

- N.B. : (1) Question No. 1 is compulsory.
 (2) Attempt any four questions out of remaining six questions.
 (3) Any assumptions made should be clearly stated.

1. Answer the following in brief : 20
 - (a) Describe three types of optical fibers. For each type give typical core and cladding diameters. Sketch their refractive index profile.
 - (b) Describe the importance of OTDR for optical fiber communications.
 - (c) Why do manufactures specify optical fiber bandwidth as bandwidth-length product ?
 - (d) Explain spontaneous emission and stimulated emission.

2. (a) Discuss the boundary conditions and the mode cutoff in case of an optical fiber. What is the significance of 'V' number. Get an expression for it in terms of N.A. 10
- (b) A step index fiber in air has a numerical aperture of 0.16, a core refractive index of 1.45 and a core diameter of 60 μm . Determine the normalized frequency for the fiber when light at a wavelength of 0.82 μm is transmitted. Estimate the number of guided modes propagating in the fiber. 10

3. (a) Explain any one fiber fabrication process with a neat diagram. 10
- (b) Explain with neat sketches fiber splicing techniques. Enlist the desirable requirements of a good fiber connector. 10

4. (a) Explain the various factors contributing to the attenuation in optical fibers. 10
- (b) Explain intramodal and intermodal dispersion in optical fibers. How does dispersion affect the transmission bandwidth of optical fibers ? 10

5. (a) Explain and compare pin diodes with APD with the help of suitable electric field diagrams. 10
- (b) What are the common LED structures used for optical fiber communications. Discuss their merits and drawbacks. Compare surface and edge emitting devices. 10

6. (a) Explain the various parameters required to find the performance of digital optical receiver. 10
- (b) List the important point-to-point link design used in optical communication. Explain each in brief. 10

7. Write short notes on (any three) : 20
 - (a) Linearly polarized modes
 - (b) Laser diodes
 - (c) Propagation of optical signal through GIF
 - (d) WDM.