10/11/17 (FN)

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

Question Paper Code : 50454

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017
Seventh Semester
Electronics and Communication Engineering
EC 6702 : OPTICAL COMMUNICATION AND NETWORKS
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Codes/tables/Charts to be permitted, if any, may be indicated

Answer ALL Questions

PART – A (10×2=20 Marks)

1. Why Partial reflection does not suffice the propagation of light ?
2. A graded index optical fiber has a core with a parabolic index profile which has a diameter of 50 μ m. The fiber has a numerical aperture of 0.2. Calculate the total number of guided modes in the fiber when it is operating at a wavelength of 1 μ m.
3. Define attenuation.
4. A manufacturer's data sheet lists the material dispersion D_{mat} = 110 ps/nm. km at a wavelength of 860 nm. Find the rms pulse broadening per km due to material dispersion if the optical source has a spectral width = 40 nm at b an output wavelength of 860 nm.
5. Write the laser diode rate equations.
6. Give some possible lensing schemes to improve optical source to fiber coupling efficiency.
7. Draw the generic structure of transimpedance amplifier.
8. Define receiver sensitivity.
9. Draw the basic structure of STS –1 SONET frame.
10. Mention any 2 nonlinear effects present in optical fiber.

PART – B (5×16=80 Marks)

11. a) Explain phase shift with total internal reflection and evanescent field. **(16)**

(OR)

b) Discuss whether TEM waves exist in an optical fiber. If not what type of mode will propagate in a practical optical fiber ? **(16)**

12. a) In detail, explain linear scattering losses. **(16)**

(OR)

b) A multimode step index fiber has a numerical aperture of 0.3 and a core refractive index of 1.45. The material dispersion for the fiber is 250 ps nm^{-1} km^{-1} which makes material dispersion the totally dominating chromatic dispersion mechanism. Estimate (a) the total rms pulse broadening per km when the fiber is used with an LED source of rms spectral width 50 nm and (b) the corresponding bandwidth – length product of the fiber. **(16)**

13. a) With steps, derive the internal quantum efficiency of LED. **(16)**

(OR)

b) With a neat diagram, explain the structure of LASER diode and its radiation pattern. **(16)**

14. a) Explain the dispersion measurements methods in optical fiber. **(16)**

(OR)

b) Discuss on the numerical aperture measurements of optical fiber. **(16)**

15. a) Explain SONET/SDH Networks. **(16)**

(OR)

b) Write a note on optical switching methods. **(16)**