Roll No. .....

Exam Code : M-23

Subject Code—59329

B. Sc. EXAMINATION

(Main & Reappear) (Batch 2018 Onwards)

(Fourth Semester)

PHYSICS

Core Course–VIII

CPL-403

Wave and Optics

Time : 3 *Hours* *Maximum Marks* : 80

Note : Attempt *Five* questions in all, selecting *one* question from each Section. Q. No. 1 is compulsory. All questions carry equal marks.

(Compulsory Question)

1. (a) Explain that why wave velocity is also called phase velocity. **4**

(b) If the radius of 10th and 20th Newton's rings are 0.2 cm and 0.3 cm respectively and the plano-convex lew is of focal lengh 90 cm, calculate the wavelength of light. 4

(c) Why is the illumination in geometrical shadow of an obstacle not commonly observed ? 4

(d) What is Numerical Aperture (N_A) of an optical fibre ? Give its significance. 4

Section A

2. (a) Show that for a transverse wave in a string $T/\rho = c^2$, where T is the tension with which the string is stretched and ρ is the mass per unit length of the string. 10

(b) Differentiate between Progressive waves and Stationary waves. 6

3. (a) Derive the One-Dimentional differential equation of wave motion. 10

(b) A 50 cm long wire having mass 6.5×10^3 kg is stretched such that it makes 80 vibrations per second. Find the stretching force in kg.wt. 6

Section B

4. (a) What are coherent sources ? Can two point like independent sources become coherent ? Explain. 6

(b) Discuss the phenomenon of interference by taking into consideration the concept of superposition of light waves. Derive the expession for intensity. 10

5. (a) Show that reflected system and transmitted system of interference pattern in case of a thin film are complementary to each other. Why an extremely thin film appears black in reflected light ? 12

(b) A film of soap is 0.00006 cm thick and has a refractive index of 1.36. For what wavelength of normal incidence of light there is no reflection ? 4

Section C

6. (a) What is the difference between a convex lens and a zone plate ? 4

(b) Define resolving power. Obtain expression for resolving power of diffraction grating. 12

7. (a) Discuss Fraunhofer diffraction at single slit. Hence deduce width of central fringe in its diffraction pattern. 8

(b) Distinguish between Fraunhoffer and Fresnel's diffraction. 8

Section D

8. (a) What do you understand by Double Refraction ? What are ordinary and extra-ordinary rays and how can you show that they are plane polarized ? 8

(b) How can plane elliptically and circularly polorized light be produced and distinguished ? 8

(a) What are the advantages of oplical fiber over conventional communication transmission media ? 8

(b) Give the construction and working of Nicol prism. 8