

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SEVENTH SEMESTER B.TECH DEGREE EXAMINATION (R), DECEMBER 2023**ELECTRONICS AND COMMUNICATION ENGINEERING****(2020 SCHEME)****Course Code : 20ECT411****Course Name: Optical Fiber Communication****Max. Marks : 100****Duration: 3 Hours****PART A*****(Answer all questions. Each question carries 3 marks)***

1. Estimate the critical angle when the core refractive index is 1.48 and the relative refractive index is 2%.
2. Illustrate the significance of cut – off wavelength.
3. Explain the attenuation in optical fiber.
4. Explain the role of optical connectors in optical fiber communication.
5. A silicon avalanche photodiode has a quantum efficiency of 70 percent at a wavelength of 950nm. Suppose 0.5 μ W of optical power produces a multiplied photocurrent of 15 μ A. Find (a) Primary photocurrent. (b) Multiplication factor.
6. Illustrate the principle of external modulation in laser diode with a neat block schematic.
7. Describe the working principle of semiconductor laser amplifier.
8. Explain the key aspects of doped fiber amplifiers in optical communication systems.
9. Explain the importance of optical splitters in the optical communication networks.
10. Illustrate the principle of optical add/drop multiplexer with a neat sketch.

PART B***(Answer one full question from each module, each question carries 14 marks)*****MODULE I**

11. a) Describe the classification of optical fiber based on modes and refractive index profile with neat sketches. (9)
- b) Illustrate index-guiding photonic crystal fiber with neat sketches. (5)

OR

12. a) Enumerate any six advantages of optical fiber communication. (6)
- b) Explain the mode-theory for propagation of light in optical fiber and show the relation of the refractive Index of core, cladding, numerical aperture and relative refractive index of an optical fiber. (8)

MODULE II

13. a) Explain the importance of intramodal dispersion and material dispersion effect in the optical fiber communication. (10)
b) Delineate splicing method in the optical fiber with a neat sketch. (4)

OR

14. a) Describe various linear and nonlinear scattering loss in optical fiber. (8)
b) Explain fiber bend loss in optical fiber. (6)

MODULE III

15. a) Illustrate the structure and working principle of Avalanche photodiode with neat diagram. (10)
b) Explain noise in laser diodes (4)

OR

16. a) Illustrate the structure and working principle of a laser diode with neat sketch. (8)
b) What are the different types of noises in photo-detector? (6)

MODULE IV

17. a) Explain the working principle of erbium-doped fiber amplifier (EDFA) under three different configurations with neat diagram. (8)
b) Consider an EDFA being pumped at 980 nm with a 30-mW pump power. If the gain at 1550 nm is 20 dB, what are the maximum input and output powers? (6)

OR

18. a) Illustrate the working principle of a typical Raman amplification system with a neat diagram. (8)
b) Delineate the working of semiconductor laser amplifier. (6)

MODULE V

19. Illustrate the working principle of OTDR with a neat diagram. Explain how the OTDR is used for tracing the various features of optical fiber communication system. (14)

OR

20. a) Describe the operating principle of wavelength division multiplexing (WDM) with neat diagram. (9)
b) Explain the working of passive optical couplers with neat sketch. (5)
