

B.Tech IV Year I Semester (R13) Supplementary Examinations June 2017

OPTICAL FIBER COMMUNICATION
(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- A multimode silica fiber that has a core refractive index $n_1 = 1.48$ and cladding index $n_2 = 1.48$. Compute the numerical aperture.
 - A light ray is incident from glass to air. Calculate the critical angle $[\theta_c]$.
 - State any two differences between step index fiber and graded index fiber.
 - What is chromatic dispersion?
 - State the advantages of ELEDs.
 - On an InGaAs photo detector a pulse of 85 nsec emits 6×10^6 photons at 1300 nm wavelength. Average e-h pairs generated are 5.4×10^6 . Calculate the quantum efficiency of detector.
 - State the types of lensing schemes for coupling improvement.
 - What is fiber splicing?
 - A digital fiber link operating at 850 nm requires a BER of 10^{-9} . Calculate quantum limit in terms of quantum efficiency.
 - What is link power budget?

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 State and explain the advantages and disadvantages of fiber optic communication systems.

OR

- 3 What is numerical aperture? Derive an expression for numerical aperture and maximum acceptance angle in case of a step index optical fiber in terms of refractive index core and cladding material.

UNIT – II

- 4 Discuss the following for optical fibers:

- Material dispersion.
- Bending loss.

OR

- 5 Explain in detail the design optimization of single mode fibers.

UNIT – III

- 6 Explain the structure of surface emitting and edge emitting LEDs.

OR

- 7 Explain with the diagrams, the different lensing schemes used to improve source to fiber coupling efficiency.

UNIT – IV

- 8 Explain the following terms relating to PIN photodiode with proper expressions:

- Cut-off wavelength.
- Quantum efficiency.

OR

- 9 With a schematic diagram, explain the working of optical receiver.

UNIT – V

- 10 Explain the following:

- Carrier to noise ratio
- Inter modulation distortion.

OR

- 11 What is rise time budget? With necessary expressions explain its significance.
