6. Define spatial frequency and examine the Fourier transforming properties of a thin lens. (10)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 817 **K**

Unique Paper Code : 32223908

Name of the Paper : Applied Optics (SEC)

Name of the Course : **B.Sc. Hons. – (Physics)_ CBCS-LOCF**

Semester : III – (Repeat Paper)

Duration : 3 Hours Maximum Marks : 50

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all.
3. Question No. **1** is compulsory.
4. **All** questions are carrying equal marks.

1. Attempt any **four** of the following : (2.5×4=10)

   (i) Differentiate between the Fourier transform and the inverse Fourier transform of an optical field.

   (ii) What are the key differences between Continuous Wave (CW) and Pulsed lasers? Provide at least two examples of each type.

   (iii) What are the essential differences between a hologram and a standard photograph of an object?

   (iv) What are fiber optic sensors? Discuss the various types of fiber optic sensors.

   (v) The output of a laser has a pulse duration of 25 ms and an average output power of 1 W per pulse. How much energy is released with each pulse?

   (vi) What is the numerical aperture and acceptance angle of a multimode fiber cable with core and cladding indices of 2.15 and 1.51, respectively?

2. Define Fiber-Bragg grating and elaborate on its construction, operation, applications, and advantages. (10)

3. What is meant by holography? Explain how holography can be utilized to detect minor vibrations or movements of an object. (10)

4. (a) Provide a detailed explanation of the construction, operation, and applications of the He:Ne laser.

   (b) How many photons are emitted per second in a 2.5 mW He-Ne laser beam? (8+2=10)

5. What are the three distinct types of transitions that can occur between two atomic energy levels? Derive a relationship between the transition probabilities of spontaneous and stimulated emission. (3+7=10)

P.T.O.