



**WEST BENGAL STATE UNIVERSITY**

B.Sc. Honours 6th Semester Examination, 2021

**ELSACOR14T-ELECTRONICS (CC14)**

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**

1. Answer any **five** questions from the following: 2×5 = 10
- (a) What are the values of phase difference and path difference for obtaining a destructive interference?
  - (b) Differentiate between interference and diffraction.
  - (c) What are the applications of Michelson interferometer?
  - (d) How will you increase the resolving power of a grating?
  - (e) Define plane of vibration and plane of polarisation of a light wave.
  - (f) State Malus' law.
  - (g) What do you mean by population inversion and pumping in LASER?
  - (h) Why does the optical fiber widely used in communication systems?
  - (i) State two conditions to get sustained interference of light.
  - (j) How does polarized light differ from unpolarized light?

**GROUP-B**

- Answer any six questions from the following** 5×6 = 30
2. State and derive Brewster's law. What does the law become when the rays of light travel from a denser to a rarer medium? 4+1
3. (a) Calculate the fringe width of interference pattern produced in Young's double slit experiment with slits  $10^{-3}$  m apart on a screen 1 m away. Wavelength of light is  $5893\text{\AA}$ . 2  $\frac{1}{2}$
- (b) What should be the thickness of a non-reflecting layer to be deposited on glass surface corresponding to wavelength  $6000\text{\AA}$ ? Refractive index of the layer is 1.35. 2  $\frac{1}{2}$
4. What do you mean by numerical aperture? Find out the expression of it. 1+4

- |     |  |       |
|-----|--|-------|
| 5.  | Write down the expression for intensity distribution function of a double slit diffraction pattern. Find the positions of maxima and minima. What is missing order in double slit diffraction? | 1+3+1 |
| 6.  | Explain the principle of operation of Phototransistors.  | 5     |
| 7.  | (a) What do you conclude about the nature of light from polarisation?  | 1     |
|     | (b) What do you mean by linearly, circularly and elliptically polarised light?   | 3     |
|     | (c) Define Faraday rotation.   | 1     |
| 8.  | (a) Briefly explain the working principle of LED.  | 4     |
|     | (b) Compare LED with p-n junction laser.   | 1     |
| 9.  | What are Einstein's A and B coefficients? Establish the relationship between them.   | 1+4   |
| 10. | Explain the theory of formation of Newton's ring and from it deduce the working formula for determination of wavelength of monochromatic light.  | 2+3   |
| 11. | Describe with necessary diagram, the step-index and graded-index optical fibre. In what respect do they differ?  | 3+2   |

**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—