2018-21

Time : 3 hours

Full Marks : 60

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer from both the Groups as directed.

Group – A

(Short-answer Type Questions)

1. Answer any **three** questions of the following : **4×3 = 12**

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

   (b) In Newton's ring arrangement the radius of the n^{th} ring with an air film and liquid film are 1.5 mm and 1.2 mm respectively. Calculate the refractive index of the liquid.

   (c) Explain Reverberation , optimum reverberation and time of reverberation

   (d) How you can compare Zone plate and Convex lens ?

   (e) Why soldiers moving on a light bridge are asked to breakdown the steps ?

   (f) In a Michelson Interferometer Circular fringes are produced If the movable mirror is displaced by 27 5 μm a shift of 100 fringes is observed. Calculate the wavelength of light.

Group – B

(Long-answer Type Questions)

Answer any **four** questons of the following : **12×4 = 48**

2. Give Newton's ring method for the determination of the wavelength of monochromatic light.

3. Using Fourier theorem, analyze a square wave, defined as :

$y = a$ for $0 < t < T/2$

$y = 0$ for $T/2 < t < T$

4. Give an account of production and detection of plane, circularly and elliptically polarised light.

5. Give the Theory of Interference of a thin film. Show that fringes on reflected and transmitted system are complementary to each other.

6. Give an idea to form of fringes using Michelson Interferometer. How it can be used to measure wavelength of Sodium Light ?

7. Define Standing Wave, give the analytical treatment for string fixed at both ends. Explain Nodes and Antinodes

8. Decribe the construction of a plane diffraction grating and discuss with theory how it can be used to measure the wave length of monochromatic light ?

9. Write notes on any two of the following :

(a) Transverse nature of light waves

(b) What is Zone plates ? Show that Zone plate has multiple foci.

(c) Fraunhoffer's diffraction due to single slit

(d) What do you mean by Plase Velocity and Group Velocity ? Establish relation between them.