

2008**M.Sc.****3rd Semester Examination****ELECTRONICS****PAPER—EL-2104****Full Marks : 50****Time : 2 hours**

The figures in the right-hand margin indicate full marks.

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

Illustrate the answers wherever necessary.

Answer Q. No. 1 and any three questions from the rest.

1. a) Explain the weakly guiding approximation in optical fibre.
 - b) Can numerical aperture be arbitrarily increased?
 - c) Draw an optical 'OR' gate and explain its operation.
 - d) What are the functions of (+) SLM and (-) SLM?
 - e) Explain why Si is not used for making LEDs and lasers?
-
2. What is a directional coupler? Derive an expression for minimum coupling length to transfer maximum energy across the coupling junctions. 2+8

(Turn Over)

3. What do you mean by LASER? Discuss with the help of energy level diagrams the operation of LASER. Why population inversion is essential to get a LASER?

2+6+2

4. What do you mean by a mode? What is the difference between multimode and single mode fibers? Why the two wave lengths $1.30 \mu\text{m}$ and $1.55 \mu\text{m}$ are important in case of single mode fiber optic communication system?

Hence why and how do we try to achieve dispersion-shifted and dispersion-flattered fibers?

Explain the possible misalignment losses in fibre-to-fibre splicing.

1+2+2+2+3

5. Discuss the mechanism of light emission from an LED. What route is usually taken to reduce losses due to self-absorber in an LED? Explain with the help of an example. Draw the schematic hand diagram of a heterojunction LED and derive its injection efficiency.

3+2+2+3

6. Write short notes on any two of the following : 5×2

- (i) Principle of pulse coding.
- (ii) Optical full adder.
- (iii) Principle of optical direction adder.

Internal Assessment — 10
