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17EC82

Eighth Semester B.E. Degree Examination, July/August 2022
Fiber Optics and Networks

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. With help of neat diagram, explain the main block of an optical fiber communication.
   (10 Marks)

   b. Explain the advantages, disadvantages and applications of OFC. **(10 Marks)**

OR

2 a. With a neat diagram, discuss the structure of single mode and multimode step index fiber with advantages of each type. **(10 Marks)**

   b. Calculate the R.I of core and cladding materials of an fiber whose NA = 0.35 and $\Delta = 0.001$. **(04 Marks)**

   c. A step-index multimode fiber with NA = 0.20 supports 1000 modes at 850nm. What is diameter of core? How many does the fiber supports at 1320nm. **(06 Marks)**

Module-2

3 a. Explain different absorption mechanism in optical fiber. **(10 Marks)**

   b. Silica has an estimated fictive temperature of 1400K with an ISO thermal compressibility of 7×10^{-11} m^2N^{-1}. RI and photo elastic coefficient for silica are 1.46 and 0.286 respectively. Determine attenuation in dB/km due to Rayleigh scattering in silica at $\lambda \approx 0.65$, 1 and 1.3km, K = Boltzman constant = $1.381 \times 10^{-23} JK^{-1}$. **(10 Marks)**

OR

4 a. Discuss inter modal dispersion with necessary equations. **(10 Marks)**

   b. Explain Macro and Micro bending losses with a neat diagram **(10 Marks)**

Module-3

5 a. Draw the diagram of a typical GaAiAS double hetro structure LED along with energy band diagram and refractive index profile and explain. **(10 Marks)**

   b. Discuss internal quantum efficiency and power in detail. **(10 Marks)**

OR

6 a. Explain Fabry-Perot resonator cavity of laser with a neat diagram. **(10 Marks)**

   b. Explain the following:
   i) Spontaneous emission
   ii) Stimulated emission
   iii) Quantum efficiency. **(06 Marks)**

   c. For an alloy $In_{0.74} + Ga_{0.26}$ $As_{0.57}$ $P_{0.43}$ used in LED find wavelength emitted by the source. **(04 Marks)**

Module-4

7 a. Explain the implementation of WDM networks with various types of optical amplifiers.
(10 Marks)

   b. Explain MZI multiplex with necessary equations. **(10 Marks)**

OR

8 a. Describe the principles of working of isolators and circulators, with a neat diagram.
(10 Marks)

   b. With help of neat diagram, explain three possible EDFA configurations. **(10 Marks)**

Module-5

9 a. Discuss in detail about optical networking terminology. Mention the merits and demerits of each. **(10 Marks)**

   b. Describe optical networking node elements with a neat diagram. **(10 Marks)**

OR

10 a. Explain the concept of wavelength routing with appropriate diagrams. **(10 Marks)**

    b. With a neat diagram, explain the public telecommunication network overview **(10 Marks)**

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