21BSC3C3PHL

B.Sc. III Semester Degree Examination, April/May - 2024

PHYSICS

03 : Wave Motion and Optics

(NEP)

Time : 2 Hours   Maximum Marks : 60

Note :   (i)   Answer **all** the Sections.

            (ii)   Non-programmed scientific calculators are allowed.

SECTION - A

1.   Answer the following sub-questions, each sub-question carries **one** mark.   **10x1=10**

   (a)   Write the relation between Phase velocity and Group velocity.
   (b)   What are Lissajous figures ?
   (c)   What is energy density ?
   (d)   Define absorption Co-efficient.
   (e)   Who proposed the wave particle duality ?
   (f)   What is thin film ?
   (g)   Write the expression for dispersive power of a grating.
   (h)   What is zone plate ?
   (i)   What is an optic axis ?
   (j)   Define stimulated emission.

SECTION - B

Answer **any four** of the following questions, each question carries **five** marks. **4x5=20**

2.   Obtain an expression for velocity of a transverse wave along a stretched string.

3.   Derive an expression for intensity of progressive wave.

4.   Show that the diameter of dark rings in Newton's rings by reflected light experiment are directly proportional to the square root of natural numbers.

5.   Define resolving power of a grating and obtain an expression for it.

6.   Describe the method of producing plane polarised light by the wire grid polariser and the polaroid.

7.   Write any five application of lasers.

SECTION - C

Answer **any three** of the following questions, each question carries **ten** marks.

3x10=30

8. (a) Derive Newton's formula for velocity of sound. Discuss Laplace correction for Newton's formula. **7+3**

    (b) Write any three characteristics of wave motion.

9. (a) Explain the modes of vibration in open and closed pipes. **7+3**

    (b) What will be the pitch of fundamental note emitted by a closed pipe 32.4 cm long. If the velocity of sound in air is 332 ms^{-1} ?

10. (a) Explain the formation of interference fringes by means of Fresnel's Biprism. **7+3**

    (b) Explain Huygen's theory.

11. (a) Describe fraunhofer diffraction due to a double slit. **7+3**

    (b) Write any three differences between zone plate and a convex lens.

12. (a) Explain the principle and working of Ruby Laser. **7+3**

    (b) Define :

    (i) Spontaneous emission

    (ii) Population inversion

    (iii) Active medium

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