

**328811(28)**

APR-MAY

**B. E. (Eighth Semester) Examination, 2020**

**(Old Scheme)**

**(Et & T Engg. Branch)**

**OPTICAL COMMUNICATION**

***Time Allowed : Three hours***

***Maximum Marks : 80***

***Minimum Pass Marks : 28***

***Note : Attempt all questions. Part (a) from each question is compulsory. Attempt any two parts from (b), (c) and (d) of each question.***

**Unit-I**

1. (a) Define Snell's law of refraction. 2
- (b) What is step-index fiber? Explain the refractive index profile and ray transmission in step index fiber. 7

[ 2 ]

- (c) Explain different types of attenuation in an optical fiber. 7
- (d) A silica optical fiber has a core refractive index of 1.50 and a cladding refractive index of 1.47. Determine (i) The critical angle at the core cladding interface (ii) The NA for the fiber (iii) The acceptance angle in air for the fiber. 7

### Unit-II

2. (a) What are the advantages of LED source? 2
- (b) Explain edge emitter LEDs structure in detail. 7
- (c) What is meant by population inversion? Explain its significance. 7
- (d) A DH surface emitter which has an emission area diameter of  $50 \mu\text{m}$  is butt joint to an  $80 \mu\text{m}$  core step index fiber with a NA of 0.15. The device has a radiance of  $30 \text{ W Sr}^{-1} \text{ cm}^{-2}$  at a constant operating drive current. Estimate the optical power coupled into the fiber if it is assumed that the Fresnel reflection coefficient at the index matched fiber surface is 0.01. 7

328811(28)

[ 3 ]

### Unit-III

3. (a) Explain the significance of fiber coupler. 2
- (b) Write short note on mechanical splices. 7
- (c) Explain star coupler in detail. 7
- (d) Write short note on distribution network. 7

### Unit-IV

4. (a) What is the function of optical detector? 2
- (b) Explain the principle of photo-detection. 7
- (c) Explain the construction and working of PIN Photo diode. 7
- (d) When  $3 \times 10^{11}$  photons each with a wavelength of  $0.85 \mu\text{m}$  are incident on a photo diode, on average  $1.2 \times 10^{11}$  electrons are collected at the terminals of the device. Determine the quantum efficiency and the responsibility of the photo diode at  $0.85 \mu\text{m}$ . 7

### Unit-V

5. (a) What is optical network? 2

328811(28)

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[ 4 ]

- (b) Explain cut-back technique for the measurement of spectral loss in optical fiber. 7
- (c) Explain the measurement technique for intermodal dispersion. 7
- (d) Write short notes on SONET. 7