**AKGEC/IAP/FM/02**

**Ajay Kumar Garg Engineering College, Ghaziabad**

**Department of ECE**

**Sessional Test-2**

Course: B. Tech. Semester: VII

Session: 2017-18 Section: EC-1, EC-2, EC-3

Subject: Optical Communication Sub. Code: NEC-701

Max Marks: 50 Time: 2 hour

***Note***: Answer **all** the sections.

**Section-A**

Attempt **all** the parts. **(5x2 =10)**

1. What is Chromatic Dispersion?
2. How the Information Capacity of an optical fiber is specified? Give example.
3. What are the advantages of Intensity Modulation?
4. Explain Fiber Bending Losses.
5. Name some materials used for fabrication of LEDs depending upon operating wavelength.

**Section-B**

Attempt **all** the parts. **(5x5 = 25)**

1. Explain Absorption Loss mechanisms with their causes in the Silica Glass Fibers.
2. What is Kerr Effect? A multimode step index fiber has a numerical aperture of 0.4 and a core refractive index of 1.45. The material dispersion parameter for the fiber is 375 ps nm−1 km−l which makes material dispersion the totally dominating chromatic dispersion mechanism. Estimate (a) the total rms pulse broadening per kilometer when the fiber is used with an LED source of rms spectral width 75 nm and (b) the corresponding bandwidth–length product for the fiber.
3. Explain the Non-Linear Scattering Losses. The beat length in a single mode fiber is 10 cm when light from injection laser with a spectral line width of 2 nm and a peak wavelength of 0.85 µm is launched into it. Determine the modal birefringence, coherence length and difference between the propagation constants.

P. T. O.

1. Explain any three types of LED structures. The total efficiency of an injection laser with a GaAs active region is 24%. The voltage applied to the device is 2.8 V and the band gap energy for GaAs is 1.27 eV. Compute the external power efficiency of the laser.
2. Define and derive the expression for Efficiency and Power of LED.

**Section-C**

Attempt **all** the parts. **(2x7.5 = 15)**

1. Explain the working principle of LED and Injection Laser. A ruby laser crystal is 5 cm long (n = 1.75). The peak emission wavelength is 0.55 µm. Determine the number of longitudinal modes and their frequency separation.
2. What is Modal Noise? Derive an expression for Intermodal Dispersion in Step Index Fibers.