Code: 13A04702 **R13**

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)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) A multimode silca fiber that has a core refractive index n_1 = 1.48 and cladding index n_2 = 1.48. Compute the numerical aperture.

(b) A light ray is incident from glass to air. Calculate the critical angle $[\emptyset_C]$.

(c) State any two differences between step index fiber and graded index fiber.

(d) What is chromatic dispersion?

(e) State the advantages of ELEDs.

(f) On an InGaAs photo detector a pulse of 85 nsec emits 6 x 10^6 photons at 1300 nm wavelength. Average e-h pairs generated are 5.4 x 10^6. Calculate the quantum efficiency of detector.

(g) State the types of lensing schemes for coupling improvement.

(h) What is fiber splicing?

(i) A digital fiber link operating at 850 nm requires a BER of 10^{-9}. Calculate quantum limit in terms of quantum efficiency.

(j) 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:

(a) Material dispersion.

(b) 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:

(a) Cut-off wavelength.

(b) Quantum efficiency.

OR

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

UNIT – V

10 Explain the following:

(a) Carrier to noise ratio.

(b) Inter modulation distortion.

OR

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

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