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10EC/TE72

Seventh Semester B.E. Degree Examination, July/August 2021

Optical Fiber Communication

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

- 1 a. What are the advantages and disadvantages of optical fiber communication? (08 Marks)
- b. Using Snell's law, derive an expression for numerical aperture of a fiber optic cable. (08 Marks)
- c. A step index fiber has a core and cladding refractive indices of 1.48 and 1.46 respectively and supports propagation of an optical signal of wavelength 820nm, calculate core radius, numerical aperture and acceptance angle. (04 Marks)
- 2 a. Explain the different types of absorption losses in optical fiber. (06 Marks)
- b. Derive an expression for pulse spreading due to material dispersion which is a function of wavelength and time delay. (08 Marks)
- c. Explain the different types of bending losses in optical fiber. (06 Marks)
- 3 a. Draw the cross-section of Ga Al As double hetero structure LED energy band diagram and refractive index variation. Explain their importance. (07 Marks)
- b. With a neat diagram, explain surface emitting LED and Edge emitting LED. (06 Marks)
- c. Explain the structure of RAPD photodiode. (07 Marks)
- 4 a. Describe the principle of operation of star coupler. (07 Marks)
- b. Explain briefly various fiber splicing techniques. (06 Marks)
- c. What are the different types of mechanical misalignments? (07 Marks)
- 5 a. With neat diagram, explain the operation of transimpedance pre-amplifier equivalent circuit. (06 Marks)
- b. Discuss coherent detection with relevant block diagram. (06 Marks)
- c. Derive an expression for receiver sensitivity and also explain quantum limit. (08 Marks)
- 6 a. Explain with block diagram, the elements of analog link. (06 Marks)
- b. Explain sub-carrier multiplexing techniques in optical fiber communication. (04 Marks)
- c. Briefly explain the rise time budget analysis with its basic elements contribute to system rise time. (10 Marks)
- 7 a. Explain the principle of operation of WDM with relevant block diagram. (07 Marks)
- b. Write a note on optical add/drop multiplexers. (07 Marks)
- c. Discuss the design and operation of a polarization independent isolator made of three miniature optical components. (06 Marks)
- 8 a. With the help of energy level diagram, explain the working of Erbium – Doped Fiber Amplifiers (EDFA). (10 Marks)
- b. With suitable diagram, describe SONET and SDH optical network function. (10 Marks)

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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.

