PG/IIIS/EL-2104/10

M.Sc. 3rd Semester Examination, 2010

ELECTRONICS

(Optical Communication and Information Processing)

PAPER—EL-2104

Full Marks : 50

Time : 2 hours

Answer **Q.No.1** and any **three** 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 the following questions : 2 x 5

(*a*) Draw an optical 'OR' gate and explain its operation.

(*b*) Show that how the different q value denotes different profile in an optical fiber.

(*c*) Explain why Si is not used for making LEDs and LASERs ?

(*d*) What is 'V' number ? What does it signifies ?

(*e*) Why WDM is advantageous over other types of multiplexing ?

2. (*a*) What are microbendings and macrobendings ? How they introduce loss of light energy in optical fiber.

(*b*) The refractive indices of the core and cladding of a step index fiber are 1·48 and 1·465 respectively. Light of $\lambda = 0{\cdot}85\,\mu$ is guided through it. Calculate the minimum and maximum values of the propagation constant β. 2 + 4 +

3. Explain with example the NRZ, RZ and Manchester code. What is TDM ? What do you mean by synchronous and asynchronous TDM. (2 + 2 + 2) + 2 +

4. Discuss the basic processes involved in working of LED with band diagram. What should have the specialities of good LED materials? Give an example of a good LED material. 7 + 2 + 1

5. What are the advantages of optical logic gates over electronic gates? Design and explain the operation of an optical half-adder. Also construct a full adder from half-adder. 2 + 4 + 4

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

   (*i*) Principle of pulse coding

   (*ii*) Directional coupler in fiber optics

   (*iii*) LIDAR.

[*Internal Assessment*: 10 Marks]