Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 40457

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Seventh Semester

Electronics and Communication Engineering

EC 8751 – OPTICAL COMMUNICATION

(Common for Computer and Communication Engineering)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. A step-index fiber has a normalized frequency V = 26.6 at a 1300-nm wavelength. If the core radius is 25 mm, what is the numerical aperture?

2. State leaky modes in optical fiber communication.

3. 150 μW optical power is launched at the input of a 10 km long optical fiber link operating at 850 nm. The output power available is 5 μW. Estimate the total attenuation in dB over the link length neglecting all connector and spice losses. What is the average attenuation per km?

4. Define dispersion. Why intermodal dispersion is not found in single mode fiber?

5. Why silicon is not used for making optical sources?

6. State the mechanisms behind the lasing action.

7. Define quantum limit.

8. Compare cutback technique and insertion loss method.

9. State the concept of WDW technique.

10. Depict EPON architecture and operational concept.

PART B — (5 × 13 = 65 marks)

11. (a) Illustrate the concept of total internal reflection and polarization components of light with necessary expressions. (13)

Or

(b) Write about the Construction, mode field diameter and Propagation Modes of a single mode fiber. (13)

12. (a) Discuss about a non-linear scattering process that is associated with the generation of an acoustic phonon and compare it with a similar process that generates a high frequency optical phonon. (13)

Or

(b) Explain how intersymbol interference affects the bandwidth in optical fiber communication. (13)

13. (a) With neat schematics. Explain about structure of a surface emitting Light Emitting Diode (LED). (13)

Or

(b) Compare and contrast PIN photodetector with Avalanche photo diodes. (13)

14. (a) Write detailed notes on the following:

(i) Various noise sources in the detection mechanism (7)

(ii) Front end amplifier (6)

Or

(b) Write in detail about how tensing schemes are used to improve optical source-to-fiber coupling efficiency. (13)

15. (a) Explain about SONET/SDH transmission formats and speed, SONET/SDH rings and SONET/SDH Networks. (13)

Or

(b) Derive total system rise time for determining the dispersion limitation of an optical fiber link.

PART C — (1 × 15 = 15 marks)

16. (a) Explain the various design techniques for dispersion optimization of single mode fibers. (15)

Or

(b) Justify that soliton is a special kind of wave that can propagate undistorted over song distance and remain unaffected after collision with each other. (15)

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