Paper / Subject Code: 42453 / Optical Communication

B.E. (EXTC) (Sem - VII) (CB) Date - 20/11/19

Time : 3 Hours **Marks: 80**

N.B. : (1) Question No. 1 is compulsory
(2) Attempt any three questions out of the remaining five questions.
(3) Figures to the right indicate full marks.
(4) Assume suitable data wherever necessary and justify the same.

1. Solve **any four**
   (a) Differentiate LED and LASER. 5
   (b) Explain different types of fibers with their refractive index profile and-mention its dimensions. 5
   (c) Draw and explain fusion splicing. 5
   (d) Explain the concept of Fiber Bragg Grating. Give its applications. 5
   (e) Derive expression for cut off wavelength for single mode step index fiber 5

2. (a) Explain in brief VAD and MCVD fiber fabrication techniques. 10

   (b) Explain linear and non-linear scattering losses in optical fiber. 10

3. (a) What are the different factors responsible for attenuation and dispersion in optical fiber. 10

   (b) Explain in detail working, principle of RAPD. Why it is called reach through APD and compare its working with PIN diode? 10

4. (a) Explain working principle of EDFA with diagram . 10

   (b) An analog optical fiber system using LASER with 3 dBm optical power into air. A coupling loss of 17.5 dB is present while launching power into fiber. Length of fiber is 6 km with a loss of 5dB/km. It is spliced at every 1.5 km with 1.1dB loss per splice. Connector loss at receiver is 0.8dB. The PIN receiver has sensitivity of -54 dBm. Estimated safety margin is 4 dB. Design the link power budget. 10

5. (a) If a multimode step index fiber having the core refractive index of 1.5, cladding refractive index of 1.38, core radius of 25 μm operates at a wavelength of 1300 nm. Calculate - 10
   (i) Numerical Aperture.
   (ii) Normalized frequency
   (iii) Solid acceptance angle.
   (iv) Total no. of modes entering the fiber.

   (b) Draw and explain block diagram of cutback method of attenuation measurement. 10

6. Write short note on: - 20
   (i) RF over Fiber
   (ii) Quantum Well Laser
   (iii) Solitons
   (iv) Optical Switches

****