5. Find the Fourier series of given function $f(x)=\begin{cases}-\pi & \text{for} -\pi < x < 0 \\ 0 & \text{for } 0 < x < \pi\end{cases}$ and hence show that $\frac{\pi^2}{8}=1+\frac{1}{3^2}+\frac{1}{5^2}+\ldots\ldots$ **8**

Unit III

6. (a) Define the Fourier Transforms. Discuss the shifting and convolution theorem of Fourier Transforms. **6**

(b) Write the Parseval's Identity for the Fourier Integrals. What are the uses of this identity ? **2**

7. Develop a system matrix for a thick lens and use it to derive the lens formula for a thin lens. **8**

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B. Sc. EXAMINATION, 2026

(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. All questions carry equal marks.

(Compulsory Question)

1. (a) Explain the phenomena of polarization of light by scattering. **1**

(b) What is the difference between unpolarized light and plane polarized light ? **1**

(c) Write the Parseval's identity for Fourier series. **1**

(d) State convolution theorem of Fourier transforms. **2**

(e) What do you understand by the chromatic aberrations ? How is it caused ? **2**

(f) Define the acceptance angle in optical fiber. **1**

Unit I

2. (a) What is polarization of light ? Discuss any *two* methods for the production of polarized light. **6**

(b) A ray of light is incident on the surface of a glass plate at the polarization angle. Calculate the angle of refraction, given the refractive index of glass is 1.5. **2**

3. Define the optical rotation of light. Explain the Fresnel's theory of optical rotation. Give its analytical treatment. **8**

Unit II

4. Define the Fourier theorem and Fourier series. Give the analysis of a rectangular wave by using Fourier theorem. **8**

Unit IV

8. (a) Explain the spherical aberration. Discuss the methods of reducing the spherical aberration. **6**

(b) Why a photograph taken by a cheap camera is always blurred ? **2**

9. (a) Distinguish between single mode and multi mode fiber. Discuss the uses of both fibers. **4**

(b) Discuss some applications of optical fibers by giving the examples in different fields. **4**

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Unit IV

8. (a) Explain the spherical aberration. Discuss the methods of reducing the spherical aberration. **6**

(b) Why a photograph taken by a cheap camera is always blurred ? **2**

9. (a) Distinguish between single mode and multi mode fiber. Discuss the uses of both fibers. **4**

(b) Discuss some applications of optical fibers by giving the examples in different fields. **4**

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