PG/IIIS/EL - 2104/09

M.Sc. 3rd Semester Examination, 2009

ELECTRONICS

(Optical Communication and Information Processing)

PAPER—EL-2104

Full Marks : 50

Time : 2 hours

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

The figures in the right-hand margin indicate marks

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

Illustrate the answers wherever necessary

1. Answer *all* questions : 2x5

(*a*) What do you mean by the mode in optical fiber ?

(*b*) What are the properties of good LED materials?

(*c*) Draw an optical 'AND' gate and explain its operation.

(*d*) Distinguish between single mode and multimode fiber.

(*e*) Why is it difficult to construct blue laser in comparison to red laser?

2. Explain stimulated emission and elucidate how it is used for construction of a LASER with reference to need optical pumping and resonator. What do you mean by open resonator? 2 + 5 + 3

3. What is wavelength division multiplexing? Why this type of multiplexing is advantageous over other types of multiplexing? With a neat diagram discuss any one method of wavelength division multiplexing? 2 + 2 + 6

4. What are the functions of (+) SLM and (-) SLM? Design an optical EX-OR gate and explain its operation. Also construct a optical Half-adder circuit using the optical EX-OR gate and explain its operation. 2 + 4 + 4

5. Explain how you can perform the arithmetic operations like substraction multiplication and division by optical logic gates with reference to the optical processes involved. 3 + 3 + 4

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

   (*i*) Bending losses in optical fiber

   (*ii*) Detection of the sub-merged bodies with laser

   (*iii*) Absorptive losses.

[*Internal Assessment* — 10 Marks]