

M.Sc. 3rd Semester Examination, 2013

ELECTRONICS

*(Optical Communication and
Information Processing)*

[Theory]

PAPER — ELC-304

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. (a) What are the basic differences between LASER and LED ?

(Turn Over)

- (b) What do you mean by intrinsic losses in optical fiber communication ?
- (c) Write two advantages of using optics in computation and data processing.
- (d) The refractive indices of core and cladding of a fiber are 1.48 and 1.47. If the length of the fiber is 1 km, find the value of the multipath broadening of the fiber.
- (e) What is V parameter of an optical fiber ?
Write its expression. 2×5
2. What do you mean by WDM system ? What are the advantages of WDM over TDM ? Discuss any one type of WDM system. $2 + 3 + 5$
3. What do you mean by +SLM and -SLM ? Draw and explain the operation of an optical half-adder using optical EX-OR gate and optical AND gate. Hence construct an optical full adder from optical half-adder. $2 + 4 + 4$

4. Discuss the principle of operation of a LED in forward bias condition. What is its internal quantum efficiency? Find its expression. Obtain the expression relating the emitted light intensity vs. the applied current to LED.
4 + 1 + 2 + 3
5. Why degenerate semiconductors are essential for developing a junction semiconductor laser? Obtaining the rate equations of photon density and electron density find the relation between the applied current density vs. stored light density in the cavity of the laser. Write the names of different quantum efficiencies of this type of laser.
2 + 6 + 2
6. What do you mean by the modes of light in an optical fiber? Obtain the expression of power of any mode of light passing through an optical planar fiber. Also show that this power always flows along the length direction of the fiber.
3 + 4 + 3

[*Internal Assessment* – 10 Marks]
