficients. 5
- (b) Using Fourier series expand the function
 $f(x) = |x|$ in the interval $(-\pi, \pi)$. 3
5. (a) Apply Fourier theorem to analyse a
triangular wave form. 5
- (b) Derive sine series from Fourier theorem.
3

Unit III

6. (a) What are Fourier Transform ?
Derive expression for sine and cosine
transform. 5

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B.Sc. EXAMINATION, 2025

(Fourth Semester)

(Re-appear Only)

PHYSICS

Paper VIII

Wave and Optics-II

Time : 3 Hours]

[Maximum Marks : 40

Before answering the question-paper, candidates must ensure that they have been supplied with correct and complete question-paper. No complaint, in this regard will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory.

(Compulsory Question)

1. (a) Explain Malus law. 2
- (b) What is Astigmatism ? How can it be corrected ? 2
- (c) State Fourier theorem. 1
- (d) Define Nodal Planes. 1
- (e) What is effect of temperature on specific rotation ? 1
- (f) What is the purpose of cladding in optical fibre ? 1

Unit I

2. (a) Explain the construction and working of a Nicol Prism. 5

- (b) Calculate the thickness of a doubly refracting crystal which can introduce a path difference of $\lambda/2$ between O-ray and E-ray. Given $\lambda = 6000 \text{ \AA}$, $\mu_o = 1.55$ and $\lambda_E = 1.54$. 3

3. (a) Define a quarter-wave plate and a half-wave plate. Deduce expression for their thickness. 5
- (b) A 20 cm tube containing sugar solution is placed between crossed nicols and illuminated by light of wavelength $6000 \text{ \AA}$. Calculate the concentration of solution. Give specific rotation = 60° and optical rotation = 12° . 3

9. (a) Define acceptance angle in optical fibres and derive an expression for it. **5**
- (b) Explain fractional refractive index change in optical fibre. **3**



- (b) Find the Fourier transform of : **3**

$$f(x) = e^{\frac{-x^2}{2}}$$

7. (a) Find the system matrix for a thick lens and derive the lens formula. **5**
- (b) Write the translation matrix and show that its determinant is equal to one. **3**

Unit IV

8. (a) Explain, how an achromatic combination can be obtained by placing two thin lenses in contact ? **5**
- (b) Define coma and how it is removed ? **3**