Unit III

5. (a) Write a short note on laser to fiber coupling.

(b) The Fresnel reflection at a butt joint with an airgap in a multimode step index fiber is 0.46 db. Determine the refractive index of the fiber core. **15**

6. (a) Explain the following terms :

(i) Optical output power

(ii) Output spectrum

(iii) Modulation Bandwidth.

(b) Briefly outline the merits and demerits of LED is comparison with the injection laser for use as a source in optical fiber communication. **15**

Unit IV

7. (a) Discuss in detail the p-i-n photodiode with regard to performance and compatibility requirements in photo-detectors.

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B. Tech. EXAMINATION, Dec. 2018

(Eighth Semester)

(B. Scheme) (Re-appear Only)

(ECE)

ECE412B

OPTICAL COMMUNICATION

Time : 3 *Hours*] [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Explain the mechanism for transmission of light within an optical fiber.

(b) Define the relative refractive index difference for an optical fiber and show how it may be related to numerical aperture. **15**

2. (a) Derive an expression for r.m.s. pulse broadening due to material dispersion in an optical fiber and define meterial dispersion parameter.

(b) An 8 km optical fiber link without repeaters uses multimode graded index fiber which has a B.W. length product of 400 MHz km. Estimate :

(i) The total pulse broadening on the link

(ii) r.m.s. pulse broadening on the link. **15**

Unit II

3. (a) Describe the mechanism of intermodel dispersion in a multimode step index fiber.

(b) The threshold optical powers for stimulated Brillouin an Raman scattering in a long 8 μm core diameter single mode fiber are found to be 190 mw and 1.70 w respectively. When using an injection laser source with a bandwidth of 1 GHz calculate the operating wavelength of the laser and the attenuation in decibels per kilometre of the fiber at the wavelength. **15**

4. (a) Discuss absorption losses in optical fibers, comparing and contrasting intrinsic and extrinsic absorption mechanisms.

(b) The material dispersion parameter for a glass fiber is 20 $ps\mu m^{-1}$ km^{-1} at a wavelength of 1.5 μm. Estimate the pulse broadening due to material dispersion within the fiber when the light is launched from an injection laser source with a peak wavelength of 1.5 μm and an rms spectral width of 2 nm into a 30 km length of the fiber. **15**

(b) Describe the multiplication process in photodetectors. **15**

8. (a) Discuss the mechanism of optical feedback to provide oscillations and amplification within the laser.

(b) Explain the terms Reusability and Laser line width used in optical systems. **15**

(b) Describe the multiplication process in photodetectors. **15**

8. (a) Discuss the mechanism of optical feedback to provide oscillations and amplification within the laser.

(b) Explain the terms Reusability and Laser line width used in optical systems. **15**