



WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 6th Semester Examination, 2022

ELSACOR14T-ELECTRONICS (CC14)

PHOTONICS

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.*

GROUP-A

Answer any *five* questions from the following

2×5 = 10

1. State Brewster's Law.
2. What do you mean by coherent light source?
3. Why light emitted by two candles cannot produce interference pattern?
4. What is division of wavefront? What is division of amplitude?
5. What is the line-shape function for LASER?
6. Why direct band-gap materials are preferred for optoelectronic devices?
7. Define acceptance angle and numerical aperture of a step index optical fiber.
8. With schematic figures, show the differences between step-index and graded-index optical fiber.

GROUP-B

Answer any *six* questions from the following

5×6 = 30

9. Derive an expression for wavelength of monochromatic light source used in Newton's ring experiment in terms of diameters of rings and radius of curvature of the lens used.

10. Discuss the phenomenon of Fraunhofer diffraction at a single slit and show that the intensities of successive maxima are nearly in the ratio $1 : \frac{4}{9\pi^2} : \frac{4}{25\pi^2}$.
- 11.(a) Define optic axis and principal section of a crystal. 2+2+1
(b) What do you mean by positive and negative crystals?
(c) Give one example of each.
- 12.(a) What are the differences between interference and diffraction of light? 2+3
(b) In a zone plate, the index of first half period zone is 0.06 cm. A parallel beam of light of wavelength 6000\AA fall on the plate. Find the distance of the first focus.
13. Briefly explain the working principle of LED. Compare LED with p-n junction LASER. 4+1
14. Give the construction and theory of (i) a quarter-wave plate and (ii) half-wave plate.
15. Explain the principles of operation of photo-transistor.
16. What is dispersion with respect to fiber optic communication?
17. What is liquid crystal? Why is it so called? How the LCD display works? 1+1+3
18. With suitable diagrams, explain the operation of p-i-n diode as light detector.

N.B. : *Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.*

—x—