Seventh Semester B.Tech. Degree Examination, October 2018
(2013 Scheme)
13.702 : OPTICAL COMMUNICATION (T)

Time : 3 Hours
Max. Marks : 100

PART – A

Answer all questions. Each carries 2 marks. (10×2=20 Marks)

1. Consider a multimode step index fiber with a 62.5 μm core diameter and a core-cladding index difference of 1.5 percent. If the core refractive index is 1.480, estimate the normalized frequency of the fiber and the total number of modes supported in the fiber at a wavelength of 850 nm.

2. What is scattering loss? Identify the causes of scattering loss.

3. Why Silicon is not used to fabricate LED or Laser diode?

4. Draw the schematic diagram of light source coupled to an optical fiber.

5. What are the drawbacks of Avalanche Photo Diode?

6. What is Receiver sensitivity? Write down the expression for $P_{sensitivity}$

7. Explain the external pumping in Semiconductor optical amplifier.

8. Derive S-matrix of $2 \times 2$ Guided wave coupler.

9. Give an example of adding and dropping wavelength with $4 \times 4$ optical add drop multiplexing devices.

10. Draw the block diagram of Free Space Optics.

PART – B

Answer any one question from each module. Each question carries 20 marks.

Module – I

11. a) Discuss in detail about the construction, mode field diameter and propagation mode of Single mode fiber.

b) Discuss in detail about dispersion, attenuation, absorption and bending loss in optical fiber.
12. a) Explain the step involved in fiber fabrication in detail.
    b) List out the requirements to be satisfied by the selection of fiber materials.
       Discuss in detail about the different materials used for fiber.

Module – II

13. a) With neat diagrams explain the various structures of LED and its working principle. Also explain about the modulation of LED.
    b) Compare Light Emitting Diode with Laser Diode.

14. a) Draw and compare the construction and characteristics of PIN and APD.
    b) A given silicon APD has quantum efficiency of 65 percent at a wavelength of 900 nm. Suppose 0.5 μW of optical power produces a multiplied photocurrent of 10 μA. What is the multiplication factor of $M$?
    c) Briefly explain the different noise sources of a photodetector.

Module – III

15. Draw the block diagram of point to point links. Also explain about link power budget and rise time budget.

16. a) With neat sketches, explain about the EDFA architecture, amplification mechanism, power conversion efficiency, gain and amplifier noise.
    b) Write a short notes on OTDR.

Module – IV

17. a) Explain the principle of operation of Wavelength Division Multiplexing with block diagram.
    b) Write short notes on Circulator and isolator.
    c) Discuss in detail about the fiber grating filter and its applications.

18. a) Explain about soliton and soliton interaction with neat sketches.
    b) Explain about the design guidelines of soliton based links.
    c) Discuss in detail about the Visible light communication.