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Question Paper Code : 41285

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Seventh Semester

Electronics and Communication Engineering

080290058 – OPTICAL FIBER COMMUNICATION

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Determine the critical angle at an interface between doped silica with $n_1 = 1.460$ and pure silica with $n_2 = 1.450$.
2. Define V parameter.
3. What do you mean by polarization mode dispersion?
4. Define group delay.
5. What is meant by spontaneous emission?
6. What are the advantages of LEDs over laser diode?
7. Define quantum efficiency of a photodetector.
8. What is Responsivity?
9. List the system requirements needed in analyzing a point -to- point link.
10. Which types of architecture are popular for SONET and SDH Networks?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain with neat block diagram the fundamentals of optical fiber communication. (10)
(ii) Discuss the mode theory of circular wave guides. (6)

Or

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(b) (i) Draw and explain the structure of graded index fiber with expressions for the refractive profile, numerical aperture and the number of guided modes. (12)

(ii) List the advantages of optical fiber communication. (4)

12. (a) (i) Discuss pulse broadening in graded index fibers with necessary equations. (8)

(ii) Explain the scattering and bending loss that occur in an optical fiber with relevant diagrams and expressions. (8)

Or

(b) (i) Discuss material and waveguide dispersion mechanisms with necessary mathematical expressions. (10)

(ii) Explain with suitable diagrams of the different mechanisms that contribute to attenuation in optical fibers. (6)

13. (a) (i) Draw the structures of edge-emitting LED and surface emitting LED and explain the operation. (10)

(ii) Discuss the effects of temperature on the performance of a diode. (6)

Or

(b) (i) Discuss the LASER diode principle, modes and threshold conditions. (8)

(ii) Explain the lensing schemes for coupling improvement with necessary diagrams. (8)

14. (a) Discuss the principle of operation of APD with neat circuit diagram. Also discuss the requirements of photo detector. (16)

Or

(b) (i) Explain the fundamental receiver operation in optical communication. (10)

(ii) Write short notes on the temperature effects on photo detectors. (6)

15. (a) (i) Explain the operational principles of WDM. (8)

(ii) Explain the rise-time budget. (8)

Or

(b) (i) Draw and explain the point-to-point fiber optic link and discuss the system considerations. (10)

(ii) Describe the principle of solitons with suitable diagrams. (6)