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BIEL-017

01155

B.Tech. IN ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

Term-End Examination

June, 2012

BIEL-017 : OPTICAL FIBER COMMUNICATION

Time : 3 hours *Maximum Marks : 70*

Note : *All questions carry **equal marks**.*
*Attempt **any seven** questions out of **Ten** questions.*

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1. (a) Explain the advantages of optical communication system and compare with electrical communication. **5**

(b) What is pulse broadening ? **5**

2. (a) Explain the formation of skew rays in optical fiber. **5**

(b) An optical fiber in air has a NA (Numerical Aperture) of 0.4. Compare the acceptance angle for meridional rays with that for skew rays which change direction by 100° at each reflection. **5**

3. A graded index fiber has a core with parabolic refractive index profile, which has a diameter of 50 μm. The fiber has a numerical aperture of 0.2. Determine:

(a) V-number of optical fiber 5

(b) Total no. of guided modes propagating in the fiber when it is operating at 1 μm. 5

4. (a) Explain different types of losses in optical fiber. 5

(b) Explain types of dispersion in optical fiber. 5

5. (a) Explain fiber drawing process during optical fiber fabrication. 5

(b) What is the difference between fiber splices and connectors ? 5

6. (a) What is population inversion ? Explain how it helps in emission of energy ? 5

(b) Calculate the ratio of the stimulated emission rate to the spontaneous emission rate for an incandescent lamp operating at a temperature of 1000° k. It may be assumed that the average operating wave length is 0.5 μm. 5

7. (a) Explain the optical detection principle of a optical source. 5

(b) Explain the detection principle of pin photo- diode. 5

8. (a) What is photoconductive detectors ? 5

(b) The electron transit time in an InGaAs photoconductive detector is 5 ps. Determine the maximum 3-αβ bendwith permitted by the device when its photoconductive gain is 70. 5

9. (a) What are the different types of noise affecting the optical receiver ? 5

(b) Draw and explain a digital optical fiber receiver. 5

10. Write short notes on ***any two*** : **2x5=10**

(a) Automatic Gain Control

(b) Optical Modulator

(c) Polarization