

6E7153

Roll No. _____

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B.Tech. VI-Sem. (Main/Back) Examination, April/May - 2026
Electronics and Communication Engineering
6EC4-03 Fiber Optics Communications

Time : 3 Hours**Maximum Marks : 70****Instructions to Candidates:**

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory.

(10×2=20)

- ✓ 1. State the requirements that are to be met in selecting materials for optical fibers.
- ✓ 2. What do you mean by pulse broadening in optical fiber.
- ✓ 3. Give the names of materials used for fabrication of optical fibers.
- ✓ 4. Define the relative refractive index difference for an optical fiber and show how it may be related to the numerical aperture.
- ✓ 5. What is quantum efficiency?
6. What is source to fiber power launching?
- ✓ 7. What is non-linear scattering? Write the names of two non-linear scattering.
8. What do you mean by modulation of LED?
- ✓ 9. Define spectral width, group velocity and group delay.
- ✓ 10. What do you mean by modal noise in optical fiber & how it may be avoided.

PART - B

(Analytical / Problem Solving Questions)

Attempt any Five questions.

(5×4=20)

1. Briefly explain the different mode of fiber characteristics and draw their refractive index profile.
2. Draw the neat diagram of the experimental setup for the measurement of dispersion and explain it.
- ✓ 3. A step index fiber has a NA of 0.17 and core diameter of $100\mu\text{m}$. Determine the normalized frequency parameters of the fiber when light of wavelength $0.85\mu\text{m}$ is transmitted through it.
4. An APD has quantum efficiency of 40% at $1.3\mu\text{m}$. When illuminated with optical power of $0.3\mu\text{W}$ at this wavelength, it produces an output photocurrent of $6\mu\text{A}$, after avalanche gain. Calculate the multiplication factor of diode.
- ✓ 5. Draw the schematic diagram of DWDM and explain its working.
- ✓ 6. Explain the factors contributing dispersion and types of dispersion in details.
- ✓ 7. Explain the working principal of EDFA amplifier.

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Three questions.

(3×10=30)

- ✓ 1. Optical power of 5mW launched into an optical fiber at a distance of 10km gives an output power of 4mW . Find the attenuation of fiber per km. What power should be launched into the fiber if $100\mu\text{W}$ of power is required at a distance of 80km .
2. What are the necessary conditions for LASER action? Define the threshold condition of LASER diode.
3. Discuss with the aid of suitable diagrams, the following techniques of Mechanical Splicing & coupling:
 - ✓ i) Spring Groove Splice;
 - ✓ ii) Fusion Splice;
 - iii) Lansing Schemes
4. What is meant by OTDR? Discuss with the aid of diagram, how this method may be useful in field measurement? In addition, mention the merits of this technique.
5. What are Homo-junction and Hetro-junctions? Draw schematic and explain the working of double Hetro-structure edge-emitting LED.