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06EC72

Seventh Semester B.E. Degree Examination, June 2012

Optical Fiber Communication

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. What are the advantages of optical fiber communication? Explain in detail. **(06 Marks)**

b. Explain briefly the fiber materials. **(07 Marks)**

c. With a neat diagram, explain the photonic crystal fibers, in optical fiber communication. **(07 Marks)**

2 a. Explain the macro bending loss in optical fiber. **(06 Marks)**

b. Explain the material dispersion with relevant expressions. **(07 Marks)**

c. Explain the following terms in optical communication :

i) Attenuation

ii) Absorption

iii) Scattering losses

(Note : Mathematical expressions and graphs may be given wherever necessary) **(07 Marks)**

3 a. Give comparison between laser diode and light emitting diode, considering the various parameters. **(06 Marks)**

b. A double heterojunction InGaAsp LED emitting at a peak wavelength of 1310 nm has radiative and non-radiative recombination times of 30 and 100 ns respectively. The drive current is 40 mA. Calculate the :

i) Bulk recombination lifetime

ii) Internal quantum efficiency

iii) Internal power level. **(07 Marks)**

c. Explain the operation of avalanche photo diode with schematic diagram and separate absorption and multiplication (SAM) APD configuration. **(07 Marks)**

4 a. Explain the examples of possible Lensing schemes used to improve optical source to fiber coupling efficiency. **(06 Marks)**

b. What is fiber splicing? Explain the fusion splicing of optical fibers with relevant diagram. **(07 Marks)**

c. What are the principal requirements of a good connector? Explain the alignment scheme used in tapered-sleeve fiber-optic connector with relevant diagram. **(07 Marks)**

PART – B

5 a. Explain the receiver sensitivity of an optical receiver. Derive an expression for receiver sensitivity. **(06 Marks)**

b. Explain the general configuration of an eye diagram showing the definitions of fundamental measurement parameters. And also explain noise margin and timing jitter parameters. **(07 Marks)**

c. Explain the operation of Burst mode receiver with received data pattern and signal level variations in pulses. **(07 Marks)**

6 a. Explain the operation of multi-channel amplitude modulation standard technique for frequency division multiplexing of N independent information bearing signals. **(07 Marks)**

b. Explain the radio-over-fiber links with a concept of a broadband wireless access network for interconnecting antenna base stations with the central controlling office. **(06 Marks)**

c. Explain the link power budget, with a relevant diagram. **(07 Marks)**

7 a. Explain the wavelength division multiplexing network containing various types of optical amplifiers. **(07 Marks)**

b. Explain the optical Isolator with a design and operation of a polarization independent isolator mode of three miniature optical components. **(06 Marks)**

c. Explain the operation of optical Add/Drop multiplexers, with a relevant diagram. **(07 Marks)**

8 a. Explain the configuration of SONET/SDH rings, with relevant diagrams. **(10 Marks)**

b. Write notes on the following :

i) Optical amplifier

ii) High speed light wave links. **(10 Marks)**

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