

CBCS SCHEME

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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 $7 \times 10^{-11} \text{ m}^2\text{N}^{-1}$. 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 $\lambda = 0.65, 1$ and $1.3\mu\text{m}$, $K = \text{Boltzman constant} = 1.381 \times 10^{-23} \text{ JK}^{-1}$. (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 GaAlAs 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 $\text{In}_{0.74} + \text{Ga}_{0.26} \text{As}_{0.57} \text{P}_{0.43}$ used in LED find wavelength emitted by the source. (04 Marks)

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.

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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