

BE | EXTC | VIII (OLD)

Optical Fiber Communication

13/05/13

P3-upq-Feb.-13KL-65 A4 E

Con. 7828-13.

(OLD COURSE)

GS-1990

(3 Hours)

[Total Marks : 100

**N.B. :** (1) Question No. 1 is **compulsory**.

(2) Answer any **four** out of remaining **six** questions.

(3) Assume **suitable** data whenever **necessary**.

1. (a) Explain spontaneous emission and stimulated emission. 5  
(b) Describe three types of optical fibers, for each type give typical core and cladding diameters, sketch refractive index profile. 5  
(c) Explain total internal reflection in an optical fiber. 5  
(d) Describe the importance of OTDR for optical fiber communication. 5
  2. (a) Derive an expression for N.A., acceptance angle cone and solid angle for a step index fiber. 10  
(b) Explain intramodal and intermodal dispersion in optical fibers. How does dispersion affect the transmission B.W. of optical fibers ? 10
  3. (a) Draw the block diagram of optical heterodyne receiver and optical homodyne receiver and explain the phenomenon of phase locking between the local oscillator and incoming signals. 10  
(b) Explain the working of LED with a neat labelled block diagram. 10
  4. (a) What do you understand by double heterostructure ? State its limitations. 5  
(b) State the difference between LED and LASER. 5  
(c) Explain the techniques for measurements of attenuation, dispersion, refractive index and N.A. of fiber. 10
  5. (a) Describe quantum efficiency and responsivity of a photodetector. Derive an expression for the responsivity of an intrinsic photodetector. 10  
(b) Explain with neat sketches fiber slicing techniques. Enlist the desirable requirements of a good fiber connector. 10
  6. (a) Explain any one fiber fabrication process with a neat diagram. 10  
(b) Find the core radius necessary for single mode operation at 820 nm of step index fiber with  $n_1 = 1.482$  and  $n_2 = 1.474$ . What is the numerical aperture and maximum acceptance angle of this fiber ? Also calculate the corresponding solid angle. 10
  7. Write short notes on any **four** .— 20
    - (a) Link power budget
    - (b) Optical receiver and noise sources
    - (c) Wave propagation in GIF
    - (d) Multiplexing of optical signal
    - (e) PIN diode.
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