

G 1732

(Pages : 2)

Reg. No.....

Name.....

**B.TECH. DEGREE EXAMINATION, MAY 2016**

**Eighth Semester**

Branch : Electrical and Electronics Engineering

EE 010 804 L 06—OPTOELECTRONICS (Elective III) (EE)

(New Scheme—2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer all questions.*

*Each question carries 3 marks.*

1. What are the concept of V-number for single mode and multimode fibers ?
2. Compare stimulated emission and spontaneous emission.
3. Give one example of lensing scheme used to improve optical source to fiber coupling.
4. What are the effects of ISI in optical fibers ?
5. Comment on gain and noise dependencies of optical amplifiers.

(5 × 3 = 15 marks)

**Part B**

*Answer all questions.*

*Each question carries 5 marks.*

6. Using graded index fibers, intermodal distortion can be reduced. How ?
7. When  $3 \times 10^{11}$  photons each with a wavelength of  $0.8 \mu\text{m}$  are incident on a photodiode, an average of  $1.2 \times 10^{11}$  electrons are collected at the terminals of the device. Determine the quantum efficiency and responsivity of the photodiode at  $0.8 \mu\text{m}$ .
8. With suitable diagrams, explain how avalanche photodiode can be used as a photo detector.
9. Explain the need for equalization in optical communication.
10. What is WDM ? Explain its types.

(5 × 5 = 25 marks)

Turn over

## Part C

Answer all questions.

Each full question carries 12 marks.

11. Describe the mechanism of intermodal dispersion in multimode step-index fiber. Show that the total broadening of a light pulse  $\delta T_s$  due to intermodal dispersion in a multimode step index fiber

may be given by  $\delta T_s = \frac{L(NA)^2}{2n_1C}$  where L is the fiber length, NA-numerical aperture,  $n_1$ -core refractive index and C velocity light.

Or

12. Explain in detail, the superiority of the wave theory of light over the ray theory, in respect of light wave propagation.
13. With neat sketch describe the structure, principle of operation and characteristics of Laser diode? What are the different types of Laser diodes?

Or

14. Give the structures of surface emitting and edge emitting LED and compare their performances.
15. What is splicing? Explain the different kinds of splicing techniques with the help of neat sketches.

Or

16. Outline the reasons for the adoption of materials and devices used for photodetection in optical fiber communication. Discuss in detail, the *p-i-n* photo diode with regard to performance and compatibility requirements in photo detectors.
17. Explain different types of noises in optical fiber detectors, mentioning their sources and the methods to reduce them.

Or

18. Explain, with neat labelled sketch, the eye diagram. How the distortion is represented in it? What are its effects in the communication system?
19. Give the working principle of Raman Amplifier and describe the pumping process in the amplifier.

Or

20. Explain the principle of fiber optic sensor system for strain and displacement measurement.

(5 × 12 = 60 marks)