



CBGS SCHEME

17EC82

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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 $\Delta = 0.001$. (8 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 $7 \times 10^{-11} \text{ m}^2 \text{N}^{-1}$. KI 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 hetero 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 $\text{In}_{0.14}\text{Ga}_{0.36}\text{As}_{0.37}\text{P}_{0.13}$ 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 revelling of identification, appeal to evaluator and for equitation written eg. 42141-30, will be treated as malpractice.

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Table of Contents Model Question Paper Venkateswaran K S

1. Understanding the eBook Model Question Paper Venkateswaran K S
 - The Rise of Digital Reading Model Question Paper Venkateswaran K S
 - Advantages of eBooks Over Traditional Books
2. Identifying Model Question Paper Venkateswaran K S
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Model Question Paper Venkateswaran K S
 - User-Friendly Interface
4. Exploring eBook Recommendations from Model Question Paper Venkateswaran K S
 - Personalized Recommendations
 - Model Question Paper Venkateswaran K S User Reviews and Ratings
 - Model Question Paper Venkateswaran K S and Bestseller Lists
5. Accessing Model Question Paper Venkateswaran K S Free and Paid eBooks
 - Model Question Paper Venkateswaran K S Public Domain eBooks
 - Model Question Paper Venkateswaran K S eBook Subscription Services
 - Model Question Paper Venkateswaran K S Budget-Friendly Options

6. Navigating Model Question Paper Venkateswaran K S eBook Formats
 - ePub, PDF, MOBI, and More
 - Model Question Paper Venkateswaran K S Compatibility with Devices
 - Model Question Paper Venkateswaran K S Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Model Question Paper Venkateswaran K S
 - Highlighting and Note-Taking Model Question Paper Venkateswaran K S
 - Interactive Elements Model Question Paper Venkateswaran K S
8. Staying Engaged with Model Question Paper Venkateswaran K S
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Model Question Paper Venkateswaran K S
9. Balancing eBooks and Physical Books Model Question Paper Venkateswaran K S
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Model Question Paper Venkateswaran K S
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Model Question Paper Venkateswaran K S
 - Setting Reading Goals Model Question Paper Venkateswaran K S
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Model Question Paper Venkateswaran K S
 - Fact-Checking eBook Content of Model Question Paper Venkateswaran K S
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
 - Integration of Multimedia Elements

- Interactive and Gamified eBooks

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