

Roll No. ....

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**B.Sc. Physics II Semester (Under CBCS)  
WAVES & OPTICS (BPH-202)**

Time : 3 Hours]

[Max. Marks : 75

**Note:**

- (i) It is compulsory to answer the questions of Part-1. Limit your answers within 20-40 word in this part.
- (ii) Answer any four questions from Part-2 in detail.
- (iii) Different parts of the same question are to be attempted adjacent to each other.
- (iv) Assume suitable standard data wherever required, if not given.

**PART-1**

1. (a) Define simple harmonic motion with suitable example. (1.5)
- (b) Differentiate transverse and longitudinal waves. (1.5)
- (c) Why is it not possible to obtain interference with two independent light sources? (1.5)
- (d) What is Rayleigh's criterion for resolution? (1.5)
- (e) What will happen if in the Newton's rings experiment, air in the inner space is replaced by a transparent liquid? (1.5)
- (f) What purpose is achieved by introducing a compensating glass plate in Michelson interferometer? (1.5)

- (g) Why the central point in the Lloyd's mirror method is a dark point? (1.5)
- (h) Why does a thin film appear coloured when seen from white light? (1.5)
- (i) Differentiate Fresnel's diffraction and Fraunhofer diffraction. (1.5)
- (j) What are standing waves? (1.5)

**PART-2**

2. (a) Find an expression for fringe width in case of Young's double slit experiment and show that bright and dark fringes are of equal width. (10)
- (b) Give the differences between Lloyd's mirror and biprism fringes. (5)

3. (a) Discuss group and phase velocities. Show that the group velocity  $v_g$  can be expressed in terms of the phase velocity  $v$  and the refractive index  $n(\omega)$  in the following manner: (10)

$$\frac{1}{v_g} = \frac{1}{v} + \frac{w}{c} \frac{dn(\omega)}{d\omega}$$

- (b) What are plane and spherical waves? Explain with suitable examples. (5)

4. Describe the principle, construction and working of Michelson's interferometer. Explain how it can be used to find the thickness and the refractive index of thin transparent film. (15)

5. Describe the plane transmission grating. Discuss analytically the diffraction at N slits. (15)

6. (a) What is meant by half period elements? How is rectilinear propagation of light explained on the basis of wave theory? (10)
- (b) What is a zone plate? Compare it with a convex lens. (5)
7. (a) Define Lissajous figures. What are the uses of Lissajous figures? (7)
- (b) What is superposition Principle? Discuss the superposition of two collinear oscillations having equal frequencies. (8)