

6/12/18 (E)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1033

I

Unique Paper Code : 32225310

Name of the Paper : Waves and Optics

Name of the Course : **Physics – GE for Honours**

Semester : III

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

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

1. Attempt any **five** of the following questions : (5×3=15)

(a) State essential conditions for obtaining sustained interference pattern.

(b) What are beats? How are they formed?

(c) Distinguish between “Fizeau” and “Haidinger” Fringes? Give examples.

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- (d) State and explain Huygens Principle of secondary waves.
- (e) Distinguish between Fraunhofer and Fresnel's diffraction.
- (f) How is a zone plate different from convex lens?
- (g) Calculate the change in intensity level when the intensity of sound increases 100 times its original intensity.
2. (a) What are Lissajous figures? (3)
- (b) Obtain analytically the shape of Lissajous figures traced out by a particle subjected to two perpendicular simple harmonic motions of equal frequencies, unequal amplitudes and phase differing by (i) zero, (ii) $\pi/4$, (iii) $\pi/2$, (iv) π . (12)
3. (a) Explain the physical characteristics that determine quality, pitch and loudness of a musical sound. (3)
- (b) Explain the formation of standing waves on a stretched string with necessary theory. (12)
4. (a) What are Newton's rings? Give the necessary theory for their formation? (10)

- (b) How would you use Newton's rings to measure wavelength of light? (5)
5. (a) Derive an expression for intensity of Fraunhofer diffraction due to a single slit and discuss the intensity pattern. (12)
- (b) A light of wavelength 6000 \AA is incident on a slit of width 0.30 mm . The screen is placed at a distance of 2 m from the slit. Find the distance between the central maxima and the first minima. (3)
6. Derive an expression for intensity of Fresnel diffraction due to a straight edge and discuss the intensity distribution. (15)
7. (a) What is a Nicol prism? How is it used to obtain polarized light? (10)
- (b) How polarized light is obtained by reflection? State and explain Brewster's law. (5)
8. Write short notes on any **three** of the following : (3×5=15)
- (a) Fresnel's Biprism
- (b) Stoke's treatment

(c) Michelson's interferometer

(d) Linearity and superposition principle