Roll No. | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 09

B.Sc. – Hons. (Mathematics) (Sem.–1)

OPTICS

Subject Code : BSHP-111-21

M.Code : 92792

Date of Examination : 27-01-23

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION - B & C. have FOUR questions each.**
3. **Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.**
4. **Select atleast TWO questions from SECTION - B & C.**

SECTION-A

l. Write short notes on :

a) Can two independent point sources, say two electric lamps operating under similar conditions, produce sustained interference pattern. Why?

b) Find the coherent length and coherent time for the white light, the wavelength of white light is 600 nm.

c) Write any four difference between interference and diffraction.

d) What is the difference between temporal and spatial coherence?

e) What is zone plate?

f) Distinguish between polarized and unpolarized light.

g) What is the difference between polarizer and analyser?

h) He-Ne Laser that produces light of wavelength 6328 Å. Calculate the energy and momentum.

i) Discuss the salient features of a laser beam.

j) Write **any four** applications of laser.

SECTION-B

2. a) Explain Young's double slit experiment with diagram. Obtain the expression for fringe width.

   b) Distance between two slits is 0.3 mm and the width of the fringes formed on the screen is 6 mm. If the distance between the screen and the slit is 1 m, find the wavelength of light used?

3. Explain Newton's Rings method. Find the expression for the wavelength and refractive index of liquid using Newton's rings method.

4. a) Distinguish between Fresnel's and Fraunhoffer diffraction.

   b) Describe the geometrical features of Fresnel's biprism. How it can be used to find the wavelength of light?

5. Give in detail Fraunhoffer diffraction at a circular aperture with diagram.

SECTION-C

6. a) Explain and derive Malus's law.

   b) How would you distinguish between plane, circularly and elliptically polarized light?

7. Explain the Huygen's theory of double refraction with diagram.

8. a) Explain the terms: *'stimulated absorption', 'stimulated emission' and 'population inversions'*.

   b) What do you understand by Einstein coefficients? Derive the expression of these coefficients.

9. What is laser? Explain the principle, construction and working of He-Ne laser.

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.