10EC/TE72

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Optical Fiber Communication

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting atleast TWO questions from each part.*

PART – A

1 a. What are the advantages, disadvantages and applications of optical fiber communication?
      (08 Marks)
   b. Write a neat sketch; derive the expression for numerical aperture of a step index fiber interms of acceptance angle and core and cladding refractive indices and further interms of relative index differences. **(06 Marks)**
   c. A multimode step index fiber has normalized frequency of 75, NA = 0.3, Refractive index of core is 1.458 and operation at 820nm. Find core radius, refractive index of cladding and number of modes gets propagated. **(06 Marks)**

2 a. Explain the absorption mechanism in optical fibers. **(06 Marks)**
   b. Explain the different types of bending losses in optical fibers. **(06 Marks)**
   c. Derive an expression for pulse spreading due to material dispersion which is a function of wavelength and time delay. **(08 Marks)**

3 a. With the help of neat diagram, explain the working of distributed feedback (DFB) laser diode. **(07 Marks)**
   b. Derive an expression for lasing condition and hence for optical gain in LASERS. **(08 Marks)**
   c. Explain briefly the structure RAPD photodiode. **(05 Marks)**

4 a. What are the different types of mechanical misalignment? Explain. **(06 Marks)**
   b. Explain briefly the various fiber splicing techniques. **(08 Marks)**
   c. Explain the principle of operation of Expanded beam connector. **(06 Marks)**

PART – B

5 a. With neat diagram, explain the operation of transimpedance preamplifier equivalent circuit.
      (06 Marks)
   b. With the schematic diagram, explain the working of an optical receiver. **(06 Marks)**
   c. Discuss how the eye diagram is powerful measurement tool for assessing the data handling capacity in digital transmission system. **(08 Marks)**

6 a. Explain subcarrier multiplexing in optical fiber communication. **(06 Marks)**
   b. With neat sketches, explain the optical power loss model for a point to point link.
      (08 Marks)
   c. Explain Rise time budget with relevant equations. **(06 Marks)**

7 a. Explain the principle of operating of WDM with relevant block diagram. **(06 Marks)**
   b. Explain the principle of Mach – Zehnder interferometer as a multiplexer. Obtain expression for ΔL. **(08 Marks)**
   c. Write a short note on tunable optical fiber. **(06 Marks)**

8 a. With suitable diagram describe SONET/SDH optical network function. **(10 Marks)**
   b. Explain indetail the amplification mechanism with energy level diagram in an EDFA.
      (10 Marks)

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